

Policy Making Session 1

29 August 2017 10:45 - 12:15
Tampere Hall - Big Auditorium
Special Session
Higher Education

Educational Science and Policy-Making

Keywords: Educational policy, Higher education, Researcher education, Social aspects of learning and teaching

Interest group:

Chairperson: Hans Gruber, University of Regensburg, Germany

Organiser: Eero Ropo, University of Tampere, Finland

Education is one of the core issues of policy in every country. Policy provides the environment and the legal basis for the growth and development of educational systems, and educational science provides reliable arguments and solid evidence that may guide political decision-making processes. The interplay between policy and educational science requires considerable joint efforts to build a common understanding of the most prevalent educational problems and their solutions. Supranational organisations, both on a political level and on a scientific level, provide the adequate basis for an appropriate broad elaboration of those problems and solutions. In this EARLI panel, the following leading questions are discussed by outstanding representatives of policy-makers and educational scientists:- How is EARLI-based research perceived by policy? How relevant is the scientific quality of research for political decisions? Does current research meet the demands of policy-makers?

- What is the relevance of empirical evidence from a policy-making perspective? What guides the formation of opinion – with regard to educational evidence – of policy-making and administration?
- Are results of research about learning and instruction appropriately disseminated and communicated? Which formats of dissemination would be most appreciated by policy-making? Should educational science develop more initiatives to inform policy-making and administration? Does policy-making recognise and respond to opportunities for dialogue with educational science?
- Are national and European instruments of funding research adequate? Is there a need for more policy-driven research programs? How important is basic research in educational science?

Educational Science and Policy-Making

Presenting Author:Manfred Prenzel, Technical University of Munich (TUM), Germany; **Presenting Author:**Dirk Van Damme, OECD, France; **Presenting Author:**Kai Sauer, Finland Ambassador to UN, Finland; **Presenting Author:**Olli-Pekka Heinonen, Finnish National Board of Education, Finland; **Presenting Author:**Liisa Laakso, University of Tampere, Finland; **Presenting Author:**Sanna Järvelä, University of Oulu, Finland

Education is one of the core issues of policy in every country. Policy provides the environment and the legal basis for the growth and development of educational systems, and educational science provides reliable arguments and solid evidence that may guide political decision-making processes. The interplay between policy and educational science requires considerable joint efforts to build a common understanding of the most prevalent educational problems and their solutions. Supranational organisations, both on a political level and on a scientific level, provide the adequate basis for an appropriate broad elaboration of those problems and solutions. In this EARLI panel, the following leading questions are discussed by outstanding representatives of policy-makers and educational scientists:- How is EARLI-based research perceived by policy? How relevant is the scientific quality of research for political decisions? Does current research meet the demands of policy-makers?

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Session A 1

29 August 2017 13:15 - 14:45
Linna - K108
Single Paper
Educational Policy and Systems, Learning and Special Education

Educational Evaluation, Accountability and School Improvement

Keywords: Achievement, Comparative studies, Culture, Educational policy, Educational Technology, Higher education, Learning analytics, Qualitative methods, Quasi-experimental research, School effectiveness, Social aspects of learning and

teaching, Synergies between learning - teaching and research, Teacher Professional Development, Workplace learning
Interest group: SIG 23 - Educational Evaluation, Accountability and School Improvement
Chairperson: Eva Vass, Australia

School-to-school collaboration as a school improvement strategy

Keywords: Achievement, Educational policy, Quasi-experimental research, School effectiveness

Presenting Author: Daniel Muijs, University of Southampton, United Kingdom

Research is increasingly showing that, under the right circumstances, collaboration can be an effective way of developing and improving schools and their capacity. It is, however, not a panacea for school improvement, and other studies show a lack of effect. This therefore begs the question of not so much whether, but under what circumstances collaboration can be a successful school improvement model. In this paper we will explore two such models, with a particular emphasis on determining the extent to which they effectively lead to improvement in school (attainment) outcomes, and what factors are related to the success or failures of these models. Both programmes were evaluated using secondary data analysis of large-scale databases, and employed propensity score matching methods to create matched comparison samples, thus creating a quasi-experimental design. Results showed that intervention 1 was not related to improvement in school attainment outcomes over time, regardless of type of school. In intervention 2, however there was a significant relationship between participation in the intervention and improvement in attainment in the supported schools in both cohorts. The implications of these findings relate to the theoretical models described earlier in providing support to a more limited model of collaboration, linked to concepts prevalent in High Reliability theory, and social capital, and to a lesser extent, constructivist organizational models.

To lead school development towards inclusion - changes in school culture, norms and practice

Keywords: School effectiveness, Social aspects of learning and teaching, Teacher Professional Development, Workplace learning

Presenting Author: Magnus Erlandsson, Malmö University, Sweden

This paper elaborates on school leaders' strategies in efforts to change school culture and teachers' professional norms with the objective to alter educational practice. The point of departure is the opportunities and obstacles that emerged in a large-scale program (with over thirty participating schools in twelve different municipalities) launched for the implementation of inclusive learning environments. The paper has an organisation-cultural theoretical approach, focusing on how to change teachers' practices through the change of school culture and teachers' professional norms. Empirical data has been collected through several recurrent interviews with school principals, as well as coordinators and executives at the municipal-administrative levels. The results highlight the importance of a shared and delegated leadership between different levels and units. Successful implementation rests on the participation of many – school leaders, educators and pupils – and their possibilities to influence the processes and take joint responsibility. As the study shows, this is not developments or practices that can be forced, through binding rules or new formulations in policy documents. The change in professional norms – a prerequisite for changes in pedagogical practises enabling inclusion – must grow from below, using the impetus, inspiration and legitimacy from the levels of principals, but where changing norms and renewed practice should find its forms through a shared, delegated and collegial leadership.

Changing policy, legislation and its effects on pedagogical leadership: a comparative study

Keywords: Comparative studies, Culture, Educational policy, Qualitative methods

Presenting Author: Jiří Kropáč, Palacký University, Czech Republic; **Co-Author:** Stefan Chudy, Faculty of Education, Palacký University, Czech Republic; **Co-Author:** Danping Peng, Faculty of Education, Palacký University, Czech Republic

The relationship between school development and changing policy is in constant flux which adds to the complexity of school leadership. Based on investigation of the theories surrounding headteacher's pedagogical leadership, the main purpose of this study is thus to explore the quality of pedagogic leadership in schools providing compulsory education under current policies. A semi-structured interview was used on 10 headteachers, 5 are from Sichuan Province in China and 5 are from Olomouc region in Czech. Results show that the current educational policies in China and Czech are both supportive to the development of pedagogical leadership, and four dimensions of pedagogical leadership are significantly affected by changing policies. Despite that, the education policy implementation processes do not always support school development, there is a growing need to pay more attention to the effective and sustainable of the development of pedagogical leadership. *Keywords: Policy; school development; pedagogical leadership; policy implementation; comparative study*

Measuring Learning, Governing Education

Keywords: Educational Technology, Higher education, Learning analytics, Synergies between learning - teaching and research

Presenting Author: Asko Kauppinen, Malmö University, Sweden; **Presenting Author:** Anna Wärensby, Malmö University, Sweden

p.p1 {margin: 0.0px 0.0px 0.0px 0.0px; font: 11.0px Helvetica; -webkit-text-stroke: #000000} span.s1 {font-kerニング: none} In this paper we discuss the recent trend of measuring learning and its effects on shaping conceptions of education. We start by looking at the use of digital tools for teaching writing, and how these can be used to generate analytics to track evidence

for learning, development and the success or failure of educational interventions. We then look at how these analytics are used to launch, for example, evidence-based curriculum changes. We further connect this micro-level trend of measuring learning to a larger trend of using evidence-based models for governing educational pursuits. In fact, we suggest that measuring learning should not be seen as a separate educational phenomenon, but is indicative of a larger change in governance, where scientific methods are called for to evaluate inputs, and practices are shaped to provide data that qualifies as evidence for the success or failure of inputs. If practices do not produce acceptable measurements for evaluation, eventually, they have no right to exist.

Session A 2

29 August 2017 13:15 - 14:45

Pinni B - B3116

Single Paper

Teaching and Teacher Education

Teacher Professional Development - C

Keywords: Developmental processes, Emotion and affect, Mathematics, Motivation and emotion, Pre-service teacher education, Qualitative methods, Social aspects of learning and teaching, Teacher Effectiveness, Teacher Professional Development, Teaching / instruction

Interest group: SIG 11 - Teaching and Teacher Education

Chairperson: Ronald Rinehart, University of Northern Iowa, United States

Teacher who perceive low student engagement use for fear appeals prior to a high-stakes examination

Keywords: Emotion and affect, Mathematics, Teaching / instruction, Motivation and emotion

Presenting Author: Dave Putwain, Liverpool John Moores University, United Kingdom; **Co-Author:** Laura Nicholson, Edge Hill University, United Kingdom

Prior to high-stakes examinations teachers use messages that focus on the importance of avoiding failure (fear appeals). Previous studies have examined those factors that influence the appraisal of fear appeals and the educational outcomes. However, studies have yet to examine the possible reasons why teachers might use fear appeals. One possibility is that teachers believe their students are not engaged with their learning. The present study examined whether teacher use of fear appeals was related to their perceptions of student engagement, followed by students' interpretation of fear appeals, and how they related to student-reported engagement. Data were collected from 2061 students in their final two years of secondary schooling and 49 teachers response for mathematics instruction. A structural equation model showed that teachers used more frequent fear appeals in mathematics lessons when they perceived student engagement to be low. More frequent fear appeals resulted in stronger challenge and threat appraisals. A challenge appraisal was associated with greater, and a threat appraisal with lower, behavioural and emotional engagement. Indirect relationships were shown from teachers' perception of behavioural engagement to subsequent student-reported engagement mediated by fear appeals frequency and student appraisal. Student appraisal seems to determine the effectiveness of fear appeals. This makes them a risky strategy for teachers who may not be able to accurately determine which students might appraise them as a challenge.

The effects of generic and profession-specific teacher variables on instructional quality

Keywords: Pre-service teacher education, Teacher Effectiveness, Teacher Professional Development, Teaching / instruction

Presenting Author: Franziska Baier, Goethe-Universität Frankfurt, Germany; **Co-Author:** Anna-Theresia Decker, Goethe-University Frankfurt, Germany; **Co-Author:** Mareike Kunter, Goethe-Universität Frankfurt, Germany

There is still research lacking on the question of what traits, skills and qualifications teachers must bring to the job in order to provide their students with high quality instruction. Only few studies have investigated several cognitive as well as non-cognitive generic and profession-specific variables at the same time. In the present study we investigated general personal characteristics (personality and cognitive ability) as well as profession-specific aspect such as knowledge and job-related motivation of 209 mathematics teacher candidates. After 14 months of teaching experience 4,672 students of these teachers from grades 7 to 10 rated their instructional quality in terms of adaptive facilitation, emotional support, classroom management and discursive treatment of different student solutions. Multilevel structural equation modeling showed a positive effect of extraversion on adaptive facilitation, emotional support and discursive treatment of different student solutions. Conscientiousness had a positive effect on classroom management. Enthusiasm for teaching had positive effects on all measures of instructional quality but discursive treatment of student solutions. Teacher candidates' pedagogical knowledge had a positive effect on adaptive facilitation and emotional support whereas unexpectedly pedagogical content knowledge had a negative effect on adaptive facilitation. The results point to the importance of taking into consideration teacher candidates' non-cognitive characteristics such as personality traits as well as fostering teacher knowledge and motivation through high quality teacher education programs.

On the road to teachership: Student teachers' identity negotiations in the pedagogical studies

Keywords: Pre-service teacher education, Qualitative methods, Social aspects of learning and teaching, Teacher

Professional Development

Presenting Author: Maarit Arvaja, University of Jyväskylä, Finland; **Co-Author:** Anneli Sarja, University of Jyväskylä, Finland; **Co-Author:** Matti Taajamo, University of Jyväskylä, Finnish institute for educational research, Finland

This study, which is situated in the context of yearlong pedagogical studies for subject student teachers, explores how the students develop their professional identity in making sense of the pedagogical studies. We are interested in how the students negotiate the past, the present and the future in their 'becoming a teacher', and how the 'self' and 'others' are negotiated in the becoming teachers' identities. The group of five university students from different disciplines (biology, languages, mathematics and history) was selected as a focus group for the study. Data were gathered through semi-structured interviews briefly after the pedagogical studies had ended. Taking a dialogical approach to narrative self-construction the study investigated the relationship between different I-positions of the self and between the self and others in the student teachers' identity negotiation. Especially, this relationship was analysed with reference to the process of positioning as evidenced in the interviews. The study demonstrated how students' biographical history strongly contributed to their perceptions of future work, and played a pivotal role in building and renegotiating their identities as becoming teachers. The study also proved the importance of pedagogical studies in contributing not only in building one's I-positioning as a subject teacher but also in building one's identity as an educator. It can be said that the students found their 'authenticity' as a teacher leaning on values and purposes that transcends their own subjectivity and also (morally) relates to an inner commitment to certain values.

Teacher Students' and Mentors' Orientations – How Differences Influence Professionalization

Keywords: Developmental processes, Pre-service teacher education, Qualitative methods, Teacher Professional Development

Presenting Author: Julia Kosinar, University of Applied Sciences and Arts Northwestern Switzerland, Switzerland;

Presenting Author: Emanuel Schmid, University of Applied Sciences and Arts Northwestern Switzerland, Switzerland; **Co-Author:** Anna Laros, University of Applied Sciences and Arts Northwestern Switzerland, Switzerland

In a first step, the project "Challenges for future primary teachers in their field studies" (School of Teacher Education, Switzerland 2014-2017) pursues the goals to 1. analyse the process structure of professionalization during traineeship and 2. to identify types of professionalization. The study is using an occupational-biographical perspective and is based on the theory of experiential learning (Combe 2010) which allows tracing steps from perceived critical incidents through to their (eventual) solutions. The empirical data consists of narrative-style interviews with teacher students at the end of their three-years-study. 14 cases were reconstructed with the qualitative approach of the documentary method (Bohnsack 2010, Nohl 2013). The analyses were guided by three comparative dimensions and led to four different so called relational types, labelled as "Personal fulfilment", "Avoidance", "Development" and "Probation". In a second step, the relation between the student's orientations concerning their field experiences (taking it e.g. as an option for their professional development or as an examination period) and the role they attribute their mentors (e.g. as supporters, assessors or experts) was further analysed. The results show that different meanings given to the mentor's role by teacher trainees and their school-mentors, may lead to tensions. If tensions occurred, processes of professionalization were hindered. In our contribution, we present our typology as well as two case studies to give further insights in specific dynamics.

Session A 3

29 August 2017 13:15 - 14:45

Virta - 120

Single Paper

Teaching and Teacher Education

Teaching and Teacher Education - Q

Keywords: Argumentation, Case studies, Educational Psychology, Pre-service teacher education, Qualitative methods, Quantitative methods, Science education, Self-efficacy, Social interaction, Student learning, Teacher Professional Development, Teaching approaches

Interest group: SIG 11 - Teaching and Teacher Education

Chairperson: Helena Viholainen, University of Jyväskylä, Finland

Impact of Professional Development on Teacher Facilitation of Science Discourse: a case study

Keywords: Argumentation, Case studies, Science education, Teacher Professional Development

Presenting Author: Emily Reigh, Stanford University, United States; **Co-Author:** Florencia Gomez Zaccarelli, Stanford University, United States; **Co-Author:** Hilda Borko, Stanford University, United States; **Co-Author:** Jonathan Osborne, Stanford University, United States

Despite the extensive knowledge base on effective teacher professional development (TPD), the field lacks an adequate understanding of how teachers implement knowledge from TPD experiences. This paper presents a case study of four teachers who participated in a TPD program focused on supporting classroom discourse and argumentation in elementary science. In order to understand changes in teacher practice after the TPD, three years of classroom videos were analyzed for *talk formats*, *activities*, and *moves* that facilitate productive science discussions. All teachers adopted key practices from

the TPD on the three parameters of analysis. However, their styles of implementation were markedly different. Overall patterns across the four cases, as well as two contrasting cases and the affordances of each will be presented. As teachers shifted to student-centered discussions, they struggled to negotiate their new role; the initial reaction for some was to step out of the discussion. Analysis of teacher moves shows their eventual adoption of a wide range of strategies that allowed them to actively facilitate the discussion without impeding student contributions. Both teachers in the contrasting cases implemented practices introduced by TPD, although one of them also combined invitations with support and brought discussions to resolution. This paper offers strategies for engaging students in scientific argumentation, a major focus of the Next Generation Science Standards, and provides evidence of how teachers take up new practices, which will inform TPD developers and providers.

MacGyver and Mother Teresa in one: Teachers' job satisfaction, conceptions of learning and role

Keywords: Qualitative methods, Quantitative methods, Teacher Professional Development, Teaching approaches

Presenting Author:Katrin Poom-Valickis, Tallinn University, Estonia; **Co-Author:**Erika Löfström, University of Helsinki, Finland; **Co-Author:**Kirsti Kislenko, Tallinn University, Estonia; **Co-Author:**Tuuli Oder, Tallinn University, Estonia

Teachers' beliefs about their role is an important component of teacher identity. Teacher identity is based on core beliefs about teaching and is an ongoing process of interpretation and re-interpretation of experience (Beijaard et al., 2000). 658 Estonian lower secondary school subject and class teachers provided metaphors that characterizes teacher's role. Additionally, the teachers were asked to reply to questions about job satisfaction and conceptions of learning. The majority of teachers' metaphors were identified to be hybrids, which shows that teachers have complex understanding about their role. Differences were found between the teacher groups participating in the study. The analysis of affective connotations of the metaphors showed that there are approximately one third of the teachers who were not satisfied either with their role or work conditions. This could be an indicator of reduced well-being. The affective connotations reflected teachers' job satisfaction. Statistically significant differences emerged between the positive and negative affective groups in terms of satisfaction with job conditions and job enjoyment. There was no significant difference among teachers based on metaphor analysis and their general beliefs (constructivist, traditional) about teaching.

The effect of school-based experience on preservice teachers' self-efficacy beliefs

Keywords: Educational Psychology, Pre-service teacher education, Quantitative methods, Self-efficacy

Presenting Author:David Berg, University of Otago, New Zealand; **Presenting Author:**Lisa F. Smith, University of Otago, New Zealand

This research examined preservice teachers' self-efficacy beliefs, immediately prior to and after the final practicum of an undergraduate three-year initial teacher education programme. The primary purpose of the study was to explore the effect of practicum on the students' teacher self-efficacy beliefs. A secondary objective was to compare the utility of two established measures of teacher self-efficacy. Teacher self-efficacy beliefs are teachers' beliefs about their capacity to carry out their professional roles successfully. These beliefs are of interest to teacher educators, as they have been shown to relate to significant outcomes for students, schools, and teachers (Tschannen-Moran, Hoy, & Hoy, 1998). A body of research has examined the impact of teacher self-efficacy beliefs; however, less attention has been given to the antecedents of such beliefs (Labone, 2004; Pfitzner-Eden, 2016; Tschannen-Moran & Woolfolk Hoy, 2007). Considering possible antecedents, it seems probable that during a practicum experience, preservice teachers have considerable engagement with Bandura's (1997) four sources of self-efficacy beliefs: mastery experience, vicarious experience, verbal persuasion, and physiological and affective states, and that these may contribute to preservice teachers' self-efficacy beliefs. In this study, preservice teachers from New Zealand ($n = 39$) completed the Teachers' Sense of Efficacy (long form) (Tschannen-Moran & Woolfolk Hoy, 2001) and the English version of the Norwegian Teacher's Self Efficacy Scale (Skaalvik & Skaalvik, 2009), before and after their final practicum placements. Results indicated that the participants' self-efficacy beliefs increased from pre to post. These results are discussed along with a comparison of the two measures.

Learning climate and conflicts in teacher education practice

Keywords: Pre-service teacher education, Quantitative methods, Social interaction, Student learning

Presenting Author:Johan Kristian Andreassen, University of Agder, Norway; **Co-Author:**Rune Høigaard, Department of Public Health, Sport and Nutrition, Norway

Cooperating teachers play a central role in the training of new teachers, and greatly affect how student teachers develop a repertoire of teaching strategies and their understanding of professional practice. This study aims to investigate student teachers' perception of mentoring during their teaching practice with an emphasis on; a) how cooperating teachers manage to facilitate an autonomy supportive learning climate; b) aspects of the interaction between cooperating teachers and student teachers and; c) conflicts in the relationship between cooperating teachers and student teachers. The participants in this study were 200 third and fourth year student teachers in primary teacher education from one university in Norway. The average age of participants was 23.8 years ($SD = 3.9$) and the response rate was 61 %. We find that student teachers experience of mentoring are characterised by major differences regarding the experience of an autonomy-supportive learning climate. We also find that conflicts are a common cause of problems in the interaction between cooperating teachers and student teachers, in particular with regard to relational conflicts.

Session A 4

29 August 2017 13:15 - 14:45

Main Building D - D14

Symposium

Instructional Design, Learning and Social Interaction, Teaching and Teacher Education

Exploring the Adoption and Sustainability of an Informal STEM Education Innovation

Keywords: Case studies, Communities of learners, Design based research, Ethnography, Informal learning, Instructional design, Peer interaction, Qualitative methods, Quantitative methods, Social interaction, Student learning, Teacher Professional Development, Teaching / instruction

Interest group: SIG 10 - Social Interaction in Learning and Instruction

Chairperson: Kristiina Kumpulainen, University of Helsinki, Finland

Discussant: Thomas Hillman, University of Gothenburg, Sweden

This symposium brings together four different perspectives on the adoption and sustainability of FUSE Studios, an alternative STEAM learning infrastructure. Since its launch, FUSE has been adapted successfully in 149 different implementations operating across five different states and three different countries (USA, Finland, and Israel). Yet, despite being adapted to each local context, FUSE has managed to preserve its coherence and integrity as an educational innovation. Therefore, an analysis of the dual processes of adoption and adaptation in FUSE implementations could thus offer significant insights into the dilemma of the integrity and sustainability of educational design (e.g., Hubbard, Mehan, & Stein, 2006).

While the idea of designing for adaptability is increasingly recognized as important (e.g., Penuell, 2011), the research literature is still thin on how this adaptability works in practice. Each of the contributions explore the adaptability of FUSE with data from implementations of FUSE from the US and Finland. Together the contributions argue for the integrity (rather than fidelity) of implementation (LeMahieu, 2011).

References

Hubbard, L., Mehan, H., & Stein, M.K. (2006). *Reform as learning: When school reform collided with school culture and community politics in San Diego*. New York: Routledge.

LeMahieu, P. 2011. What We Need in Education is More Integrity (and Less Fidelity) of Implementation. [Web log comment]. Retrieved from <http://www.carnegiefoundation.org/blog/what-we-need-in-education-is-more-integrity-and-less-fidelity-of-implementation/>

Penuel, W. R., Fishman, B. J., Cheng, B. H., & Sabelli, N. (2011). Organizing research and development at the intersection of learning, implementation, and design. *Educational Researcher*, 40(7), 331-337

Adaptation begets adoption: How an educational innovation became part of the regular school day

Presenting Author: Reed Stevens, Northwestern University, United States; **Co-Author:** Jaakko Hilppö, University of Helsinki, Finland; **Co-Author:** Kemi Jona, Northeastern University, United States

This paper presents an analysis of the first phases of adoption of FUSE, an innovative educational program. The paper conceptualizes this adoption process from an actor network theory (ANT, e.g., Latour, 2005) perspective which calls attention to its socio-material. More specifically, the research question our case study addresses is how a new actant (i.e. the FUSE Studio) was incorporated into a standing and relatively stable actor-network (i.e. the traditional public school day)? By analyzing open-ended interviews (Patton, 2002) conducted with key personnel working on both sides of the FUSE research-practice (the designers of FUSE and the district adopting it), the findings highlight *mutual appropriation* (e.g., Downing-Wilson, Lecusay, & Cole, 2011) taking place during the adoption and spread of FUSE as well as the surprising importance of 3D objects printed by the students and their circulation. In all, the paper contributes to understandings of how educational innovations, as actants, spread and become stable actors in different networks.

Organizing for interest discovery and peer support in a free-choice environment

Presenting Author: Daniela DiGiacomo, University of Colorado at Boulder, United States; **Co-Author:** William Penuel, University of Colorado Boulder, United States; **Co-Author:** Katie Van Horne, University of Colorado Boulder, United States

Designed by learning scientists, FUSE Studios is an interest-driven learning experience that is offered to in and out-of-school educational settings throughout the United States and abroad. Offering young people a chance to engage in on- and off-line STEAM-related “challenge” sequences, FUSE is a free-choice learning environment that has been widely lauded by teachers and educators since its inception in 2014, in particular for its ability to engage and sustain students’ interest and participation. In this paper, we make use of two years of evaluation data to analyze youth experiences and outcomes of FUSE as related to their patterns of participation. Employing the framework of Connected Learning to make sense of the results, we find that 1) FUSE Studios promoted a high degree of support for youth interest-discovery and peer-support, regardless of mode of participation; and 2) positive attitudes toward science and engineering were predicted by high reported experiences of interest-discovery. We discuss these findings in an attempt to offer implications for those interested in designing learning environments that are open-ended, rigorous, and have the potential to strengthen current and future attitudes toward STEAM-related fields.

How do teachers make sense of a new infrastructure for learning?

Presenting Author: Kristiina Kumpulainen, University of Helsinki, Finland; **Co-Author:** Antti Rajala, University of Helsinki,

Finland; **Co-Author:**Anna Mikkola, University of Helsinki, Finland

In this paper, we investigate how Finnish teachers make sense of a new FUSE Studio infrastructure for learning. Infrastructure for learning refers to socio-materially mediated arrangements on which the school activity relies (Stevens, et al., 2016). Finnish schools represent an interesting site for researching the uptake of FUSE due to the unique nature of Finnish educational policy that centers on teachers' autonomy (Sahlberg, 2011; Simola, 2015). Our study asks; How do Finnish teachers make sense of the FUSE infrastructure for learning? Which possibilities and tensions do teachers identify in the uptake of FUSE in their schools? Informed by cultural-historical theorizing our study stresses teachers' agency in educational reforms. This involves regarding teachers as valued participants in co-configuring educational reforms to address local needs. The empirical data derive from two public schools situated in culturally and socioeconomically heterogeneous suburbs of Helsinki. The data comprise 23 teachers' and four principals' accounts derived from semi-structured interviews conducted after a two-day in-service FUSE training program. The interviews were analysed using qualitative content analysis and thematic analysis (Kvale & Brinkmann 2009). The analysis revealed critical themes unpacking the teachers' sensemaking of FUSE. Namely, 1) FUSE as a possibility 2) FUSE as a tension, 3) FUSE within the operating culture and leadership of the school, and 4) FUSE and teacher agency and empowerment. In conclusion, the study highlights the complexity involved in the task of reforming school instruction and suggests that reforms can only succeed by involving the teachers as contributors to the process.

Productive deviations: students' agency and adaptations of FUSE

Presenting Author:Reed Stevens, Northwestern University, United States; **Co-Author:**Jaakko Hilppö, University of Helsinki, Finland

This study focuses on analyzing the adaptations students make to an innovative educational program when it is implemented as part of their regular school day. More specifically, the study highlights how these adaptations are managed locally by the teachers and the students and the learning that ensues from them. Building on socio-cultural and activity theory perspectives (e.g., Engeström, 2009; Rajala, 2016), the study conceptualizes these adaptations as *productive deviations*, and argues that they represent pivotal cases for understanding the management of the tension between the students agency the pedagogical design of the learning environment. The data for the study comes from an ethnographic data corpus of seven different FUSE Studios during 2014-2015 in a large midwestern school district in the United States. The conducted interactional analysis (e.g., Jordan & Henderson, 1995) has shown the deviations were sparked by the challenges offered by FUSE, but importantly extended and expanded them in unexpected ways. More specifically, the deviations were centered around the creation of new artifacts, like computer games or emoji pillows and this creation process required solving relatively complex design or production problems on part of the students and not present in the challenges. Furthermore, in order to solve these kind of problems, the students brought new tools and resources to FUSE step-by-step learned to use them. In all, the study contributes to current investigations into the connection between agency and learning in formal educational settings (e.g., Siry et. al, 2016; Rajala, 2016)

Session A 5

29 August 2017 13:15 - 14:45

Linna - K103

Symposium

Culture, Morality, Religion and Education

Morality is not enough – Dimensions and factors contributing to teacher ethos

Keywords: Morality, Social development, Teacher Professional Development, Values education

Interest group: SIG 13 - Moral and Democratic Education

Chairperson: Karin Heinrichs, Otto-Friedrich-University Bamberg, Germany

Discussant: Dimitris Pnevmatikos, University of Western Macedonia , Greece

Teachers' ethos often is connected with the moral person. But it has not been discussed that a so called immoral person can have deep and highly efficient professional ethos as f. i. having the will that all children in a class learn, doing a just grading or being involved for handicapped youngsters. In most models the moral person is necessary to define ethos but not a sufficient condition for teacher ethos. In this symposium we analyze how the morality of a person (stage development, moral feelings, sense of necessity, relatedness to virtues, but also moral knowledge, moral pedagogical content knowledge, moral motivation etc.) are connected to professional ethos of teachers. Considering the classical models of ethos it can be conceptualized as a) ethos as attitude, sensibility, responsibility, professional virtue, communicative competence (Gardner, 2007; Tirri, 2008; Campbell, 2007; Heinrichs, 2015), b) ethos as concern, commitment and caring behavior (Noddings, 1992; Veugelers, 2011; Nucci, 2001) , c) ethos as professional or moral identity (Krettenauer, 2015; Lapsley, 2014, Edelstein et al., 1993), d) ethos as a "procedural" competence (Oser, 1998; Heinzer, 2013), and e) ethos as an empirical moral and value judgment (Beck, 2015; Harder, 2015; Bauer, 2013; Coklar, 2012). We can hypothesize that at least b) and c) are mostly overlapping personal morality with ethos. The symposium thus takes place at the frontline of the modeling process of a very important professional competence. Morality of a person is not enough for teachers' ethos. Teacher ethos is rather a situation specific concept.

To be moral is not enough – Relatedness of moral personality to the professional ethos

Presenting Author:Fritz Oser, University of Fribourg, Switzerland

In this more theoretical paper we would like to outline why concepts like moral identity or moral self or moral personality, even moral models, do not predict the moral ethos of a teacher. The seeing in the opposite direction mirrors the same problem, namely, high ethos values do not predict a perfect moral personality. This refers of course to all models that presume that a person with high moral identity (Blasi, 1984; Krettenauer, 2015) does not necessarily see the needs and the weaknesses and the learning deficits etc. of a child in which ethos is at stake and which is a necessary condition for having a teaching ethos. In addition to this we begin to see that the moral reaction to a human problem is highly domain and situation related (see Beck 2003).

Empathy – a core concept of teacher ethos, but not enough?

Presenting Author:Karin Heinrichs, Otto-Friedrich-University Bamberg, Germany; **Co-Author:**Simone Ziegler, Otto-Friedrich-University Bamberg, Germany; **Co-Author:**Julia Isabella Warwas, University of Bamberg, Germany

Harder (2015) or Noddings (1992) consider teacher ethos as a set of values teachers committed to in order to act as a professional, in particular to care for their students and a social climate in classes. Thus, teacher ethos is relevant not only in moral dilemmas, but maybe also effect moral acting in situations of less moral intensity. Studies on patterns of moral decision-making in adulthood, in particular on the happy victimizer pattern (HVP) pointed out that people who decide for breaking a moral rule sometimes feel happy if they could take advantage for themselves. Thus, their social orientation sometimes is limited by their own preferences. This paper presents a study on patterns of moral decision-making among students (economics, business and vocational education as well as students who aim to become teachers). The participants were confronted with moral conflicts. We found that students who liked to become teachers show higher empathy and social orientation than students of economics. However, also among future teachers the HVP emerged. That means that even (future) teachers are sometimes not following their social orientation and care for others. Moreover, they sometimes also care for their own needs. Finally, we would try to conceptualize teacher ethos by referring to Rosenberg's model of non-violent communication. We argue that teacher ethos in a sense of getting into appreciating relationships has to go beyond caring for others but calls for balancing students' as well as teachers' needs.

Teacher ethos: A stable moral personality trait or a situation-specific competence?

Presenting Author:Alfred Weinberger, Pädagogische Hochschule der Diözese Linz, Austria

This study scrutinizes two widespread assumptions regarding teacher ethos. The first assumption refers to the view that teacher ethos is a stable personality trait. The second assumption relates to the view that teacher ethos corresponds to the morality of the teacher. The first assumption can be challenged by referring to the theory of situation specificity TSS (Patry, 1991) which posits that any social behavior is situation specific. The second assumption can be challenged by clarifying the question how teacher ethos is defined. Oser et al. (1991) define teacher ethos as the competence to solve an interpersonal conflict discursively. It is hypothesized that a) pre-service teachers discourse orientation is situation specific and b) there is no correlation between the discourse orientation and the stage of moral judgment. 940 critical incidents of 94 pre-service teachers were content analyzed with respect to the types of interpersonal conflicts and the discourse-orientation. The Moral Competence Test MCT assessed moral judgment competence. The results indicate a significant situation-effect revealing that pre-service teachers show different discourse-orientation in different situations. A correlation analysis with the variables "discourse-orientation" and "moral judgment competence" yields a zero-correlation revealing that there is no link between ethos and morality. Implications for teacher education are discussed. Oser, F. et al. (1991). *Der Prozess der Verantwortung. Berufsethische Entscheidungen von Lehrerinnen und Lehrern*. Freiburg/CH: Pädagogisches Institut der Universität. Patry, J.-L. (1991). *Transssituationale Konsistenz des Verhaltens und Handelns in der Erziehung*. Bern: Lang.

Does teachers' ethos need morality?

Presenting Author:Brigitte Latzko, University of Leipzig, Germany; **Co-Author:**Eveline Gutzwiller-Helfenfinger, University of Teacher Education of Lucerne, Switzerland; **Co-Author:**Anne-Cathrin Paeßler, University Leipzig, Germany; **Co-Author:**Katrin Gottlebe, University Leipzig, Germany

According to the current research teachers' ethos is mainly conceptualized along moral dimension (e.g. Klaassen, 2002; Tirri, 1999). This is not surprising - even from a linguistic point of view - as ethos and morality are often used synonymously. Dominating approaches towards the concept of teacher ethos within teacher education reflect this understanding (e.g. Weinberger, 2014). This presentation aims at analyzing this phenomenon, namely the strong interrelation of professional ethos and morality, in order to question the same. By referring to selected empirical data on diagnostic skills as key competencies of teachers' professionalism (Zlatkin-Troitschanskaia, Beck, Sembill, Nickolaus & Mulder, 2009) we argue that we need to consider more than moral dimensions to capture teachers' professional ethos.

Session A 6

29 August 2017 13:15 - 14:45

Pinni B - B4115

Symposium

Culture, Morality, Religion and Education, Educational Policy and Systems, Lifelong Learning, Teaching and Teacher Education

Forging forward in and through the arts through education

Keywords: Arts, Case studies, Communities of practice, Culture, Educational policy, Knowledge creation, Literacy, Out-of-school learning, Qualitative methods, Reflection

Interest group: SIG 04 - Higher Education, SIG 11 - Teaching and Teacher Education, SIG 13 - Moral and Democratic Education, SIG 25 - Educational Theory

Chairperson: Georgina Barton, University of Southern Queensland, Australia

Discussant: Viviana Sappa, Swiss Federal Institute for Vocational Education and Training, Switzerland

The significance and impact of the arts on and in education has been well documented globally (Bamford, 2006; Pascoe, et. al., 2005). Despite this importance there continues to be a disjuncture between priorities in education policy and these benefits. The marginalisation of the arts in education appears to be linked to the increasing rise of standardised tests to measure student achievement in a performance based educational climate (Baguley & Fullarton, 2013; Barton et al., 2013; Ewing, 2010). Despite these observations a rich diversity of arts education practices exists across the globe. This symposium aims to explore the UNESCO Roadmap for Arts Education (2006) the tenets of which underpin the World Alliance for Arts Education (WAAE) via research, networking and advocacy. The Road Map's key aims are, to: 1. uphold the human right to education and cultural participation, 2. develop individual capabilities, 3. improve the quality of education and 4. promote the expression of cultural diversity. After an initial introduction to the key concepts and a reflection activity, four presentations will follow based on the aims above. The symposium will conclude with an open forum led by Associate Professor Ralph Buck (Chair of the WAAE) as the discussant, and featuring a panel of arts education experts, on the future of arts education practice and research.

The place of the arts in curriculum and schooling: Improving the quality of education

Presenting Author:Georgina Barton, University of Southern Queensland, Australia; **Co-Author:**Robyn Ewing, University of Sydney, Australia

Recent research demonstrates that the provision of arts education, particularly in developed countries, is at an all-time low. Reasons attributed to this decrease include increasing pressure on teachers and schools to improve results in high stakes testing such as the Scholastic Aptitude Test (SAT) in the United States, Pan-Canadian Assessment Program (PCAP) and the National Assessment Program: Literacy and Numeracy (NAPLAN) in Australia. Most of these focus on the testing of a narrow range of literacy (and numeracy) skills. Despite this perceived view of limited access to arts education increasing research over the last fifteen years documents the benefits of embedding quality arts experiences and processes in children's literacy education and across the curriculum more generally. This paper therefore addresses the tense relationship between the arts and literacy by illustrating how the association between the two can be dynamic, rewarding and is flourishing in some in- and out- of -school contexts. We begin by acknowledging a more inclusive definition of literacy as "interpretive and expressive fluency through symbolic form, whether aural/sonic, embodied, textual, visual, written or a combination of these within context" (Barton, 2014, p. 3). We demonstrate how the key aims of the UNESCO Road Map for Arts Education can be realised by highlighting the unique literate practices that underpin effective arts education programs and creative teaching and learning in schools. Finally, several contemporary examples of transformative arts and literacy learning and teaching will be shared.

Art and Soul: Upholding the human right to education and cultural participation

Presenting Author:Martin Kerby, University of Southern Queensland, Australia; **Co-Author:**Margaret Baguley, University of Southern Queensland, Australia

A number of international declarations and conventions that aim at securing for every child and adult the right to education including The Universal Declaration of Human Rights (1948) and the Convention on the Rights of the Child (1990) exist. In 2006 UNESCO identified the critical importance of arts education through their Road Map for Arts Education (2006). The importance of the arts in fostering a sense of community and cultural citizenship was a finding in Bamford's (2006) global study on the impact of the arts in education. She found that "quality arts education within schools can lead to social, economic and educational improvements within communities" (Bamford, 2006, p. 122). The involvement of the community has been a particular focus of the Australian Government's approach to the Centenary Commemoration of World War 1. The 'spirit of Anzac' is now widely regarded as the "linchpin of Australian national identity" (Deane, 2002 cited in Fischer, 2012, p. 222). Its capacity to generate an "all-inclusive experience of Australian multicultural togetherness" (Fischer, 2012, p. 226) where once it had been the jealously guarded domain of the white Anglo Saxon male is indicative of the malleability that in part explains its enduring fascination (Seal, 2011). This presentation describes two arts-based projects in Australia secured under the Queensland ANZAC Centenary Grant and the Australian Government's Arts and Culture Fund – Public Program grant. Both projects were the result of cross institutional collaborations that drew on individuals with a range of expertise from a variety of fields without an explicit connection to either the military or historical commemoration.

Arts-based research, wellbeing and A/r/tography: Developing individual capabilities

Presenting Author:Susanne Garvis, University of Gothenburg, Australia; **Co-Author:**Abbey MacDonald, University of Tasmania, Australia

Arts-based research with young children provides new ways to understand children's lives and perspectives. Arts-based research can be seen as a method within qualitative research study (Cole & Knowles, 2008). In recent years, there has

been growth in the use of arts-based research tools in a number of disciplines, all seeking ways for children to participate and share their understanding of their world. This chapter provides a snapshot of current arts-based research tools with young children (aged birth to five years) in two disciplines; health and education. The chapter concludes with a reflection about visual methods and a call for researchers to also think about the engagement of other arts-based research tools that could be implemented with the youngest of children. Similarly, A/r/tography is a method by which artists/teachers/researchers can use art as research method. A/r/tography continually asks questions in an effort to engage with ongoing practices in art and education in order to create knowledge rather than discover it. In so doing, it is only resolved retrospectively as new understandings are shared upon reflection on practice (LeBlanc et. al., 2015). Six individuals representing six continents share their experiences as university professors teaching undergraduate and graduate classes or supervising graduate students completing a/r/tographic dissertations, or as PhD graduates who used a/r/tography as the methodology in their theses or dissertations.

Arts, language, training, education, learning (AlféA)

Presenting Author: Martin Kerby, University of Southern Queensland, Australia; **Co-Author:** Jean-Charles Chabanne, ENS de Lyon, France

Finding the optimal way to integrate the arts and education [AE] is a universal concern. The OECD describes how AE fosters “skills that fuel innovation in the economy and society: creativity, imagination, communication and teamwork to name a few”. AE’s unique contributions to skills considered ‘fundamental’, argue for giving them their rightful place: AE calls upon technical skills, including the broad conception of literacy known as multiliteracy in the 21st century. AE is also inseparable from a cultural education which should provide as many opportunities as possible to encounter, experiment, analyse, discuss, appreciate or criticise as large a range of artworks as possible and through this process to create one’s own personal collection of arts experiences and documented knowledge. This paper aims at presenting the AlféaRT project, a research network supported by a research initiative of the University of Lyon and the French national science agency. AlféaRT means Arts, languages, formation, éducation, apprentissages: recherche et transfert (Arts, language, training, education, learning: research and transfer) and has two related objectives. The first consists of identifying and understanding the inseparable theoretical and practical issues encountered by teachers who seek to give arts education and education through the arts their rightful place. This research project used methods of field observations, video elicitations and interviews. The second objective, linked to the first, was to design a multi-user multimedia resource that can be used for research and teacher education purposes, based on the needs formulated in real settings by the stakeholders.

Session A 7

29 August 2017 13:15 - 14:45

Pinni B - B0039

Symposium

Culture, Morality, Religion and Education

Acculturation and Adjustment of Minority Youth: Individual, Family, and School Related Factors

Keywords: Achievement, At-risk students, Content analysis, Cultural diversity in school, Developmental processes, Language (Foreign and second), Mixed-method research, Parental involvement in learning, Quantitative methods

Interest group: SIG 21 - Learning and Teaching in Culturally Diverse Settings

Chairperson: Elena Makarova, University of Applied Sciences and Arts Northwestern Switzerland, Switzerland

Discussant: Kerstin Göbel, University of Duisburg-Essen, Germany

The process minority youth undergo while adjusting to the mainstream culture is known as acculturation. Research on acculturation distinguishes between acculturation strategies (integration, assimilation, separation/segregation, marginalisation), acculturation outcomes, and conditions of acculturation. Acculturation outcomes in the school context can be measured in terms of students’ psychological well-being and their academic performance. For minority youth, family and school are the two main contexts of acculturation. The aim of the symposium is to discuss trajectories of minority students’ acculturation in terms of family and school related characteristics that are influential for youths’ adjustment. Based on a longitudinal study, the first paper shows that acculturation change is a variable process and its patterns are differently related to family relations and adolescent school adjustment. Applying an integrative review of research on acculturation, the second paper illustrates various ways in which parents’ expectations, attitudes or behaviours can support or hamper minority youths’ school adjustment. The third paper presents a study on minority parents’ educational expectations, support for their children and coping strategies with their children’s difficulties in education. The fourth paper demonstrates that school related variables play a significant role in immigrant students’ achievements, not only in a second language but also in a third language. Furthermore, youths’ acculturation and academic experiences are intertwined with issues of language, identity, and cultural belonging. Overall, the symposium provides multifaceted insights into challenges minority students encounter during the acculturation process, and illustrates the interplay between individual family and school related factors of minority youths’ adjustment

Person-Centered Trajectories of Cultural Behaviors and Values among Chinese American Adolescents

Presenting Author: Linda Juang, University of Potsdam, Germany; **Co-Author:** Moin Syed, University of Minnesota, United States

For children of immigrant background, acculturation is a key construct for understanding psychological, social, and educational adjustment. Our longitudinal study examines the stability and change patterns of acculturation among Chinese American adolescents. We tested whether these patterns are related to key demographic variables as well as family cohesion, self-esteem, general and academic self-efficacy, and GPA. The sample included 316 9th and 10th grade Chinese American adolescents assessed three times over two years. Defining our cohorts as year in school, we analyzed our data as an accelerated longitudinal design covering four time points. We used joint trajectory mixture modeling to assess group-based patterns of change in U.S. and Chinese behaviors and values. The analyses suggested a six-class solution for values and a six-class solution for behaviors. The results show that acculturation value patterns were not related to gender, nativity, or parent education. Acculturation value patterns were, however, related to family cohesion, self-esteem, general and academic self-efficacy, and GPA. The results show that acculturation behavior patterns were not related to gender but were related to nativity and parent education. Acculturation behavior patterns were also related to general self-efficacy and family cohesion, but not self-esteem, academic self-efficacy, or GPA. Findings suggest that acculturation change is a slow process, it is quite variable, and patterns of trajectories relate differently to family relations and adolescent school adjustment.

Family Related Factors for Minority Youths' Acculturation and Their School Adjustment

Presenting Author:Elena Makarova, University of Applied Sciences and Arts Northwestern Switzerland, Switzerland; **Co-Author:**Judith 't Gilde, University of Vienna, Austria; **Co-Author:**Dina Birman, University of Miami, United States

An important process underlying the adjustment of ethnic minority youth in the country of settlement is acculturation. The ecological approach to acculturation research suggests that the relationship between acculturation and adjustment is shaped by the surrounding context. The family context has been recognised as crucial in the acculturation of young people from ethnic minority backgrounds. Research on acculturation has shown that intergenerational discrepancies in immigrant families can impact minority youths' adjustment in various ways. This study systematizes the findings of empirical research on minority youth acculturation, focussing on the influence of family-related factors in minority youths' psychological adjustment and their academic achievement. A total of 348 peer-reviewed articles were selected and analysed for content, using a deductively developed and inductively enriched system of categories. Overall, the content analysis of the target categories indicates various ways in which parents' expectations, attitudes or behaviours can support or hamper minority youths' school adjustment. Our results also show that young people's school adjustment is often embedded in an acculturation dilemma shaped by the discrepancy of youths' attitudes and expectations and those of their parents. Finally, our findings indicate a number of factors that can bridge an acculturation gap between family and school context.

Parental Coping Efforts on Successful Education of Minority Youth: The "Tanoda" Schools in Hungary

Presenting Author:Janos Gyori, Eötvös Loránd University, Hungary

Since the mid 1990s a chain of extracurricular afterschools – so called 'Tanoda'-s – are functioning in Hungary, which are maintained by different NGO-s and offer non-formal remedial and/or enrichment education for students who come from disadvantaged – in a big number from Roma – families. In our research on Tanoda-s we mainly focused on the students' and their families' social background and their strategies to cope with educational difficulties. As a part of our research, we carried out in-depth interviews with 14 parents from three Tanoda-s, on their educational expectations, support for their children and coping strategies with their children's difficulties in education. It was found that parents display much devotion to their children's educational success and would wish to find the most promising paths for the best possible educational carrier for them. However, while they have warm, supportive parental attitudes with high expectations in education, they are not ready to support their children's full independence to pursue these goals, they are overprotective and restrictive with their children because of their different social anxieties and fears, and because of some sorts of short term family needs and goals. In case of Roma students in Tanoda-s it means that parents from ethnic minority groups hold a somewhat controversial attitude towards their children's acculturation into the majority's system of education.

Role of School in Immigrant Students' Literacy Performance and Acculturation into the New Society

Presenting Author:Orly Haim, Beit Berl College, Israel, Israel

This study investigates the role that school related variables play in literacy performance in second and third language among immigrant youth. Additionally, the study explores the students' perspectives regarding their educational experiences. The sample includes 267 Russian speaking eleventh graders drawn from 18 Israeli high schools. Data about the schools were collected through structured interviews with the school principals. Students' perceived school experiences were elicited via academic letter writing tasks. A total of 180 letters (60 letters in each language: Russian, Hebrew and English) drawn from the entire data set are analyzed qualitatively through content analysis. This study utilizes a mixed method approach. Multivariate analysis of covariance, controlling for students' SES, arrival age and gender, indicate that students' academic performance in Hebrew and English differs by a number of school related factors: school type, school SES, provision of academic and language support, and teachers' training to work with immigrant students. Qualitative analyses of students' letters reveal a number of major themes in the data including: language inequality and power struggle, academic difficulties, unequal social and cultural relations, and issues of identity (i.e., the 'self'- and the 'other'). These results highlight the role of the particular learning environment and socio-linguistic context as sources of variation in both L2 and L3 performance among immigrant learners besides individual learner characteristics. Additionally, the findings point to the significant role of the immigration experience in explaining the perceived educational experiences and

acculturation processes among immigrant youth.

Session A 8

29 August 2017 13:15 - 14:45

Main Building A - A32

Symposium

Assessment and Evaluation

The use of rubrics for feedback and learning – new insights from research

Keywords: Assessment methods and tools, Attitudes and beliefs, Mathematics, Multimedia learning, Peer interaction, Science education, Self-regulation, Student learning, Teaching approaches

Interest group: SIG 01 - Assessment and Evaluation

Chairperson: Robbert Smit, University of Teacher Education St.Gallen, Switzerland

Discussant: Anders Jonsson, Kristianstad University, Sweden

The role of feedback is essential for learning. It is most powerful when given in an elaborated form to help the learner change erroneous knowledge components and, thus, improve achievement. Rubrics are assessment tools that provide such beneficial information to the learner. This symposium presents four papers studying 'rubrics' as an instrument for formative assessment in different levels of education. The first two papers focus on the use of rubrics in higher education. While presentation one looks at the benefits of peer-assessment with the help of rubrics, presentation two investigates how the involvement of students in the construction of a rubric fosters their competence for self-regulation. The other two presentations are based in elementary education. In study three it is observed how the rubric serves as a tool for clarifying the learning aims at different stages of the instruction phase, e.g., before, during, and after the learning sequence. The fourth study looks at the effects of a rubric for mathematical reasoning on students' self-efficacy beliefs and student achievement. The discussion by Anders Jönsson will address common themes in the four papers and critical suggestions, aimed at deepening our understanding and advancing the research on the use of rubrics for learning.

Peer-assessors' heuristics and peer-feedback produced in peer assessment with the use of rubrics

Presenting Author:Olia Tsivitanidou, University of Cyprus, Cyprus; **Co-Author:**Costas Constantinou, University of Cyprus, Cyprus

In this study, we sought to examine undergraduate student teachers heuristics in the peer-assessor role when offering feedback to peers in a science course with the use of rubrics. We also aimed to examine whether the strategies that we were able to identify associate with students' initial background knowledge and the type of feedback that they produce. Participants were 24 undergraduate student teachers in Primary Education from a university in Cyprus, who were studying a web-based unit on marine Ecosystems. By the end of the teaching unit, students reciprocally and individually assessed the web-portfolio of a peer-group, with the assistance of 3-point Likert scale rubric with pre-defined criteria. Their actions on their screens were recorded during the enactment of the peer-assessor role with the use of the RiverPast Software Pro. Data were collected from four sources: pre-instructional tests, screen-video captured data, peer-feedback data and post-instructional interviews with students. Data were exposed to qualitative analysis and then also treated quantitatively through the use of non-parametric tests. Findings revealed two main assessor profiles. In particular, assessors were distinguished into *autonomous* (profile 1) and *informed* (profile 2). Overall, students' initial performance was not associated with their actions on the peer-assessor role. Assessors' profiles had statistically significant differences in the explicit guidance offered as part of the feedback produced; informed assessors offered more guidance compared to the guidance offered by autonomous assessors. The findings have implications for teaching practice as well as policy for teaching and learning in web-based learning environments.

The effect of co-created rubrics on self-regulation, performance and self-efficacy

Presenting Author:Juan Fraile, Universidad Francisco de Vitoria, Spain; **Co-Author:**Ernesto Panadero, Universidad Autónoma de Madrid, Spain; **Co-Author:**Rodrigo Pardo, Universidad Politecnica de Madrid, Spain

According to the review of Panadero & Jonsson (2013), criteria transparency is one of the key elements to support a formative use of rubrics. Some authors have postulated from a theoretical stance that involving students in the co-creation of rubrics can have benefits such as better understanding of criteria, engagement, motivation and confidence, learning and performance (e.g. Arter & McTighe, 2001). Nevertheless, the effect of co-creating and using co-created rubrics has never been compared with the effect of using the same rubric given by the teacher, which is the main aim of this study. We explored how the use of co-created rubrics (experimental condition) for three different tasks compared to just handing-out the same rubrics (control condition) might affect self-regulation, self-efficacy, performance, task stress and students' perception in two different classroom groups. The group that co-created the rubrics showed a higher level of self-regulation as measured by thinking aloud protocols. Partial significant effects were found on self-efficacy and performance. Clear expectations and training on the use of rubrics are related with criteria transparency and can be attributed to co-creating rubrics. In the light of our results, co-creating rubrics through the collaboration of the teacher and the students is a highly recommended pedagogical enterprise.

Rubrics as diagnostically formative feedback tools – A study in compulsory schools

Presenting Author:Niels Bech Lukassen, University College of Northern Jutland / Aarhus University, Denmark

This research study addresses the challenge of providing students with quality feedback based on a co-constructed rubric. The research suggests that rubrics can be created within a framework of three cyclical elements, and include students as significant co-constructors. The study uses micro- ethnographical classroom methods that include thirty hours of recorded teaching sessions and eight student focus group interviews. The data is from two Danish compulsory schools – from seventh grade classrooms. Rubrics are defined as an educational tool analyzed with a system theoretical approach as suggested by Niklas Luhman. Rubrics hold the potential to serve as diagnostic tools with the purpose to provide both students and teachers with information of how they construct meaning. Four (selected) results are being displayed: 1) Students observe teaching and learning as very complex phenomena. 2) Students and teachers are in need of a variety of diagnostic assessment tools that assist them in understanding the learning intentions. 3) The results suggest that when teachers are implementing a whole variety of diagnostic assessment tools the students find the teaching more meaningful and motivating. 4) Rubrics hold the potential to reduce in classroom complexity and the students are in general motivated to work with rubrics.

The impact of a rubric on primary students' self-efficacy and mathematical reasoning competence

Presenting Author:Robbert Smit, University of Teacher Education St.Gallen, Switzerland; **Co-Author:**Patricia Bachmann, University of Teacher Education St.Gallen, Switzerland

Rubrics are assessment tools that help students gain complex competencies. Our quasi-experimental study aimed to evaluate an assessment instrument supporting primary teachers to teach and assess mathematical reasoning competence. Students in 44 5th and 6th grade primary classes (n = 721) in two Swiss cantons worked on their mathematical reasoning competencies. In half of the classes a standards-based rubric for peer- and self-assessment was applied. An achievement test and questionnaires for students and teachers were administered before (t1), at the end of the intervention (t2), and four months later (t3). The results of the quantitative analyses demonstrated that our intervention with the rubric significantly fosters the students' mathematical reasoning competence in the long run. The effects are mediated by self-efficacy beliefs. Classes in the rubric intervention group appeared to have more frequent peer- and self-assessment. Those classes also possessed higher self-efficacy beliefs. However, for reasoning competence there was no difference between the control and the intervention group. Within the classes the effects were different for the individual students. Students, who stated at t3 to have done more peer- and self-assessment, possessed higher self-efficacy beliefs for reasoning. Mediated by the beliefs those students also showed higher mathematical reasoning competence.

Session A 9

29 August 2017 13:15 - 14:45

Pinni B - B4117

Symposium

Teaching and Teacher Education

Patterns and foci of tutoring dialogues in primary classrooms

Keywords: Case studies, Inquiry learning, Knowledge creation, Mixed-method research, Primary education, Problem solving, Qualitative methods, Quasi-experimental research, Student learning, Teacher Professional Development, Teaching / instruction

Interest group: SIG 11 - Teaching and Teacher Education

Chairperson: Stefanie Schnebel, University of Tübingen, Germany

Discussant: Kathrin Krammer, Switzerland

Teachers' scaffolding and forms of tutoring are considered crucial for promoting students' learning. Research shows that tutoring dialogues or scaffolding foster students' understanding and increase in knowledge especially in complex learning situations. There is some evidence, that teachers' cognitions are related to their supportive actions and that there is a crucial link between teachers' tutoring activities and the processes of problem solving and knowledge-building. However, knowledge about patterns and foci of tutoring dialogues and the linked cognitions of teachers are scarce. The symposium picks up this gap.

The first paper shows findings from a study on scaffolding in technological education in primary classes. Patterns of scaffolding and their relation to teachers' cognitions on scaffolding are investigated using a qualitative approach. The second contribution presents a qualitative study on tutoring dialogues between teachers and students in primary classes focussing on the kinds of cognitions addressed in the dialogues and the knowledge fostered. The last two papers refer to the same tri-national study which investigated teachers' knowledge, beliefs and tutoring actions in a structured learning environment in science. The first of the two papers shows the patterns of scaffolding actions, distinguishing between cognitive activation, evaluation, and regulation. In the last contribution, these patterns are related to teachers' pedagogical content knowledge and beliefs.

The symposium focuses on tutoring dialogues in primary education, brings together teachers' cognition, teachers' focused actions and effects on students' learning and aims at providing an insight into different methodological approaches used for investigating scaffolding or tutoring dialogues.

Teachers' Scaffolding in Problem Solving Tasks in Technology Education

Presenting Author: Julia Steinfeld, Duisburg-Essen University, Germany

Teachers' scaffolding is one of the most influential factors on students' learning processes, especially in primary schools (Cadima et al. 2010). Moreover, teachers' scaffolding is in particular crucial in open and problem based learning environments (Hmelo-Silver et al. 2007) which is one of the main approaches in Technology Education (Mioduser 2009, Hill 1998). Through practical problem solving children can understand the manmade world, involving using and discovering scientific concepts and skills in conjunction with design-and-make activities. The complexity and ambiguities for teachers and their scaffolding are challenging in this approach (Hmelo-Silver et al. 2007). Therefore, this exploratory case study investigates teachers' scaffolding patterns and their cognitions in problem solving tasks in Technology Education in German primary schools. Video tapes and stimulated recalls with teachers have been carried out. The coding system for analyzing the video and interview data has been developed in deductive and inductive way. The results confirm the significance of activating and structuring scaffolds and show how teachers deal with complexities in problem solving processes.

Knowledge-building patterns in educational dialogue

Presenting Author: Heli Muhonen, University of Jyväskylä, Finland; **Co-Author:** Helena Rasku-Puttonen, University of Jyväskylä, Finland; **Co-Author:** Eija Pakarinen, University of Jyväskylä, Finland; **Co-Author:** Anna-Maija Poikkeus, University of Jyväskylä, Finland; **Co-Author:** Marja-Kristiina Lerkkanen, University of Jyväskylä, Finland

Classrooms create settings of knowledge building, where ideally, students and their teacher jointly develop their understanding (Mercer, 1995). Dialogue can be considered as the facilitator of this collaborative learning process (e.g., Alexander, 2006; Lyle, 2008; Mercer, 2008). This study aimed to examine knowledge-building patterns in Grade 6 educational dialogues. The data consisted of 20 video-recorded lessons from the classes taught by seven teachers, selected by using a latent profile analysis and examined with a qualitative functional analysis of classroom talk. Episodes of educational dialogue were found to represent three main types of knowledge, based on facts, views and experiences. These three types were further identified as forming six diverse knowledge-building patterns in educational dialogues. The findings indicated that factual orientation dominated the Grade 6 lesson dialogues. However, factual knowledge building often occurred with the other two main types of knowledge. Our findings suggest that it is important for teachers to explore the possibilities of different knowledge-building patterns to acknowledge the concrete ways to scaffold educational dialogues and to guide students' learning through it.

Cognitive activating or social regulating – foci in tutoring dialogues in primary science classes

Presenting Author: Stefanie Schnebel, University of Tübingen, Germany

With the aim of increasing scientific literacy, learning arrangements are needed which enable students to learn about scientific ways of working and problem solving. Besides the tasks provided and the quality of the learning arrangements the learning support of the teachers is crucial for the learning processes (Decristan et al. 2015; Hushman et al. 2015). The international research project 'Innovations for science and technology education in the region of the Lake of Konstanz' provided 75 teachers in Austria, Germany and Switzerland with the opportunity to work with a mobile learning arrangement on the topic of flying. In the context of this research project, several aspects were studied. The sub-project presented here seeks to determine how teachers support the students in their working and learning processes. In order to achieve a detailed analysis on the support activities, teachers' actions were videotaped and coded. The codes were aggregated to the main categories cognitive activating, evaluative and regulative interventions. From the subsequent latent class analysis three types of teacher activities were derived. The findings describe types of teachers who show preferences in special dimensions of learning support.

Teachers' knowledge, professional development and learning support practice for science education.

Presenting Author: Franziska Vogt, University of Teacher Education St.Gallen, Switzerland

The paper is based on the research project on "Innovations for science and technology education" whereby 75 primary teachers were given a mobile learning arrangement on the topic of flying (physics). The analysis presented seeks to capture the interplay between teachers' professional knowledge (professional content knowledge (PCK) and content knowledge (CK)), the question of the effectiveness of interventions in form of two different professional development courses focussing on either PCK or CK and the practice of learning support. The research questions concentrate on (i) the effects of the interventions on teachers' professional knowledge, and (ii) the relation between professional knowledge and practice of learning support. Measures include questionnaires with scales on domain specific PCK, a test on CK, as well as the video analysis of teachers learning support practice (another contribution of the symposium). The results indicate the challenges of targeting specific competences through professional development. The relations between knowledge and practice can only be found in certain areas, mainly the relation between CK and PCK focussing on students' sense-making and cognitive activation and content focused structuring and evaluation, which are relevant for an understanding of professional knowledge and practice required for scaffolding.

Session A 10

Considering process features in family literacy programs: Ways and explanatory models

Keywords: Experimental studies, Literacy, Parental involvement in learning, Social interaction

Interest group:

Chairperson: Caroline Villiger, University of Teacher Education Bern, Switzerland

Discussant: Paul Leseman, Utrecht University, Netherlands

Research on family literacy confirms that family influence on the child's language and reading development is considerable (Sénéchal, 2006). Thus, many family literacy programs (FLP) have tried to implement beneficial strategies and methods in disadvantaged families, but effects on child outcomes are moderate (van Steensel et al., 2011). Recent research therefore focuses more on process features like implementation quality and parent-child interactions, in order to get more detailed insights into program success. Generally, in educational research, learning processes (e.g., quality of handling learning contents and quality of interactions when learning) are getting more attention. Even though less apparent, they are supposed to have a strong predictive power when explaining learning success of students (Hattie, 2009; Seidel & Shavelson, 2007). This symposium brings together researchers from the Netherlands, Australia and Switzerland to investigate the role that process features of FLP play in the development of the child's language and reading competence, focusing on various aspects of implementation quality and quality of parent-child interactions and their association with outcomes. The aim of the symposium is to provide new understanding about the effectiveness of FL interventions as a function of a successful implementation of a method (rather than the implementation of a "successful method"). Implications for future research and for implementation in practice are provided.

Outcomes and implementation quality of a Dutch family literacy program: Early Education at Home

Presenting Author: Sanneke de la Rie, Rotterdam University of Applied Sciences, Netherlands; **Co-Author:** Roel van Steensel, Erasmus University Rotterdam, Netherlands

Family literacy programs (FLPs) aim to promote children's literacy development by stimulating their home literacy environments (HLE), particularly in at-risk families. Observed differential effects for these families raise questions about their capability of implementing FLPs optimally. However, a dearth of data on FLP-implementation was observed (De la Rie et al., 2016; Sénéchal & Young, 2008). In this study we measured various aspects of implementation quality of the FLP 'Early Education at Home' (EEH) and related these to program effects. EEH aims to promote kindergartners' language and literacy skills by stimulating their parents to engage them in literacy-related activities and by teaching parents strategies for realizing stimulating interactions. We hypothesized 'enactment' (Powell & Carey, 2012) variables (HLE, parent self-efficacy, quality of parent behavior and language) to serve as mediators of EEH-effects, which we tested using multi-level SEM. We expected program 'receipt' (parental attendance at training sessions, program activities conducted) to predict program outcomes, which we tested using multi-level regression. Seven primary schools participated in this quasiexperimental study, involving 119 children (*Mean* at pre-test: 64 months) in the experimental condition and 98 controls, and their parents (60% low-middle educated). No significant EEH-effects were found, and neither enactment nor receipt variables influenced child outcomes. Parent self-efficacy and quality of parent behavior and language significantly predicted child outcomes. Explanations for the lack of EEH-effects, in terms of delivery of EEH to parents, parental implementation of EEH, and contextual/intervention features, are discussed. We conclude with suggestions for future research and implications for program developers.

Paired Reading with parents' or volunteer tutors: Do process features explain differential effects?

Presenting Author: Caroline Villiger, University of Teacher Education Bern, Switzerland; **Co-Author:** Silke Hauri-Junghans, Pädagogische Hochschule FR, Switzerland; **Co-Author:** Annette Tettenborn, University of Teacher Education of Lucerne, Switzerland; **Co-Author:** Isabelle Hugener, University of Teacher Education Lucerne (PH Luzern), Switzerland; **Co-Author:** Manuela Frommelt, University of Teacher Education of Lucerne, Switzerland; **Co-Author:** Catherine Naepflin, University of Teacher Education of Lucerne, Switzerland

Paired Reading (PR) is a very established method to enhance reading fluency and comprehension of young or struggling readers (Topping, 2001) whose effects are widely confirmed by many authors (e.g., Lam et al., 2013; Silva, et al., 2008; Topping & Lindsay, 1992). However, little is known about detailed mechanisms of the method. Therefore, this study investigates mediating effects of process features like interaction and implementation quality on outcome variables, in order to disentangle effects of the acting person (tutor) and the method. A PR program with randomized control group design was implemented with 3rd Grade students by comparing two training conditions – parents' and volunteer tutors (parents' *N* = 67, volunteers' *N* = 64; control group *N* = 68). Volunteer tutors outperformed parents' tutors and the controls: Children who trained with volunteers developed significantly better in reading fluency when controlling for individual characteristics and initial reading level. In contrast, no effects were found on comprehension in none of the two conditions. Analyses of video data of one videotaped training session per pair (*N* = 113, without control group) showed that parents praised the child significantly less and showed less warmth than volunteers did when interacting with the child. Moreover, volunteers talked significantly more about book content than parents, however, they did not differ significantly in other aspects of

implementation. Further analyses will investigate whether effects on fluency were mediated by process factors like praise, warmth or content-related conversation. Findings are discussed with regard to future implementation of PR training in practice.

Stimulating parent-child interaction through storytelling activities of a family literacy program

Presenting Author:Rosa Teepe, Radboud University Nijmegen, Netherlands; **Co-Author:**Inge Molenaar, Radboud University Nijmegen, Netherlands; **Co-Author:**Ron Oostdam, University of Applied Sciences Amsterdam, Netherlands; **Co-Author:**Ludo Verhoeven, Radboud University Nijmegen, Netherlands

Preschool vocabulary knowledge develops mainly informally via parent-child interaction. Family literacy programs (FLP's) aim to promote children's vocabulary by supporting parent-child interaction quantity and quality. In addition to traditional storytelling activities that are part of FLP's (such as shared book reading), we developed a technology-enhanced storytelling (TES) activity including real time interaction support. In this study we investigate parent-child interaction of dyads involved in the regular FLP ($n = 15$), FLP plus TES ($n = 15$) and controls ($n = 15$) during a storytelling activity. We examine the effect of the FLP and FLP plus TES on the quantity and quality of parent-child interaction over time and associations with children's vocabulary development. Dyads were observed four times during a school year doing a paper-based and technology-enhanced storytelling activity each time. Analyses show that at Time 1 (after 6 weeks of FLP), no significant differences were found in the interaction quantity and quality of dyads involved in the FLP and the control condition. Moreover, large differences among parent-child dyads in the quantity and quality of interaction were found, indicating the diversity among dyads. Analysis of the other three time slots will examine the development of parent-child interaction over time, and associations with children's vocabulary development. This will provide insights in how an FLP influences parent-child interaction over time, how much implementation time is required for an FLP to be effective, and how development of parent-child interaction relates to vocabulary.

Beyond the text: fathers and mothers engaging with their toddlers around a book

Presenting Author:Elisabeth Duursma, University of Wollongong/Early Start Research Institute, Australia

Shared parental bookreading is known to benefit children's language and literacy development (e.g., Bus, Van IJzendoorn, & Pellegrini, 1995; Mol & Bus, 2011). However, what happens during a book reading interaction is perhaps even more important than the reading of the text itself. This study examined the strategies 25 Australian fathers and mothers used during shared bookreading with their 2-year-olds using an existing coding system developed by Fletcher & Finch (2015). Strategies included asking questions, labelling, expansions and positive feedback. Initial results indicated that both parents used a wide range of strategies and focused on labelling and asking questions. The association between parental strategies and child language, social, emotional and cognitive development will be discussed.

Session A 11

29 August 2017 13:15 - 14:45

Main Building A - A2A

Symposium

Teaching and Teacher Education

Teachers' professional competences, instructional quality and student learning outcomes

Keywords: Competencies, In-service teacher education, Mathematics, Mixed-method research, Quantitative methods, Secondary education, Student learning, Teacher Effectiveness, Teacher Professional Development, Teaching / instruction

Interest group: SIG 11 - Teaching and Teacher Education

Chairperson: Christian Bruehwiler, University of Teacher Education St.Gallen, Switzerland

Discussant: Trude Nilsen, University of Oslo, Norway

Owing to the importance of teachers' professional competences for effective academic learning processes, teacher education is currently subject to high expectations. In concrete terms, teacher education programmes are supposed to 1) prepare future teachers for a successful entry into the teaching profession by developing and fostering their professional competences. This should lead 2) to high-quality instruction, and finally 3) to higher student learning Outcomes. The symposium explores different aspects of this threefold expectation of effectiveness teacher education ought to meet. The first presentation focuses on the development of teaching competences in the context of a video-based intervention. The intervention was implemented in a teacher preparation programme, and aims to promote constructivist ways of teaching. Thereafter, the second presentation sets out to analyse the interrelations between mathematics teachers' knowledge, their skills and their performance in the classroom. The third presentation then addresses the question of how teachers' general pedagogical knowledge (GPK) relates to the quality of their instruction. In this study, GPK was assessed via a standardised paper-pencil test and by means of a video-based measure of situation-specific skills in classroom management. Completing the picture, the last presentation goes into the effects of teachers' professional knowledge and beliefs about mathematics learning on instructional quality and student achievement. Overall, the findings contribute to a better understanding of the development of teaching competences and the impact of teachers' professional competences on instructional quality and student learning. Moreover, the symposium provides a platform for discussing different ways of measuring situation-specific skills.

Video-based Promotion of Teaching Competences in Teacher Education

Presenting Author: Mirjam Kocher, University of Education Zurich, Switzerland; **Co-Author:** Matthias Baer, Educational University Zurich, Switzerland; **Co-Author:** Christine Villiger, Educational University Zurich, Switzerland; **Co-Author:** Anna Locher, Educational University Zurich, Switzerland

How to promote teaching competences in teacher education is still a relatively un-researched field. The presentation first shed a light on some elected results from previous studies, which show that lessons of student and experienced teachers contain primarily direct instruction and rather low cognitive demand. Then results of a new intervention study are presented. This study aims the promotion of constructivist ways of teaching instruction in teacher education with a video-based intervention. A central element of the intervention is the analyses of and the reflection on own lesson videos by student teachers and by experienced teachers. The study participants are student teachers of the Educational University of Zurich and experienced teachers, who are mainly involved in the training of the student teachers as mentors. The focus of the intervention is on the adaptive promotion of (1) the student teachers and (2) the experienced teachers by video lessons, which they taught by themselves in the subject German. Additionally data from control groups are recorded without intervention. The intervention is implemented in the regular schedule of the Educational University during three semesters. The effects of the intervention is investigated in a multiperspective way by eight data collection instruments over four measurement points. By the time of the EARLI-conference we will show results about the development of teaching competences within the intervention groups and the control groups. Additionally differences between the intervention groups and the control groups will be presented.

Relations between mathematics teachers' knowledge, skills and instructional quality

Presenting Author: Armin Jentsch, University of Hamburg, Germany; **Co-Author:** Lena Schlesinger, University of Hamburg, Germany; **Co-Author:** Gabriele Kaiser, University of Hamburg, Germany; **Co-Author:** Ute Suhl, Humboldt-University Berlin, Germany; **Co-Author:** Sigrid Blömeke, University Oslo, Norway

Research on both teachers' professional competencies and teachers' performance in the classroom has been of major interest in mathematics education. In the present study, we analyze how mathematics teachers' knowledge, their skills and their performance in the classroom are related to each other. To assess the teachers' professional knowledge and skills, we used established instruments. An observational protocol was developed based on an extensive literature review. Factor analyses were conducted to investigate the dimensionality of instructional quality. All reliability measures indicate at least satisfactory results. Latent correlations were calculated. The resulting relations between cognitive skills and performance are discussed within the last years.

Effects of teachers' pedagogical knowledge and skills on their instructional quality

Presenting Author: Caroline Nehls, University of Cologne, Germany; **Co-Author:** Johannes König, University of Cologne, Germany; **Co-Author:** Armin Jentsch, University of Hamburg, Germany; **Co-Author:** Lena Schlesinger, University of Hamburg, Germany; **Co-Author:** Gabriele Kaiser, University of Hamburg, Germany; **Co-Author:** Andreas Busse, University of Hamburg, Germany; **Co-Author:** Sigrid Blömeke, University of Oslo, Norway

Pedagogical knowledge has been identified as a relevant category of teacher knowledge, but hardly any study has examined its relationship to instructional quality. In this presentation, therefore, we analyze how (1) teachers' general pedagogical knowledge (GPK) assessed via a standardized paper-pencil test as well as (2) a video-based measure of situation-specific skills to manage the classroom are related to the quality of teachers' instruction delivered to students. A sample of 113 in-service mathematics teachers from middle schools in Hamburg, Germany, is used, deriving from the project TEDS-Instruct. The teachers were assessed via instruments that our research group had developed in previous studies. Observation protocols were applied to capture the instructional quality, covering the three basic dimensions of instructional quality (cognitive activation, classroom management, constructive support). In the presentation, instruments are outlined and findings from scaling analysis, inter-correlation, regression, and mediation analysis will be presented. Evidence will be provided that situation-specific skills in the area of classroom management serve as a more proximal predictor for instructional quality than teacher knowledge. Implications of findings and suggestions for future research will be discussed.

Impacts of teachers' professional knowledge and beliefs on teaching quality and student achievement

Presenting Author: Christian Bruehwiler, University of Teacher Education St.Gallen, Switzerland; **Co-Author:** Lena Hollenstein, University of Teacher Education St.Gallen, Switzerland; **Co-Author:** Benita Affolter, University of Teacher Education St.Gallen, Switzerland; **Co-Author:** Titus Guldemann, University of Teacher Education St.Gallen, Switzerland

It is common ground in educational research that teachers' professional competence is essential for effective academic learning processes. In general, the professional competence is thought to be composed of cognitive and non-cognitive aspects. With specific regard to mathematics education, the cognitive aspects of teachers' professional competence include mathematics content knowledge (MCK), mathematics pedagogical content knowledge (MPCK), and general pedagogical knowledge (GPK), whereas beliefs about mathematics learning are considered to be non-cognitive aspects. Within the context of the longitudinal study *Outcomes of Teacher Education* (German: *Wirkungen der Lehrerbildung*, WiL), which is a Swiss extension of the international comparative study TEDS-M, we build on these assumptions and investigate

the effects of professional knowledge and beliefs about mathematics learning on teaching and student achievement. The sample comprises 30 primary teachers (three years after graduation) and 548 students. Our results show a significant effect of MCK and GPK on student achievement gains in mathematics. Furthermore, it was found that a higher extent of GPK contributes to a higher quality of instruction. As far as teachers' beliefs about mathematics learning are concerned, our analyses point to a significant impact on instructional quality, but they did not reveal significant effects on student achievement. These findings shall be discussed in terms of the importance of teachers' professional knowledge and beliefs for effective academic learning processes.

Session A 12

29 August 2017 13:15 - 14:45

Pinni B - B3111

Symposium

Teaching and Teacher Education

Collaborative teaching and inclusion: benefits and challenges

Keywords: Attitudes and beliefs, Case studies, In-service teacher education, Mixed-method research, Primary education, Qualitative methods, Quantitative methods, Special education, Teacher Professional Development, Teaching / instruction

Interest group: SIG 15 - Special Educational Needs

Chairperson: Susanne Schwab, University of Wuppertal, Germany

Discussant: Ineke Pit-ten Cate, University of Luxembourg, Luxembourg

The importance of collaborative teaching practices between classroom teachers and special needs teachers has been emphasized as important for successful inclusive education. However, relatively little is known about collaborative educational practices, how teachers experience these and how they are related to attitudes and beliefs. These issues are addressed in this symposium, by means of quantitative, qualitative and mixed-methods studies. The first study uses structural equation modeling to illustrate the importance of teachers' experiences and attitudes for their willingness to cooperate in inclusive education. The second study including Learning Support Teachers, Resource Teachers and Classroom Teachers sought to establish the nature and extent of collaboration amongst teachers and to identify the benefits and barriers to implementation. It was shown that teachers value collaboration and are motivated to implement it, but that challenges lie in planning, time constraints and limited professional development opportunities. The third study aimed to shed light on the preparation and daily practice of beginning co-teachers and to find out if co-teaching can be a means to reduce the outflow of pupils to special education. Co-teachers and the organizations in which they worked used one year to prepare for implementation by means of training, international collegiate consultation and planning. Next, co-teaching was implemented in their schools. Co-teaching appeared very significant for professional development. It was experienced as very motivating as teachers felt they were realizing sustainable change in the institutional process of creating appropriate education for all.

Under which conditions do primary school teachers cooperate in inclusive education?

Presenting Author: Frank Hellmich, Paderborn University, Germany; **Co-Author:** Susanne Schwab, University of Wuppertal, Germany; **Co-Author:** Fabian Hoya, Paderborn University, Germany; **Co-Author:** Gamze Görel, University of Paderborn, Germany

Cooperation between primary school teachers and special education teachers is an important prerequisite in inclusive education. Until now, little is known about the willingness of primary school teachers to cooperate with special education teachers in inclusive schools. Therefore, we investigated $N=168$ primary school teachers' willingness to cooperate in inclusive education, their attitudes towards inclusion, their experiences in joint education of students with and without special educational needs, their self-efficacy beliefs and their attitudes regarding teamwork. The results of a structural equation model illustrate the importance of attitudes regarding teamwork and primary school teachers' experiences in joint education of students with and without special educational needs for their willingness to cooperate in inclusive education.

Collaborative classroom practice for inclusion

Presenting Author: Susanne Schwab, University of Wuppertal, Germany; **Co-Author:** Una O'Connor Bones, Ulster University, United Kingdom

Collaborative practice is integral to effective inclusion. Within schools, teacher collaboration can foster communities of practice through a series of professional relationships that enhance the educational experience and learning outcomes of pupils with special educational needs (SEN). In Ireland, Learning Support Teachers (LSTs) and Resource Teachers (RTs) provide additional support to the increasing numbers of children with SEN in mainstream classrooms. Working alongside Classroom Teachers (CTs), this tripartite of teaching expertise represents an opportunity for whole-school and classroom-based approaches to successful collaborative, inclusive practice.

This presentation describes the perceptions and experiences of collaborative practice between primary CTs, RTs and LSTs in a cohort of primary schools in the West of Ireland. Using a mixed methods approach, the study sought to establish the

nature and extent of collaboration amongst these teachers and to identify the benefits and barriers to implementation. The findings suggest that whilst teachers are increasingly aware of the value of collaboration, its implementation is largely aspirational, with a series of challenges relating to time constraints, ad hoc planning and limited professional development opportunities most commonly identified as constraints to a consistent approach. The article considers the consequences of this shortfall and options for improved engagement between teachers are identified.

Co-teachers as change agents towards more inclusive education

Presenting Author:Elke Struyf, University of Antwerp, Belgium; **Co-Author:**Dian Fluijt, University of Applied Sciences Utrecht, Netherlands; **Co-Author:**Cok Bakker, UCR / Utrecht University, Netherlands

Purpose: Four primary schools participated in a three years pilot in which co-teaching was considered as a means to realize more inclusive education. The aim of the research was to study the preparation and daily practice of beginning co-teachers in order to achieve a higher goal: to find out if co-teaching can be a means to reduce the outflow of pupils to special education. During the first year, sixteen co-teachers prepared themselves and their organization for the implementation of co-teaching by means of training, international collegiate consultation and planning. During the second and third year the co-teachers practiced co-teaching in their schools.

Method: We collected naturally occurring and organized data. Naturally occurring data were our field notes from the co-teaching training, collegiate consultation, work- and intervision meetings and film and photo shoots. The organized data consisted of data collected with a reflection instrument (interview) and a survey.

Results: Data collection revealed that co-teachers experienced a deep meaning for their work, experienced fun, professional development and ownership in the work. Further they felt supported by the co-teaching partner(s). Co-teachers indicated the importance of having an open attitude, to be reflective and to feature solution-oriented communication skills. The pilot demonstrates that the co-teaching teams in each school developed as small intrinsic motivated collegial sub networks who felt able to realize effective and sustainable change in a diverse, comprehensive and diverse organizational process as initiated by the recent law to create more appropriate education for all.

Collaboration for Inclusive Education - "It is just there on paper"

Presenting Author:Estelle Swart, Stellenbosch University, South Africa; **Co-Author:**Mirna Nel, North-West University, South Africa

To become inclusive, schools and classrooms should focus on how to operate as communities where everyone experiences a sense of belonging, is accepted, supports and is supported by all members of the school community. In practice it means that all educational practices should be inclusive, including providing integrated support services through intersectoral collaboration to address a range of internal and external barriers to learning. To realise this, transdisciplinary collaboration within an inclusive learning support framework is essential. As part of a larger project several qualitative studies focusing on how South African teachers understand collaboration within a learning support framework have been conducted.

One of the central findings of this study was that teachers still conceptualise learning difficulties from a medical perspective and consequently refer individual children to specialists for assessments, support and placement in a school environment where they will receive specialist support. The main concern of this paper is that developing sustainable collaborative practices for addressing barriers to learning seems to be a persistent challenge in South Africa. The reasons include amongst others low teacher morale; limited understanding of inclusive education; teachers' perception that they don't have the required knowledge and skills to teach all pupils, more specifically those experiencing barriers to learning; lack of resources and support and large classrooms.

Session A 13

29 August 2017 13:15 - 14:45

Main Building D - D10B

Symposium

Motivational, Social and Affective Processes

Productive collaboration contextualized in science learning: Theorizing the role of antecedents

Keywords: Collaborative Learning, Educational Psychology, Higher education, Motivation and emotion

Interest group: SIG 08 - Motivation and Emotion, SIG 10 - Social Interaction in Learning and Instruction

Chairperson: Toni Rogat, Purdue University, United States

Chairperson: Simone Volet, Murdoch University, Australia

Discussant: Martina Nieswandt, University of Massachusetts Amherst, United States

To yield the benefits for deep-level understanding, students working in small groups need to go beyond simple participation to engage in ways that translate their motivations into productive collaborative learning. Productive collaborative processes involve drawing connections between concepts with disciplinary practice during knowledge co-construction and task completion. Ensuring students engage in these high-quality collaborative processes is a valued outcome of higher education. The collection of presentations in this symposium are at the frontiers of research investigating *explanatory*

antecedents central to productive collaborative processes contextualized within science learning (e.g., veterinary medicine, teacher education, physics, and engineering). The symposium offers diversity in presentation given the study of a range of antecedents including student motivation, epistemological beliefs, and engagement. The papers present a cohesive set in (1) empirically investigating antecedents of productive collaboration and/or their relation to actual collaborative processes, (2) using novel theory-driven frameworks and (3) relying on rigorous methods that draw on two data sources (e.g., self-report surveys, interviews, video-taped observations) and accounting for two levels of analysis (i.e., group and individual level).

Students' epistemic beliefs about group process as antecedents for collaborative interactions

Presenting Author:Toni Rogat, Purdue University, United States; **Co-Author:**Ala Samarapungavan, Purdue University, United States; **Co-Author:**Clark Chinn, Rutgers University, United States; **Co-Author:**Temitope Adeoye, Purdue University, United States; **Co-Author:**Todd Shuba, Purdue University - West Lafayette, United States

One underlying antecedent of productive collaborative interactions may be students' epistemological beliefs about group learning as a reliable process for developing knowledge. Here, we are conceptualize the beliefs students hold about the role of groups for their individual learning and about the types of group interactions that benefit understanding. This can include beliefs ranging from how groups are best structured, to beliefs about forms of discourse, or beliefs about how learning can best be co-regulated. While previous work indicates epistemological beliefs influence employed strategies and learning, this research has focused on individual learning without considering social processes. Prior research suggests that group conceptions can be modified with opportunities to collaborate in the context of curriculum affording meaningful activity. However, previous studies rely on questionnaires, which do not elicit students' detailed beliefs, such as *how* and *why* interacting with peers enriches knowledge. In the current study, we examine the standards university students in veterinary medicine, with their group, report in open-ended surveys and interviews related to the (1) task product, (2) group strategies, and (3) group processes during collaborative activity in a problem-based learning units when solving authentic cases. Results indicate that when asked to discuss characteristics of good solutions to veterinary problems, students most frequently invoked the use of good group processes as a characteristic of good solutions. This indicates that students view the reliability of processes as an important indicator of high-quality solutions. This belief is very compatible with reliabilist approaches to epistemic cognition.

Interdependent impact of diverse motivational profiles in student-led collaborative learning

Presenting Author:Simone Volet, Murdoch University, Australia; **Co-Author:**Marja Vauras, University of Turku, Finland; **Co-Author:**Cheryl Jones, Murdoch University, Australia

While in student-led collaborative learning, group-level interaction analyses in relation to the quality of joint activity have unveiled meaningful patterns of cognitive engagement and key participatory roles, the antecedents of productive collaboration have received limited attention. Even less known is the impact of group members' antecedent motivational profiles relevant to the group activity. Our aim is to study how students with diverse profiles engage in and influence productive collaborative learning. Matched pre-post questionnaires were given to 108 first year university teacher students in a science unit including small group laboratory activities, which were video recorded. Based on seven motivation/affect variables (e.g., interest in science, science self-efficacy, science anxiety), four clusters were identified in both pre and post data: Vulnerable, Disengaged, Promising and Optimal. Evolving profiles were established on the basis of pre and post data clusters, e.g. Vulnerable becomes Disengaged or Promising Optimal. Four groups, differing in members' evolving motivational profiles, were analysed in terms of their on-going engagement. Two individual-level analysis methods (role and metacognitive regulation) were used to determine the quality of individual contributions towards productive group engagement. Associations of antecedents data (motivational profiles, prior science knowledge) to actual engagement (roles, regulatory functions) were examined at individual and group configuration level. Preliminary results indicate that individuals' motivational profiles as well as diversity of profiles within the group contribute to affording or constraining productive engagement. In discussion, we stress the systematic approach to understand the impact of motivational profiles in productive collaborative learning and for educational practice.

Investigating the antecedents to productive collaboration in physics teams

Presenting Author:Susanne Lajoie, McGill University, Canada; **Co-Author:**Maedeh Kazemitabar, McGill University, Iran; **Co-Author:**Emanuela Buonamici, McGill University, Canada

This exploratory study examines the antecedents to productive collaboration in physics teams (n=17) who compete at a one-day physics competition. Productive collaboration is based on social regulation as well as content regulation. In particular, we examine the teams' regulation processes during collaborative learning in the context of the social challenges faced during team work. An instrument designed to capture the nature of the regulation processes students employ during collaborative learning was used to capture students' goals for participating in the competition along with the challenges they experienced. Using a mixed methods case study approach we found that teams who reported lower levels of reported challenges were more effective at team collaboration. Preliminary results showed that apart from individual student goals, teams who demonstrated more team-based goals, had prior familiarity with each other, and collaborated with more instances of positive social emotional interactions ranked better in the competition.

The role of histories, contexts and interactions in shaping engagement

Presenting Author:Susan Nolen, University of Washington, United States; **Co-Author:**Milo Koretsky, Oregon State

University, United States

This research study focuses on the relationship between antecedents and productive collaborations in STEM contexts. Antecedents are often seen as characteristics or conditions prior to or at the start of the “main show,” in this case, collaborative learning. Taking a situative perspective, however, boundaries between “before” and “during” are not so clear cut. Histories of individuals and the groups in which they participate are continuous, stretching into the past and into the future, and interacting in a continuously moving “present.” We present a case study that examines the role of individual and group histories, along with affordances of the project, in shaping engagement and learning throughout a university capstone course for engineers. The implications of findings for designing projects bridging school and real world contexts are discussed.

Session A 14

29 August 2017 13:15 - 14:45

Pinni B - B1096

Symposium

Instructional Design

Designing tasks that foster learning

Keywords: Assessment methods and tools, Cognitive skills, Educational Psychology, Higher education, Instructional design, Reading comprehension, Writing / Literacy

Interest group: SIG 06 - Instructional Design

Chairperson: Antje Proske, TU Dresden, Germany

Discussant: Joerg Zumbach, University of Salzburg, Austria

A variety of tasks have been shown to enhance retention of information. However, learning requires more than rote memorization. Success in the classroom draws upon comprehension, integration, and transfer. In this symposium, we explore how tasks that leverage cognitive, metacognitive, and/or motivational processes can support these complex learning outcomes through active knowledge construction. As an introduction, we will discuss the distinction between on-line and off-line tasks, as well as the processes and products addressed in the extant body of memory, comprehension, and learning research. We then present empirical investigations of different conditions for effective learning tasks. First, we report on the importance of identifying task demands for learning success. Second, we show that encouraging learners to generate and answer questions by themselves is particularly effective for learning from text when learners generate deep-level questions or questions intended for tutoring. Finally, we discuss the benefits of answering questions on students' ability to use information from text in source-based essays. This symposium will foster discussion about the design of powerful educational interventions that promote active construction and deep understanding.

On-line and Off-line Tasks to Foster Learning from Text

Presenting Author: Danielle McNamara, Arizona State University, United States; **Co-Author:** Kathrin McCarthy, Arizona State University, United States; **Co-Author:** Scott Hinze, Virginia Wesleyan College, United States

This talk provides an introduction to this symposium focused on designing tasks to foster learning from text by providing background on learning in the context of comprehension research and theory to establish the types of processes and products involved in learning. Based on these foundations, we review tasks that enhance comprehension on-line (encoding during reading) or off-line (testing after reading). Despite the overlap in learning goals of on-line and off-line tasks, little research has directly compared these techniques or explored their potential interactions. Finally, we discuss potential future research on these types of tasks. These comparisons have strong potential to differentiate the mechanisms responsible for the benefits of comprehension tasks, while providing potentially powerful tools for educational interventions.

Measuring task model construction while working with multiple documents

Presenting Author: Jean-Francois Rouet, University of Poitiers, France; **Co-Author:** Raquel Cerdan, Faculty of Psychology, University of Valencia, Spain; **Co-Author:** Eduardo Vidal-Abarca, Universidad de Valencia, Spain; **Co-Author:** Silvia Giménez, University of Valencia, Spain

Theories of task-oriented reading assume that readers construct a representation of the task demands (or task model) that guides their decisions of what to read and how to read it. This study examined the role of undergraduate students' encoding of search questions in their success at responding the questions based on a set of three related texts on the topic of advertisement. Our main goal is to propose a measure that captures individual differences in task encoding. Forty first-year undergraduate students read three complementary texts on advertisement and answered ten comprehension questions. In addition, they were asked to solve a task model assessment on each question by indicating which paraphrase, among three options, better reflected what the question said. Results indicate that success in identifying task demands seems to be related to precision in answering and in learning from the texts. Suggestions for future research are provided.

Fostering Text Comprehension by Encouraging Students to Generate and Answer Their Own Questions

Presenting Author: Gregor Damnik, TU Dresden, Germany; **Co-Author:** Antje Proske, TU Dresden, Germany; **Co-Author:** Hermann Körndle, TU Dresden, Germany; **Co-Author:** Susanne Narciss, TU Dresden, Germany

Recent research has shown that encouraging students to generate and answer questions during studying an expository

text can foster students' comprehension to a great extent. However, different instructions may affect how well this learning technique promotes students' knowledge acquisition. In the present paper, two factors that may be mainly responsible for differences in this regard will be investigated. In a three-by-two factorial design participants had to either reread an expository text or to study this text and to generate and answer questions. If the latter was the case, participants were either trained to generate shallow or deep level questions. Furthermore, participants completed their assignment either for the purpose of tutoring or for their own knowledge acquisition. Results indicate that generating and answering questions is a powerful technique to foster students' comprehension. This is particularly true if students are instructed to generate questions for the purpose of tutoring or if they are encouraged to generate and answer deep level questions.

Improving academic writing by macro-structural questions that support source text comprehension

Presenting Author:Antje Proske, TU Dresden, Germany; **Co-Author:**Felix Kapp, TU Dresden, Germany; **Co-Author:**Susanne Narciss, TU Dresden, Germany

In academic writing writers often compose from sources. One possibility to support source-based essay writing is to provide questions which facilitate source text comprehension by initiating macro-strategies. In order to examine whether the provision of macro-structural questions during studying source texts leads to better results in academic writing both writing process and performance of a group supported by these questions was compared to a study-only group which read the source texts without answering questions. Results revealed that students provided with macro-structural questions wrote longer essays and spend significantly more time prewriting and writing/revising their essays than did the students of the study-only group. Studying source texts with macro-structural questions resulted in text products of better readability and partly better accuracy and coverage of content. These findings suggest that engaging students in answering macro-structural questions when reading source texts can positively affect both writing process and performance.

Session A 15

29 August 2017 13:15 - 14:45

Pinni B - B3109

Symposium

Lifelong Learning, Teaching and Teacher Education

Advances in studies on agency and development in educational settings; concepts and methods

Keywords: In-service teacher education, Informal learning, Lifelong learning, Qualitative methods, Quantitative methods, Teacher Professional Development, Workplace learning

Interest group: SIG 14 - Learning and Professional Development

Chairperson: Jeroen Imants, Radboud University Nijmegen, Netherlands

Discussant: Michael Goller, University of Paderborn, Germany

The aim of this symposium is to discuss advances in research on agency and development in educational contexts. Conceptual and methodological issues will be discussed, as well as their interrelationships. In current research many definitions and approaches of agency can be identified. A question is if diversity should be regarded as enriching, or as creating conceptual vagueness and complexity. Another question is how qualitative and quantitative methods are employed, and if this might be related to diversity in definitions and approaches. An educational issue is which role agency can play in development and innovation. Agency can be powerful in stimulating development in educational contexts. The transformative potential of agency can be restricted by structural aspects. The question is how agency research can illuminate this interplay between agency and educational context. In this symposium four studies are presented that shed light on these three questions. Two small scale studies analyze the role of agency in development and reform in complex and difficult educational settings. The third study analyzes methods that were applied in 11 research projects on agency in educational contexts. The fourth study develops a model in which agency is the linking concept between professional development and reform. Each paper will be presented with a focus on the three questions. Presentations are followed by questions and comments from the discussant, addressing the three question. Then, the presenters are invited to take place in an 'open fishbowl' to discuss the comments. Audience is invited to participate in this discussion format.

Agency-promoting leadership in transforming organizational practices in Finnish teacher education

Presenting Author:Päivi Hökkä, University of Jyväskylä, Finland

This study examines transforming teacher education by focusing on agency-promoting leadership in one Finnish teacher education department. In the framework of a subject-centred sociocultural approach, the study elaborates on the main challenges, pitfalls and insights in transforming teacher education practices into a more innovative model. Agency is understood to be manifested when professional subjects and/or communities make choices, take stances and have an influence on their work and professional identities. Agency-promoting leadership refers to the idea that educational organizations should be managed and led through communication, collaboration and interaction, highlighting people, relationships and learning, rather than strong management, externally set standards and accountability culture. The main data consist of videotaped group discussion, in which the four leaders of the teacher education department (the head, deputy, research leader and pedagogical leader) recall their shared leadership history and the most critical events in the department during 2006-2013. The data are analyzed via qualitative approaches, applying thematic analysis. The findings

imply that in leading teacher education transformations collective leadership is salient. In creating collective leadership leaders are asked to understand the meaning of professional identity and to renegotiate their professional identities as leaders. It is also critical that the leaders promote the professional agency of their personnel during the transformation processes. This study suggests that agency-promoting leadership can act as an intertwining coupling between organizational transformations and individual professional learning and identity renegotiation.

Exploring in-service teachers 'sense of agency: changes after participating in a Master program

Presenting Author:Giuseppe Ritella, University of Helsinki, Finland; **Co-Author:**Maria Beatrice Ligorio, Università degli Studi di Bari, Italy; **Co-Author:**Maria Antonietta Impedovo, Aix Marseille University, France

In this research we are interested in understanding changes in how sense of agency is expressed by in-service teachers coming from difficult socio-economic conditions, as consequence of participating in a Master program. A semi-structured interview was administrated to nine in-service teachers, coming from three African countries. The data collected was qualitatively analysed through a coding system based on five types of agency (Subjective, Relational, Epistemic, Transformative and Collective), all designed based on the existing literature. The five themes concerning agency are not mutually exclusive, considering the complexity of the concept and the difficulties in the operationalisation of the abstract concept of agency. Therefore, to assign the statements to the right type of agency, we combined a linguistic analysis (explicit meaning) with a discourse analysis (implicit meaning) by looking at different linguistic features such as the description of the speaker's desires and intentions. Teachers describe various types of agency, as expressed in their relationships to colleagues, students, and the community

Assessing contemporary research on agency—a methodological perspective

Presenting Author:Crina Damsa, University of Oslo, Norway; **Co-Author:**Dominik E. Froehlich, University of Vienna, Austria; **Co-Author:**Andreas Gegenfurtner, Technische Hochschule Deggendorf, Germany

In this presentation, we review eleven contemporary empirical research papers about agency in educational settings. Rather than giving a general impression of the methodological approaches used in the field, we focus on very recent research endeavors only--at the time of writing, all eleven papers are in press and part of an agency-themed edited volume. At the same time, these papers capture a large variety in terms of region (e.g., Australia, Belgium, Chile, Indonesia), industry (e.g., education, healthcare, information technology), methodological approaches (qualitative, quantitative, and mixed method approaches), and feature different flavors of the main concept (e.g., creative agency, relational agency, agentic feedback-seeking, transformative agency). This variety of contexts, methods, and concepts is what has potential to advance our understanding of the concept of agency. However, this variety also creates a problem of integration--how can empirical studies that are conducted in different contexts, with different methods, and with slightly different interpretations of the core concept be reconciled? In this review, we critically assess the empirical and methodological contributions and their theoretical and practical implications. This step of reflection and review is important, as the huge variety of pathways adopted to measure and conceptualize a focal phenomenon needs to be narrowed down to what works (in the given circumstances) to inform future research.

Bridging teacher professional development and school reform; the role of agency

Presenting Author:Jeroen Imants, Radboud University Nijmegen, Netherlands; **Co-Author:**Merel van der Wal, Radboud University Nijmegen, Netherlands

Teacher agency is identified as an important factor in professional development and school reform. In studies on workplace learning, the role of agency has recently gained attention. We developed a model in which professional development and school reform are linked by means of the concept of teacher agency and insights in workplace learning. The aim of this paper is to present and to use the integrated model as a tool to analyze and interpret assumptions in teachers' professional development and school reform research. Based on the model, an instrument is constructed and applied for the analysis of empirical studies on teacher professional development and school reform. 44 recent research articles on agency and reform / development were analyzed. Results show that the model is a dynamic framework to describe professional development and reform at both organizational and individual levels, and to explicate teachers' agentic role in the enactment of content and strategy of professional development and reform, and the interaction with outcomes. The model integrates agency in interaction with structural aspects and provides a conceptual connection between school reform and professional development literature. As such, it serves as an extension of previous theoretical models of professional development towards integration of change context and school context in in terms of workplace learning. Practically, the model provides an analytical framework to evaluate professional development and school reform from an agentic perspective. This offers opportunities for an all-round evaluation of professional development and school reform, initialized either top-down or bottom-up.

Session A 16

29 August 2017 13:15 - 14:45

Pinni B - B3110

Symposium

Learning and Social Interaction, Motivational, Social and Affective Processes

Interactions with teachers, peers and parents: joint contributions to child development in school

Keywords: Achievement, Developmental processes, Early childhood education, Motivation, Peer interaction, Social development, Social interaction, Teaching / instruction

Interest group: SIG 05 - Learning and Development in Early Childhood , SIG 10 - Social Interaction in Learning and Instruction

Chairperson: Karine Verschueren, KU LEUVEN, Belgium

Discussant: Erin McTigue, University of Stavanger, Norway

According to bio-ecological models, children's development is shaped by their relationships and interactions in their proximal environment. In preschool and elementary school, key social actors are teachers, peers, and parents. Whereas previous literature has supported the role of each of these relationships as a context for development, research on their interplay and joint impact on child development at school is lacking. Moreover, with regard to teacher-child interactions, the relative contribution of different interaction levels (i.e., dyadic vs. classroom) remains unclear. This symposium brings together four longitudinal studies from four countries that examine the joint effects of social interactions at different levels for children's behavioral and academic development. Interactions and relationships are assessed using observations and/or teacher reports. The first study ($N = 187$ children in 43 classes) examines the role of dyadic and classroom-level dimensions of teacher-student interactions for the development of preschoolers' language and self-regulation skills. The second study ($N = 237$ children in 36 classrooms) addresses the joint contribution of (dyadic and classroom-level) teacher-student interactions and peer likeability for kindergartners' behavioral development. The third study ($N = 228$ peer rejected Grade 5 students from 45 classes) investigates the role of dyadic teacher behavior for changes in rejected students' peer likeability and academic achievement. Finally, a cross-lagged longitudinal study ($N = 444$ students followed from Grade 4 to 6) investigates the reciprocal relations between teacher-child and mother-child relationships and children's behavioral and motivational adjustment. An expert in child academic development and social interactions will reflect on these studies' implications.

How do teacher emotional and autonomy support relate to child language and self-regulation skills?

Presenting Author: Marina Lemos, University of Porto, Portugal; **Co-Author:** Joana Cadima, University of Porto, Portugal;

Co-Author: Tiago Ferreira, University of Porto, Portugal; **Co-Author:** Teresa Leal, University of Porto, Portugal; **Co-**

Author: Karine Verschueren, KU Leuven, Belgium

In this study, we examine the extent to which teacher emotional and organizational/autonomy support at dyadic and classroom levels predict language and self-regulation skills in preschool. Participants were 187 children (49% boys; $M = 4.95$ years) attending 43 preschool classrooms and their respective teachers. Children were assessed at the beginning of the year with a self-regulation and vocabulary measure. Classrooms were observed using the Classroom Assessment Scoring System and rated on the overall emotional and organizational support. Teachers reported on levels of dyadic teacher-child closeness and autonomy. At the end of the school year, children were assessed using direct measures to tap vocabulary and self-regulation skills. Multilevel analyses indicated that closeness at the dyadic level made a positive significant contribution to vocabulary, after controlling for initial levels of vocabulary. In addition, dyadic autonomy support positively predicted self-regulation skills, after controlling for initial levels of self-regulation. Moreover, moderating effects for boys and girls were found such that girls benefit the most from close relationships regarding vocabulary growth. No effects of classroom-level processes were found. The findings underscore the importance of dyadic close relationships for fostering vocabulary in preschool, while individual autonomy support may be additionally important to foster children's ability to regulate their own behaviors. Findings have important implications for understanding the role of dyadic and classroom social processes on the development of language and self-regulation skills.

Peer acceptance and teacher-child interactions: Relative contribution to kindergartners' development

Presenting Author: Tessa Weyns, KU Leuven, Belgium; **Co-Author:** Hilde Colpin, KU LEUVEN, Belgium; **Co-**

Author: Sarah Doumen, Universiteit Hasselt, Belgium; **Co-Author:** Karine Verschueren, KU Leuven, Belgium

The present longitudinal study examined the joint effects of peer acceptance and individual and class-level teacher-child interactions on the development of externalizing and internalizing behaviors in kindergarten. A sample of 237 children (49% boys, $M_{age} = 5.19$ years) from 36 classrooms was followed during three waves in kindergarten. Individual and class-level teacher-child interactions were observed, while peer ratings were used to assess peer acceptance, and teacher ratings to assess child behavior. Multilevel modelling showed that children who were better accepted by peers at the start of kindergarten had lower levels of externalizing and internalizing behavior over time. Children who had more negative individual interactions with their teachers displayed higher levels of externalizing behavior throughout kindergarten, and children whose teacher displayed more sensitive interactions at class-level had lower levels of internalizing problems over time. Our study has several implications for further research and practice. Regarding research, it provides strong evidence for the inclusion of both individual and class-level teacher-child interactions, given the different associations of these two levels, and for the importance of including several dimensions of teacher-child interactions in future research. Regarding practice, our study underscores the value of involving several social actors in the school context for improving behavioral development of children.

Teacher behavior with peer-rejected students: Associations with peer status and academic achievement

Presenting Author: Marloes Hendrickx, Utrecht University, Netherlands; **Co-Author:** Tim Mainhard, Utrecht University,

Netherlands; **Co-Author:** Henrike Boor-Klip, Radboud University, Netherlands

Rejection by peers puts students at risk for limited academic achievement. The present study first explored teacher behavior and then examined the role of teacher behavior in changes in peer liking status as well as academic achievement for 228 peer-rejected students ($M_{\text{age}} = 10.47$). Frequency and valence of teacher behavior were observed, peer rejection and liking rating were measured using peer reports, and academic achievement was measured using standardized tests. Results of multilevel analyses showed that peer-rejected students had lower scores on the standardized tests and received higher frequency and more negative valence of teacher behavior. More positive teacher behavior was associated with an increase in peer liking ratings over time, but not with changes in academic achievement. In sum, teacher behavior did result in improved peer evaluations but this improvement was not (yet) reflected in increased school performance.

Children's behavioral and motivational adjustment: Relationship with mothers and teachers

Presenting Author:Eija Pakarinen, University of Jyväskylä, Finland; **Co-Author:**Riitta-Leena Metsapelto, University of Jyväskylä, Finland; **Co-Author:**Marja-Kristiina Lerkkanen, University of Jyväskylä, Finland; **Co-Author:**Anna-Maija Poikkeus, University of Jyväskylä, Finland; **Co-Author:**Jari-Erik Nurmi, University of Jyväskylä, Finland

Previous research highlights the benefits of warm and supportive relationships with caring adults for child adjustment. The present study investigated the cross-lagged associations between children's behavioral adjustment, task-avoidant behaviors and relationship with mothers and teachers in a sample of 444 Finnish students. Teachers evaluated children's internalizing and externalizing problems, prosocial behavior and task-avoidant behavior at the end of Grades 4 and 6, and also reported closeness and conflict in their relationship with a particular child. In addition, mothers reported affection and negative affect with their child and also rated children on task-avoidant behaviors. The results of cross-lagged path models showed that the higher the children scored on externalizing problems at Grade 4, the more conflict teachers reported in relationships with them two years later. Children's task-avoidant behaviors and teacher-rated conflict were reciprocally associated. Prosocial behavior was negatively predicted by a previous level of teacher-rated conflict. Mothers' negative affect was related to increased task-avoidant behaviors. Boys' prosocial behavior positively predicted whereas their externalizing problems negatively predicted subsequent maternal affection. High maternal affection was negatively related to girls' subsequent internalizing problems. Implications for educational practice and future research are discussed.

Session A 17

29 August 2017 13:15 - 14:45

Linna - K110

Symposium

Learning and Special Education

Cognitive determinants and association between arithmetic and reading

Keywords: Cognitive skills, Learning and developmental difficulties, Learning disabilities, Literacy, Mathematics, Metacognition, Numeracy

Interest group: SIG 15 - Special Educational Needs

Chairperson: Mikko Aro, University of Jyväskylä, Finland

Discussant: Ann Dowker, University of Oxford, United Kingdom

Deficits in mathematical abilities place a heavy burden on an individual's well-being and represent major costs to a nation's economics. In many cases mathematical difficulties co-occur with reading difficulties. Comorbid difficulties have been suggested to be more resistant to early support and can lead to serious long-term consequences for later school achievement and narrowing of one's societal and occupational prospects in adult life. Despite the importance of understanding the nature and development of difficulties in mathematics and reading, knowledge on underlying factors and stability of association across time is limited.

Varying operationalizations of math and reading skills have been proposed as one factor complicating interpretation of the previous findings related to cognitive correlates of mathematics, mathematical difficulties and their comorbidity with reading difficulties. In the present symposium the focus is in arithmetic calculation covering basic addition, subtraction and multiplication. Reading skill is operationalized as fluency in word list, sentence or text reading tasks. All four presentations cover both domain-specific factors (number-specific processes such as numerical magnitude processing) and domain-general factors (i.e. metacognition, processing speed or working memory).

This symposium will shed light on unexplored question of stability of the covariance between reading and arithmetic across the grades and extend current understanding of which cognitive factors underlie individual differences in basic arithmetical skills and it's covariance/comorbidity with reading. This is important in order to provide a solid basis for designing scientifically validated diagnostic tests and remediation programs for children at risk

Domain specific and general cognitive correlates of arithmetic and it's covariance with reading

Presenting Author:Tuire Koponen, University of Jyväskylä, Finland; **Co-Author:**Jonna Salminen, University of Jyväskylä, Finland; **Co-Author:**Riikka Heikkilä, University of Jyväskylä, Finland; **Co-Author:**Mikko Aro, University of Jyväskylä, Finland

Understanding of the factors that underlie the development of fluency in arithmetic and it's covariance with reading fluency is limited. This study examined domain-specific and domain-general cognitive factors related to arithmetic fluency as well

as it's covariance with reading fluency at the end of the 1st Grade. Two hundred Finnish 7-year-old ($M = 92.7$ months, $SD = 3.5$ months) children were assessed in domains of number skills (verbal counting, number writing and number comparison), language skills (phonology, rapid naming and letter knowledge), memory (verbal short term memory and working memory) and processing speed. The relations between measures were modeled in a structural equation model (SEM) framework using the Mplus 7.4 program (Muthén & Muthén, 1988–2015). Of the skills assessed, verbal counting skill had strongest association with arithmetic as well as it's covariance with reading fluency. Also phonology, number comparison, working memory and processing speed were associated both with arithmetic fluency as well as it's covariance with reading. Moreover, number writing was related to arithmetic fluency but not it's covariance with reading fluency. This finding supports the view that the relation between verbal counting and the development of fluency in reading and arithmetic is not accounted by phonology, working memory or speed of processing, which have all been suggested as possible contributors for the cross- domain predictive power of verbal counting skill. **Keywords:** arithmetic fluency, reading fluency, cognitive skills, verbal counting

Concordance Between Reading and Arithmetic Skills: Stability and Change from Grade 1 to Grade 7

Presenting Author:Heidi Korpipää, University of Jyväskylä, Finland; **Co-Author:**Tuire Koponen, University of Jyväskylä, Finland; **Co-Author:**Mikko Aro, University of Jyväskylä, Finland; **Co-Author:**Kaisa Aunola, University of Jyväskylä, Finland; **Co-Author:**Asko Tolvanen, University of Jyväskylä, Finland; **Co-Author:**Anna-Maija Poikkeus, University of Jyväskylä, Finland; **Co-Author:**Marja-Kristiina Lerkkanen, University of Jyväskylä, Finland; **Co-Author:**Jari-Erik Nurmi, University of Jyväskylä, Finland

The present study aimed to examine the extent to which there is stability in the concordance between reading and arithmetic skills from Grade 1 to Grade 7. The reading and arithmetic skills of a total of 1,335 Finnish children were assessed at the end of Grade 1 and again at the end of Grade 7. Stability and change in this concordance of skills were also examined with respect to the following predictors: linguistic skills (phonological awareness, letter knowledge, rapid automatized naming (RAN)), basic number skills (counting), general cognitive abilities (working memory, nonverbal reasoning) and parental education level. All predictors except working memory and nonverbal reasoning were measured when the students were in kindergarten. The results showed that there was substantial stability in the concordance of reading and arithmetic skills from primary school (Grade 1) to secondary school (Grade 7). This stability was predicted by letter knowledge, RAN, counting, working memory, and nonverbal reasoning. Unstable, time-specific concordance in Grade 1 was predicted by reading and arithmetic pre-skills including phonological awareness, letter knowledge, and counting, whereas time-specific concordance in Grade 7 was predicted by parental education level and nonverbal reasoning.

Keywords: Reading, arithmetic, concordance, comorbidity, development

Learning from your mistakes:Associations between cognitive control, metacognition and arithmetic

Presenting Author:Elie Bellon, KU Leuven, Belgium; **Co-Author:**Wim Fias, University of Ghent, Belgium; **Co-Author:**Bert De Smedt, KU Leuven - University of Leuven, Belgium

We investigated the theoretically appealing, but empirically little explored association between cognitive control and arithmetic. As arithmetic facts are stored in an associative network, incorrect but competing answers have to be inhibited when retrieving the answer. Consequently, individual differences in cognitive control are expected to contribute to individual differences in arithmetic fact retrieval. An important factor that has been often neglected in theoretical models of cognitive control, but received a lot of attention in educational research, is metacognition (i.e., the ability to assess one's own cognitive knowledge). To the best of our knowledge, there are no studies that have investigated the joint roles of cognitive control and metacognition in children's arithmetic. Furthermore, their unique roles in addition to the well-known domain-specific determinant of arithmetic, numerical magnitude processing, remains unclear. We investigated this issue in 127 typically developing 2nd graders. Our data revealed that inhibition (an aspect of cognitive control), calibration of confidence (a measure of metacognition) and numerical magnitude processing were significantly related to addition and multiplication. Regression analyses revealed that calibration of confidence and numerical magnitude processing remained unique predictors of addition and multiplication, and that inhibition was a unique predictor of addition. These data stress the importance of children's calibration of confidence, which should be considered as an important variable in studies on children's arithmetic performance. From an educational point of view, children can be instructed to identify their own mistakes, which consequently will improve their arithmetic performance.

Cognitive correlates of dysfluency in arithmetic and reading

Presenting Author:Jonna Salminen, University of Jyväskylä, Finland; **Co-Author:**Tuire Koponen, University of Jyväskylä, Finland; **Co-Author:**Riikka Heikkilä, University of Jyväskylä, Finland; **Co-Author:**Mikko Aro, University of Jyväskylä, Finland

This study examined cognitive correlates related to dysfluency in calculation (MD) and reading (RD), and comorbid fluency problems (MDRD) with regard to arithmetical operation used in classification of problems (addition vs subtraction). The group of children with MD ($N = 21$ / $N = 18$), RD ($N = 18$), and MDRD ($N = 14$) were compared in terms of domain-specific (numeracy and language) and domain-general cognitive skills (working memory, short-term memory and processing

speed). Results showed expected differences between MD and RD groups in domain-specific skills. RD group was slower in naming objects and letters than MD, and MD group was weaker in number comparison than RD but only when subtraction was used in defining MD. When addition was used in defining MD single-deficit groups (MD and RD) were more similar and they differed only in letter naming, where MD group was faster. Several differences in domain-specific and domain-general skills were found between MD and MDRD as well as between RD and MDRD groups. In sum, the overlap and specificity of the cognitive skills in children with MD, RD, and MDRD should be examined in more detail with regard to arithmetical operation type defining MD in order to better take into account the individual cognitive profiles when developing tailored educational support.

Session A 18

29 August 2017 13:15 - 14:45

Pinni B - B4116

Symposium

Cognitive Science

Multiple influences of language on number skills and mathematics achievement

Keywords: Achievement, Developmental processes, Early childhood education, Language (Foreign and second), Language (L1/Standard Language), Learning and developmental difficulties, Mathematics, Numeracy, Reading comprehension

Interest group:

Chairperson: Camilla Gilmore, Loughborough University, United Kingdom

Chairperson: Iro Xenidou-Dervou, Loughborough University, United Kingdom

Discussant: Bert Reynvoet, KU LEUVEN, Belgium

Both domain-specific (e.g. magnitude representations) and domain-general (e.g. executive function) cognitive skills play an important role in symbolic number processing skills and contribute to individual differences in mathematics learning and achievement. One important domain-general skill, which is receiving increased research interest in recent years, is language. In this symposium we will explore the role of language in symbolic number skills at multiple levels and in multiple populations. We will consider both the role of mathematical language skills in predicting individual differences in preschool (Paper 1) and school-aged (Paper 2) children's acquisition of early number skills. We will also explore whether the effects of language persist throughout development. Specifically, we will show the ways in which language differences continue to influence symbolic number processing by examining English-Chinese adult bilinguals (Paper 3) and Dutch-speaking, compared to English-speaking, adults (Paper 4). Using a variety of methodologies and across different populations, the papers in this symposium reveal that language is an important, and often overlooked, factor in understanding mathematical performance. Uncovering the role of language on symbolic number processing skills is important, not only to better understand the factors that contribute to individual differences in mathematics learning and achievement, but also because language influences can shed light on the nature of symbolic number representations and processing.

Risk Classification for Low Mathematics Performance in Preschool: The Role of Mathematical Language

Presenting Author:David Purpura, Purdue University, United States; **Co-Author:**Elizabeth Wehrspann, Purdue University, United States; **Co-Author:**Amy Napoli, Purdue University, United States; **Co-Author:**Sara Hart, Florida State University, United States

Early mathematics skills are a critical aspect of school readiness. Unfortunately, many children struggle to acquire these skills, and difficulties in mathematics appear early and persist. Theoretical and empirical evidence has pointed to deficits in domain-specific skills (e.g., non-symbolic mathematics skills) or domain-general skills (e.g., language and executive functioning) as being the underlying cause of mathematical difficulties (MLD). However, some researchers have suggested that there may be multiple factors either separately or jointly underlying MLD. In the current study, we assessed a sample of 114 three to five year old preschool children on a battery of domain-specific and domain-general factors in the fall and spring of their preschool year to identify time 1 (fall) factors associated with low performance in mathematics knowledge at time 2 (spring). We used classification and regression tree analyses, a strategy that uses step-wise partitioning to create subgroups from a larger sample using multiple predictors, to identify the factors that were the strongest classifiers of performance for younger and older preschool children. Results indicated that the most consistent classifier of low mathematics performance at time 2 was children's time 1 mathematical language skills. Further, distinct classifiers of low performance emerged for younger and older children. Time 1 executive functioning skills and print knowledge were common classifiers for younger preschool children and time 1 general vocabulary and mathematics knowledge were common classifiers for older preschool children. Ultimately, these findings suggest that MLD may be multifaceted and that risk classification may differ depending on children's age.

Reading and math abilities differentially predict math competencies in young children

Presenting Author:Jacob Paul, The University of Melbourne, Australia; **Co-Author:**Robert Reeve, University of Melbourne, United Kingdom

Children's emerging math abilities depend on different cognitive competencies (core number, executive function and language abilities). Given early math ability comprise different competencies, it is unclear whether the same set of cognitive

markers are important for all math skills. To examine this issue, we assessed 267 6-year-olds standardised math and reading competence tests, as well as visuo-spatial working memory and core number (dot enumeration, number comparison) abilities. We also assessed their number fact retrieval speed and ability to read number strings (e.g., “3407”) at 6, 7 and 8 years. Arguably, single digit number fact abilities and reading number string abilities are associated with different cognitive abilities. We suggest number fact speed would be more associated with general math ability, while reading number string abilities would be more associated with reading ability. It is also important to determine whether general vocabulary and math test jointly predict the two math abilities, independent from different number-specific and general cognitive markers. To investigate these possibilities, we used a random intercept cross-lagged panel model to identify the reciprocal influences of number-specific and general cognitive markers in predicting reading number strings and number fact fluency. Findings show dot enumeration and general math ability predicted number fact fluency; and vocabulary and general math ability predicted the ability to read number strings. Along with dot enumeration ability, it is evident the entering school math and reading tests have utility in differentially predicting different early math competencies.

Number Word Processing in English-Chinese Bilinguals

Presenting Author:Becky Wong, National Institute of Education, Singapore; **Co-Author:**Rebecca Bull, National Institute of Education, Singapore, Singapore

Symbolic number processing and transcoding is a foundational numerical ability used in daily life. Yet, the cognitive mechanism that underlies this ability remains under debate, as seen from the plethora of models in the field of numerical cognition. Using bilingual number words as a case in point, the present study examines the cognitive mechanism underlying the processing and transcoding of English and Chinese number words among bilingual adults who show a balanced profile of language dominance. Potential participants (N = 110) completed a pre-screening questionnaire to assess their language dominance. 22 of those identified as balanced bilinguals participated in the rest of the behavioural study. First, we investigated whether participants could intentionally employ a semantic route to process and transcode pure English (e.g., “five six”), pure Chinese (e.g., “ ”), and / or mixed (e.g., “five ”) number words. Next, we investigated whether the semantic system that supports bilingual number word processing and transcoding is sensitive to the notation in which the number words are presented in (i.e., notation dependent) or not (i.e., notation independent). Our results indicate that balanced bilinguals can intentionally employ a semantic route for processing and transcoding pure English, pure Chinese, and mixed notation number words. Additionally, in support of early models of numerical cognition (e.g., Dehaene & Cohen, 1995), our study is one of the first to find behavioural evidence that the semantic system which supports bilingual number word processing and transcoding is notation independent.

Language effects on adults’ number line processing: An eye-tracking study

Presenting Author:Iro Xenidou-Dervou, Loughborough University, United Kingdom; **Co-Author:**Lieven Verschaffel, K.U.Leuven, Belgium; **Co-Author:**Koen Luwel, KU Leuven, Belgium; **Co-Author:**Camilla Gilmore, Loughborough University, United Kingdom; **Co-Author:**Ernest Van Lieshout, VU University Amsterdam, Netherlands

Understanding the cognitive factors that influence the way we process numbers is important given how fundamental numeracy is for education and our everyday lives. To date, cross-linguistic research with children has shown that language is one of those factors. In adults, however, the role of language has been unclear. Number-naming systems vary significantly across languages. For example, in Dutch for two-digit numbers (above twenty), the unit is named first, followed by the decade (e.g., 52 is “tweeënvijftig”). This is known as the “inversion property” and studies with children have shown that it can overload their Working Memory (WM) and negatively affect their number processing skills. Our aim was to examine the effects of language on adults’ number line processing. We conducted an eye-tracking experiment with Dutch- and English-speaking adults asking them to estimate the position of two-digit numbers on a 0-100 number line under two conditions: with and without WM load. Contrary to our expectations, Dutch adults did not take more time to move their eyes to the number line when hearing two-digit number-names compared to the English participants. Both groups’ performance dropped in the WM load condition. But, in both conditions, Dutch-speaking adults’ first fixation on the number line was further away from the correct response compared to the English-speaking adults. Even though we intuitively expect that number names are fully automatized by adulthood, our findings suggest that WM and language can affect adults’ basic number line processing.

Session A 19

29 August 2017 13:15 - 14:45
Main Building D - D13
Symposium
Higher Education

Mixing Methods for Advancing Higher Education Research

Keywords: Achievement, Communities of learners, Design based research, Developmental processes, Higher education, Mathematics, Mixed-method research, Pre-service teacher education, Qualitative methods, Quantitative methods, Student learning

Interest group: SIG 04 - Higher Education

Chairperson: Miriam Barnat, University of Hamburg, Germany

Discussant: Judith Schoonenboom, University of Vienna, Austria

Higher education research can serve to legitimise policy decisions. At the same time, the idea of evidence-informed policy and practice is highly debated, because of the complexity of teaching and learning (Biesta, 2010). Mixed Methods research may provide adequate information for political decisions as it draws a nuanced picture of the intricacies of education exceeding the limits of quantitative and qualitative approaches. For obtaining this added value the literature provides detailed methodological guidance for the general design of Mixed Methods studies (Teddle & Tashakkori, 2009). However, integrating results gained with different kinds of methods during the course of a particular research project still poses considerable challenges, for example creating meta-inferences. Focussing on the effects of educational interventions directed at students or educational developers, the presentations use - inherently mixed - network data (Presentation 1), integrate interview and survey data (Presentation 2 & 3), or combine all three kinds of data and the respective analyses (Presentation 4). The contributors present different solutions to the challenges of integrating the results. Hence, the symposium brings together a range of studies in order to discuss the potential and challenges of Mixed Methods for advancing higher education research.

References:

Biesta, G. J. J. (2010): Why 'What Works' still won't work: From evidence-based education to value-based education. In: *Studies in Philosophy and Education*, 29, 5, pp. 491-503. Teddle, C., & Tashakkori, A. (2009). *Foundations of mixed methods research: Integrating quantitative and qualitative approaches in the social and behavioral sciences*. Thousand Oaks: Sage.

Help seeking and friendship in learning community networks

Presenting Author: Jasperina Brouwer, University of Groningen, Netherlands; **Co-Author:** Andreas Flache, University of Groningen, Netherlands; **Co-Author:** Ellen Jansen, University of Groningen, Netherlands; **Co-Author:** Adriaan Hofman, University of Groningen, Netherlands; **Co-Author:** Christian Steglich, University of Groningen, Netherlands

Learning Communities (LCs) are a common example of small-scale teaching and are assumed to facilitate academic relationships and friendship among students. Derived from Tinto's interactionalistic model that academic and social relationships contribute to achievement, special attention is given to the antecedents of relationships building in the networks in LCs. The current study addresses the research question who do students ask for academic support and to what extent do LCs contribute to establishing academic support and friendship relationship? The sample consists of eight learning communities with 95 first-year students and answered two social network questions, respectively about help seeking and friendship. Longitudinal social network analysis, i.e., stochastic actor based modelling, shows that it is more likely that students ask their similar achieving friends and from the same sex for academic support and friendship. Compared to lower achieving students, higher achieving students ask their fellow students more for academic support but have also more friends. In the first semester they seek help in their learning community, but compared to the first semester, in the second semester it is more likely that they ask for academic help outside their learning community. We do not find a significant effect for LCs on the academic support relationships and friendships.

A Mixed Methods approach to evaluate the effectiveness of mathematics teacher education in Germany

Presenting Author: Nils Buchholtz, University of Oslo, Norway

In a longitudinal evaluation study at several German universities a.o. the acquisition and development of mathematical pedagogical content knowledge (MPCK) of future mathematics teachers was investigated (Buchholtz & Kaiser, 2013). The study is a German supplementary study of the international comparative TEDS-M 2008 study on the professional competence of future mathematics teachers (Tatto et al. 2012). On the one hand the development of the MPCK of future teachers from first-year cohorts of five universities was surveyed longitudinally using quantitative instruments relating to TEDS-M 2008. Additionally, it was examined in qualitative oriented interviews, what individual perceptions the future teachers have of courses on mathematics education. As a result, different systematic perceptions could be identified that could be assigned to the characteristics of university courses on mathematics education. Through the combination of data from the instrument-driven survey and from the interviews relationships between knowledge acquisition and perceptions could be described that indicate aspects of effective teacher education in courses on mathematics education. Hereby the future teachers' explanations provided an interpretation background for the development of their MPCK.

Combining methods to study the effects of first-year support on students' academic competence

Presenting Author: Elke Bosse, University of Hamburg, Germany; **Co-Author:** Miriam Barnat, University of Hamburg, Germany

For a comprehensive understanding of study success and the transition into higher education, research needs to gain insights into the complex interplay of individual and contextual factors (Heublein, 2014). While the existing research on individual factors (Richardson, Abraham, & Bond, 2012) allows testing hypothesis based on a quantitative approach, qualitative studies may serve to further explore the role of contextual factors. To combine both perspectives, mixed-methods research suggests creating meta-inferences, i.e. to integrate quantitative and qualitative data (Tashakkori & Teddle, 2009). Based on a study that investigates the effects of first-year support on the development of academic competence in German higher education, the paper demonstrates the benefits as well as the challenges of mixed-methods research. Combining a longitudinal student survey and interviews, the study confirms empirical findings in the field (e.g.,

the relevance of learning strategies) and complements them with insights into the role of support programmes (e.g., study skill workshops).

Using mixed methods to support educational design decisions in 'bad data' contexts

Presenting Author: Tobias Jenert, University of St.Gallen, Switzerland

Educational research is often conducted in practical contexts such as schools or higher education institutions and aims to contribute to the development of instructional designs or programmes. Consequently, there have been repeated attempts to methodologically integrate the design aspect into educational research leading to concepts such as design-based research. Ideally, design decisions are based on clear evidence, obtained through an analysis of data gathered from the intervention. In actual projects, however, design decisions often have to be taken based on data that is incomplete, ambiguous or not meeting established scientific quality standards. We illustrate and discuss examples of an actual design research project where design decisions had to be taken in such 'bad data' contexts. Examples include different mixed methods configurations that helped to increase the interpretability and practical significance of the data. We will discuss methodological variants of 'mixing' and triangulation such as combining quantitative and qualitative data or applying different analyses on a dataset. In addition, we discuss limitations regarding the consistency between data, design decisions, and resulting effects.

Session A 20

29 August 2017 13:15 - 14:45

Main Building C - C6

Symposium

Learning and Instructional Technology

Processing dynamic visuospatial information: influences of hand proximity and multi-touch gestures

Keywords: Cognitive skills, Comprehension of text and graphics, Computer-assisted learning, Experimental studies, Instructional design, Learning Technologies, Multimedia learning

Interest group: SIG 02 - Comprehension of Text and Graphics

Chairperson: Romy Brömme, Leibniz-Institut für Wissensmedien, Germany

Discussant: Paul Ginns, University of Sydney, Australia

Multi-touch devices like tablets are increasingly important in educational contexts. During multi-touch interaction, users' hands are inherently near to the displayed information. Prior research shows faster and more accurate reactions with hands near to static visuospatial stimuli than with far hands (Abrams, Weidler, & Suh, 2015). Brömme et al. and Brucker et al. investigated the relevance of this near hand effect when extracting complex visuospatial information from dynamic visualizations. With hands near to dynamic visualizations participants not only better accomplished an attentional monitoring task (Brömme et al.), but they were also superior in learning task-relevant information in two domains (Brucker et al.). For a perceptual domain, the latter effect only holds true for high-visuospatial-ability learners. Gauthier and Bétrancourt as well as Blanqui et al. investigated the near hand effect regarding direct interaction in 3D-object-rotation tasks via direct multi-touch gestures, mouse or keyboard interaction or in an automatic condition without control. Whereas Blanqui et al. showed that the automatic condition was worse during training compared to all conditions with control (multi-touch, mouse, keyboard), Gauthier and Bétrancourt found a moderating role of visuospatial abilities on training and task performance: Low-visuospatial-ability participants profited from keyboard interaction, whereas high-visuospatial-ability participants profited from mouse and multi-touch interaction. To conclude, there seems to be a near hand effect for attentional processing and learning of visuospatial information from dynamic visualizations, but a less convincing effect regarding direct interaction with virtual objects. Additionally, beneficial effects of hand proximity are more likely to occur for high-visuospatial-ability participants.

Hands on and action: Near-hand film presentation boosts attentional control on multi-touch devices

Presenting Author: Romy Brömme, Leibniz-Institut für Wissensmedien, Germany; **Co-Author:** Birgit Brucker, Leibniz-Institut für Wissensmedien (IWM), Germany; **Co-Author:** Peter Gerjets, University of Tuebingen, Germany

Previous research revealed preferential attentional processing of static visuospatial objects near the hands that might be the result of enhanced perceptual-driven bottom-up or cognitive control-driven top-down processes. The current study investigated whether this hand proximity bias also applies to dynamic information, for example in films or animations. The Monkey Business illusion (Simons, 2010) was used to differentiate between bottom-up (detection of unexpected events) and top-down (accomplishment of a monitoring task) processes of attention. An enhanced task-relevant processing in the monitoring task was hypothesized, because of a fostered attentional (top-down) control when the film was presented near the hands. Participants watched the film once on a tablet PC by either touching the tablet at both sides (near hand) or laying their hands on their lap (far hand). As expected, the monitoring task was accomplished more often correctly when the film was presented near the hands. This result pattern indicates a stronger attentional control for task demands in dynamic multi-touch environments. Thus, training and instructional videos that afford a high amount of attentional resources should be touched directly to ensure a more effective processing and elaboration of the dynamic material.

Learning on multi-touch devices: Is directly touching dynamic visualizations helpful?

Presenting Author:Romy Brömme, Leibniz-Institut für Wissensmedien, Germany; **Co-Author:**Birgit Brucker, Leibniz-Institut für Wissensmedien (IWM), Germany; **Co-Author:**Sarah-Christina Weber, Leibniz-Institut für Wissensmedien (IWM), Germany; **Co-Author:**Peter Gerjets, University of Tuebingen, Germany

There is strong evidence that visuospatial processing and also learning is fostered near the hands. This near-hand effect is particularly of interest during interacting with information on multi-touch devices, because on these devices usually the hands are used to interact with digital objects and thus, the hands are near to the displayed information. Two studies addressed the question whether the near-hand effect also occurs during interacting with dynamic visualizations in two domains (perceptual vs. conceptual). Participants interacted in the first experiment with videos (perceptual domain: human movements) and in the second experiment with animations (conceptual domain: biological processes) on a multi-touch monitor and were in both studies randomly assigned to one of two conditions (hand proximity: near vs. far). Participants either held their hands constantly at the dynamic visualizations during their whole playtime (near) or they placed their hands into their lap while they watched the dynamic visualization (far). Moreover, the visuospatial abilities of the participants were assessed as a potential moderator during learning with dynamic visualizations. Results showed a near-hand effect in both experiments: In the first experiment only participants with higher visuospatial abilities in the near hand condition showed better learning in terms of recognition performance, whereas in the second experiment participants in the near hand condition generally showed better learning in terms of decomposition performance. These findings give first evidence that the near-hand effect also occurs for perceptual and conceptual learning from dynamic visualizations.

Impact of visuospatial abilities and interaction device in learning to manipulate 3D virtual objects

Presenting Author:Mireille Betrancourt, University of Geneva, Switzerland; **Co-Author:**Damien Gauthier, University of Geneva, Switzerland

Many disciplinary domains involve the understanding and manipulation of computerized 3D objects that can be tough to acquire for some students. An experimental study was conducted to investigate whether the type of interaction modality (keyboard, mouse and touchscreen) had an impact on learning to perform manipulation tasks on 3D virtual objects for participants with low or high visuospatial abilities (median split using the scores obtained to the Mental Rotation Test prior to the experiment). According to the literature, it was expected that touchscreen interaction, that involves meaningful gestures, would be the most effective and preferred mode of interaction, especially for participants with low visuospatial abilities. The participants (N = 36) learned to manipulate the 3D objects during a 10-trial training phase with one of the three interaction modalities. Then they performed the same manipulation task on 12 trials but without feedback, using the same modality as in the training phase. Regarding performance in accuracy during training, there was no effect of interaction modality or visuospatial abilities. However, a significant interaction between the two factors was found, with participants with low visuospatial abilities achieving the best accuracy using the keyboard and participants with high visuospatial abilities achieving higher performance with mouse and touchscreen. The same interaction pattern was found in the test phase. Interestingly, the participants, though they used only one interaction modality in this experiment, massively expressed preference for the touchscreen.

Influence of MultiTouch gestures on the 3D rotation of a figure in an embodied cognition approach

Presenting Author:Didier Blanqui, University of Toulouse, France; **Co-Author:**Franck Amadieu, University of Toulouse, France; **Co-Author:**Claudette Mariné, University of Toulouse, CLLE, France; **Co-Author:**Mireille Betrancourt, University of Geneva, Switzerland

The aim of this study was to investigate the effect of MultiTouch gestures on strategies and performance in a visuospatial task. The task was adapted from Shepard and Metzler's (1971) mental rotation task and consisted in judging whether two 3D virtual objects presented in different positions in space were the same or different. Four conditions were compared depending on the type of interaction implemented to rotate the object: keyboard, mouse, MultiTouch interaction or automatic rotation (no user control). Regarding MultiTouch interaction, a congruent gesture, similar to a real rotation gesture, was developed for rotating the object along one axis. Following an embodied cognition approach, we assumed that training with user control conditions should be more effective to the development of visuospatial abilities. In addition, MultiTouch interaction should favour perceptive strategies (visual alignment of the objects) due to the congruent gesture while the other modes should more promote mental rotation strategies. The Vandenberg and Kuse's mental rotation test was administered before and after the training. During training, automatic rotation lead to lower performance and more mental rotation strategies than the three conditions with user control. However, there was no difference between the three types of interactions with user control.

Session A 21

29 August 2017 13:15 - 14:45

Main Building A - A3

Symposium

Cognitive Science, Learning and Instructional Technology

Trajectories towards adaptive expertise: connecting school mathematics and out-of-school experiences

Keywords: Cognitive development, Cognitive skills, Computer-assisted learning, Developmental processes, Mathematics, Numeracy

Interest group:

Chairperson: Erno Lehtinen, University of Turku, Finland

Organiser: Erno Lehtinen, University of Turku, Finland

Discussant: Camilla Björklund, University of Gothenburg, Sweden

Studies of the use of mathematical knowledge in the rapidly changing working life refer to the importance of the ability to deal with mathematics in novel, conceptually demanding, and partly messy situations. This emphasizes that people should develop capabilities to use their mathematical skills in a highly adaptive and flexible way in novel situations in which the salient mathematical aspects are not explicitly apparent. Mathematical skills needed in changing work environments will not be developed through traditional classroom teaching alone, as the nature of the needed mathematical skills is changing. Many researchers have presented that this type of flexible and innovative use of mathematical knowledge, typical for professional mathematicians, should be an important aim also for school learning. In this symposium we focus on the trajectories of the adaptive use of mathematical skills in school learning and summarize findings of studies in which non-conventional methods are used in order to overcome the limitations of traditional school mathematics. First paper presents evidence of a broader form of arithmetic problem solving skills, which takes into account students' abilities to apply multiple procedures in an adaptivity way. Next paper report on an effective means to enhance adaptivity with arithmetic through a computer game. Third paper provides evidence of the possibilities to enhance students' reflectiveness in modeling word problems through humor. Finally the last paper provides an overview of a research line which examines how to extend mathematical education outside the normal bounds of the classroom.

Developing calculation flexibility in multi-digit division – a latent transition analysis

Presenting Author: Andreas Schulz, Zurich University of Teacher Education, Switzerland; **Co-Author:** Timo Leuders, University of Education Freiburg, Germany

The aim of this study is to shed light on learning trajectories within the development of calculation flexibility in multi-digit division. During an intervention, 209 fourth graders first discovered, then compared and practiced division strategies. Latent classes and transition probabilities concerning the use of distinguishable strategies were identified. Furthermore, students' abilities in reasoning about number relations were assessed. It was shown that students with lower reasoning abilities had only a slim chance of developing flexibility, whereas students with higher reasoning abilities had a substantial chance. In particular, children's abilities in the pretest in using $10 \times N$ patterns alone do not facilitate the further development of flexibility. However, abilities in using the split and add strategy appear to be an important stepping stone towards the flexible use of more advanced shortcut strategies and for the development of flexibility in multi-digit division.

The Effects of the Number Navigation Game on the Development of Adaptive Number Knowledge

Presenting Author: Boglarka Brezovszky, University of Turku, Finland; **Co-Author:** Jake McMullen, University of Turku, Finland; **Co-Author:** Minna M Hannula-Sormunen, University of Turku, Finland

It is suggested that in order to develop adaptive expertise with arithmetic problem solving, instruction should place more focus on practice with different combinations of numbers and operations. This practice should enhance students' adaptive number knowledge, described as students' recognition and flexible and adaptive use of different numerical characteristics and relations during problem solving. The aim of this study was to examine the effects of the Number Navigation Game (NNG), a game-based learning environment in the enhancement of elementary school students' adaptive number knowledge and general arithmetic skills such as arithmetic fluency and pre-algebra knowledge. Participants of the study were 1168 four, five and sixth grade students. Classes were randomly assigned to experimental ($n = 642$) and control ($n = 526$) groups. The experimental group played Number Navigation for ten weeks while the control group participated in regular mathematics instruction. Both groups completed paper-pencil pre- and post-tests of adaptive number knowledge, arithmetic fluency and pre-algebra knowledge. Results show that the experimental group improved more than the control group on all the measured mathematical learning outcomes. Results also showed a variation in the effectiveness of the intervention across different skills in the three grade levels. These results are in line with previous research, showing small general but stronger specific effects when looking at sub-groups, suggesting that focus should rather be placed on exploring more specific questions regarding the effectiveness of game-based interventions.

Is it real, or a joke? Realistic considerations to word problems in a test versus a humor setting

Presenting Author: Wim Van Dooren, KU Leuven, Belgium; **Co-Author:** Lieven Verschaffel, Katholieke Universiteit Leuven, Belgium

Research has shown that learners have a strong tendency to exclude real world considerations when solving word problems. In this study, we investigated whether children would adapt their behavior when solving word problems in which realistic considerations are required (P-items) when these problems are embedded in a humoristic context as compared to when they are offered a typical word problem solving context. 148 sixth graders solved four P-items in a humor condition versus in a word problem condition. It was found that significantly more realistic responses were given in the humor condition than the word problem condition, and this was the case for 3 of the 4 administered problems. Suggestions for further research and potential implications for classroom instruction will be discussed.

Approaching basic mathematics in a non-conventional way

Presenting Author:Erno Lehtinen, University of Turku, Finland; **Co-Author:**Minna M Hannula-Sormunen, University of Turku, Finland; **Co-Author:**Jake McMullen, University of Turku, Finland; **Co-Author:**Nonmanut Pongsakdi, University of Turku, Finland; **Co-Author:**Boglarka Brezovszky, University of Turku, Finland

The standard way to teach school mathematics is not providing citizens with the adaptive and flexible mathematics literacy needed in future society and working life. We have conducted a series of studies in which children and school pupils approach mathematical skills in a non-conventional way. In the first study, small children in day care used a tablet game (Fingu) to deal with number pattern and then the same figures and number combinations (adapted from the game) were connected to their regular everyday activities. In the second study, mathematics training was integrated with a strategic computer game environment in which there were no ready-made mathematics tasks but students had to create and solve their own tasks in order to conduct arithmetic operations needed to progress in the game. In the third study teachers were trained to deal with word problems differently. First complex word problems were solved in small groups and after that students were asked to think about exciting experiences they have had and then model them as mathematical word problems. All conditions resulted in slightly better achievement in standard mathematics tasks than conventional mathematics education but in addition triggered spontaneous focusing on mathematically relevant features of the environment and more flexible ways to use mathematical skills.

Session A 22

29 August 2017 13:15 - 14:45

Linna - Väinö Linna (K104)

Symposium

Learning and Social Interaction

Socio-cognitive conflict and learning: the role of regulation, argumentation and motivation

Keywords: Argumentation, Cognitive development, Conceptual change, Conversation / Discourse analysis, Motivation, Quantitative methods, Reasoning, Social aspects of learning and teaching, Social interaction, Technology, Writing / Literacy

Interest group: SIG 03 - Conceptual Change, SIG 10 - Social Interaction in Learning and Instruction, SIG 26 - Argumentation, Dialogue and Reasoning

Chairperson: Baruch Schwarz, Hebrew University of Jerusalem, Israel

Discussant: Anne-Nelly Perret-Clermont, University of Neuchâtel, Switzerland

Cognitive conflict has been one of the most central mechanism of the Piagetian theory of human development. Doise, Mugny and Perret-Clermont (1975), extended this notion to socio-cognitive conflict. Whereas the solitary individual might be biased towards confirmation and therefore ignore negative feedback originating in the inanimate world or else information having a cultural origin, according to socio-cognitive conflict theory, the discovery of novelty, the intrigue of 'otherness', the social pressure and emotionally heightened experience of disagreement with another person would increase the probability that subjects would try to resolve their internal conflicts of viewpoints and thereby progress in cognitive terms. Socio-cognitive conflict was progressively transformed from a mechanism of development to a setting. Researchers began to understand the processes by which the resolution of conflicts between students engaged in social interaction could lead to learning. Among these processes, conflict resolution has been shown to depend on modes of argumentation (Schwarz & Baker, 2016). This symposium presents recent advancements on the role of argumentation in the resolution of socio-cognitive conflicts of students engaging in learning tasks. Other factors such as motivation and social regulation will also be presented. Finally, research on the role of technologies in stressing conflict during argumentation will be presented.

The regulation of sociocognitive conflict: Consequences for learning and interpersonal relations

Presenting Author:Fabrizio Butera, University of Lausanne, Switzerland

I will first present the early research that led to develop the theory of socio-cognitive conflict, which argues that dissent with one or several partners over a task in which learning is concerned may stimulate task-related cognitive activity and result in progress. Then, I will report research showing that socio-cognitive conflict is beneficial for learning to the extent that conflict is regulated in an epistemic manner; that is, by focusing on the task or on the knowledge at hand. On the contrary, socio-cognitive conflict can result in detrimental effects whenever conflict is regulated in a relational manner, that is, by focusing on status and on interpersonal dominance. Finally, I will move to more recent research addressing the question of the motivational determinants of various forms of conflict regulation. I will conclude on the interest of studying the specific forms of conflict regulation for teaching at school and at university.

The role of argumentative discourse goals in mitigating my-side bias in the writing of arguments

Presenting Author:Mark Felton, San Jose State University, United States; **Co-Author:**Amanda Crowell, Hunter College, City University of New York, United States

Research has shown that novice writers tend to ignore opposing viewpoints when framing and developing arguments in writing, a phenomenon commonly referred to as my-side bias. In a recent study, we tested whether manipulating argumentative discourse goals in a dialogue that occurred prior to writing would mitigate my-side bias. We found that

consensus-seeking argument with a disagreeing partner was more effective in mitigating my-side bias than persuasion-seeking argument. Here, in Study 1, we revisit the dialogue data from this previous study to explore how differences in the two argumentative discourse conditions might explain their differential effects on my-side bias. In study 2, we ask whether similar differences in argumentative discourse can be found when we test the same manipulation in discourse goals (persuasion vs. consensus) with expert arguers. The educational implications of both studies are discussed.

Socio-cognitive conflict and conceptual change: Unrealistic hopes and suggestions for improvement

Presenting Author:Christa Asterhan, Hebrew University of Jerusalem, Israel

Conceptual change involves both an improved capability to construct the correct scientific explanation, as well as more efficient inhibition and overriding of automatically activated, but irrelevant schemas and propositions. Instructional strategies for conceptual change should then support both, by providing students with opportunities to detect and understand the errors in (their) naïve theories *and* to fully comprehend the scientifically accepted theory. However, traditional show-and-tell instruction only focuses on the latter, whereas traditional socio-cognitive conflict research mainly focuses on making students aware of differences. Collaborative argumentation with a disagreeing peer is an activity that, in potential, combines both and can therefore be very powerful. However, this potential is often not realized. In this presentation, I present evidence from recent studies that suggest that students need additional instructional supports that (a) make them aware of the conceptual differences between solutions, and (b) make the correct full explanation more salient and accessible.

Supporting socio-cognitive conflict awareness in SNS discussions groups: A social network analysis

Presenting Author:Dimitra Tsovaltzi, Saarland University, Germany; **Co-Author:**Nikita Dutta, Saarland University, Germany; **Co-Author:**Thomas Puhl, Saarland University, Germany; **Co-Author:**Armin Weinberger, Saarland University, Germany

Socially embedded large-scale forms of communication, like SNS (social networking sites) provide a rich context of socio-cognitive interactions where conflict can arise. However, without support users may not be able to register this conflict appropriately, or they might not know how to deal with it in a productive way. This may lead to missed opportunities of individual and group-level learning. Supports for conflict awareness and for processes of argumentation to resolve the conflict in group discussions can leverage the richness of socio-cognitive interactions. This article presents a comparison of such supports in a university teacher-trainee course on communication theory that included weekly SNS discussions. Group Awareness Tools (GATs), were used to increase attitude conflict awareness. Argumentation scripts were used as a cognitive guidance to help learners capitalize on this awareness and resolve the conflict. We use Social Network Analysis (SNA) to analyze conversational data and data from a communication attitude questionnaire on group-level processes relevant to attitude change during argumentative SNS discussions: number of interactions, information flow control, influence distribution, and attitude similarity. Both GATs and argumentation scripts influence argumentation processes positively, but scripts influence even more processes.

Session A 23

29 August 2017 13:15 - 14:45

Pinni B - B4113

Symposium

Motivational, Social and Affective Processes, Teaching and Teacher Education

Professional development of student teachers during their field experiences

Keywords: Attitudes and beliefs, Cooperative / collaborative learning, Design based research, Developmental processes, Higher education, Knowledge creation, Motivation and emotion, Pre-service teacher education, Qualitative methods, Quantitative methods, Student learning

Interest group: SIG 08 - Motivation and Emotion, SIG 11 - Teaching and Teacher Education, SIG 14 - Learning and Professional Development

Chairperson: Dagmar Festner, University of Paderborn, Germany

Discussant: Margje W.J. van de Wiel, Maastricht University, Netherlands

In teacher education there is an ongoing debate how much practice is necessary and appropriate to prepare teacher students in the best way for their future workplace. In some European countries such as in Germany increasingly long-term internships are implemented with the aim to interrelate theoretical knowledge teacher students already have with their gathered practice experiences. But as empirical evidence for the effectiveness of internships and probable influencing factors is scarce, especially long-term internship are still on trial (Arnold, Gröschner, & Hascher, 2014). The aim of the symposium is to bring together different perspectives on the professional development of teacher students: Whereas two contributions focus on changes of learning-to-teach patterns and educational knowledge during long-term internship, another paper highlights the experience and change of emotions as an important element during student teaching. In addition, the fourth contribution amplifies the concept of deliberate practice as one possible way of fostering professional development of student teachers.

References Arnold, K.-H., Gröschner, A. & Hascher, T. (Eds.) (2014). *Pedagogical field experiences in teacher education: Theoretical foundations, programmes, processes, and effects*. Münster: Waxmann.

Changes in learning-to-teach patterns of student teachers during long-term internships

Presenting Author:Dagmar Festner, University of Paderborn, Germany; **Co-Author:**Alexander Groeschner, Friedrich Schiller University Jena, Germany

Teacher education should be aimed at developing students' learning-to-teach patterns from an *inactive/survival* or *reproduction oriented learning pattern* to an *(in)dependent meaning oriented learning pattern*. Although the change in the direction of *independent meaning oriented learning pattern* is desirable, previous studies provide evidence that changes in learning-to-teach patterns are mutable in all directions. To gain deeper insight into the reasons for these changes, the focus of the present study is the comparison of two groups of student teachers, who change their learning-to-teach pattern during a five months internship in an (un)desired direction. In the study $N=182$ student teachers in the second semester of the teacher education master program filled in an online-questionnaire at the beginning (t_1) and at the end (t_2) of their five months internship. The findings show that students are more likely to change their patterns towards independent meaning oriented a) if they perceive the behavior of mentors in a positive way, b) if they feel in a larger extend satisfied with (less) strain and c) if they are convinced that they achieved the targets within the internship. Furthermore, we found an increase of self-estimated competence in both groups. But the group which changed patterns in a desired direction d) rated their competence at the beginning of the internship lower and at the end higher compared to the group which changed in undesired direction.

The development of educational knowledge during long-term internships in teacher education

Presenting Author:Sarah Mertens, University of Wuppertal, Germany; **Co-Author:**Cornelia Graesel, Bergische Universität Wuppertal, Germany

One recently introduced and increasingly important element in German teacher education are extended periods of internships. These long-term internships are supposed to improve the professional teacher education. Overall, research addressing competence development during these longer internships in teacher education is still rare. Most of the current research focusses on self-assessment of competences on the one hand and objective tests on the other hand (for an overview see Besa & Büdcher, 2014). A combination of both ratings is rarely used. Additionally, most of the studies do not include control groups. The purpose of this study is to examine three kinds of competence measures to inspect if students with and without a long-term internship differ in their development of educational knowledge as one part of professional competence. Besides a self-assessment questionnaire (Gröschner, 2009), students had to answer an educational knowledge test (Seifert & Schaper, 2010), as well as a video-based tool to measure teachers' professional vision (Seidel & Stürmer, 2014). To examine the competence development, a 2x2 mixed design was used. Here, the group membership (internship group vs. control group) was chosen as between-subjects factor and the measurement point (pretest vs. posttest) as within-subjects factor. In the analysis the internship group has shown a significantly higher professional vision and competence self-assessment than the control group which did not pass the long-term internship. A significant development of the conceptual knowledge determined by the educational knowledge test could not be demonstrated for any of the two groups.

Emotions in cooperative field experiences

Presenting Author:Tina Hascher, University of Bern, Switzerland; **Co-Author:**Lea de Zordo, University of Bern, Switzerland; **Co-Author:**Gerda Hagenauer, University of Bern, Switzerland

Collaboration is an essential element of the teaching profession and a precondition of school development and school. One key learning opportunity for collaboration are internships in pre-service teacher education as they often take place in teams. Although there is some evidence that learning during internships can be fostered by collaborative settings such as student teacher teams and peer-coaching (Goodnough et al., 2009; Lu, 2010), little is known about the learning processes and outcomes. Even less is known about the emotional experiences of student teachers in collaborative internships. Our quantitative study with future preschool and primary school teachers ($N_{t1} = 205$; $N_{t2} = 132$) aimed at analysing cooperative student teaching from an emotional point of view: Which emotions do pre-service teacher experience regarding collaborative student teaching during internship? How are these emotions correlated to different forms of collaborative student teaching? Results showed that the emotional potential of collaborative internships is high: Emotions occur both before and during collaborative internships with a stress on positive emotions such as excitement, enthusiasm, and proud. However, student teachers also experience an array of negative emotions such as nervousness, irritation, and anger. Teaming models are the most frequent forms of team teaching right from the beginning of internships. There is no clear pattern regarding the correlation between emotions and team teaching forms.

Fostering student teachers' deliberate practice: a school-based educators' perspective

Presenting Author:Maaïke Endedijk, University of Twente, Netherlands; **Co-Author:**Larika Bronkhorst, Utrecht University, Netherlands

Deliberate practice, defined as prolonged engagement in practice that is purposefully designed to improve performance, even when a satisfactory level of performance has already been reached, is increasingly recognized as necessary for professional development across professions. Yet, exemplars of how to stimulate deliberate practice, particularly during teacher education, are limited. This paper sets out to explore how student teachers' deliberate practice can be promoted during a dual teacher education program, capitalizing on expert school-based educators' experience. Based on a thematic

analysis of in-depth interviews with thirteen school-based educators, locally recognized as experts, our results refine and elaborate on previously developed design principles. Findings stress the importance of working from explicated theories of practice, using pupils as sources of feedback, anticipatory reflection, creating powerful learning contexts in school, and keeping professional development, especially during teacher education, realistic. Using these design principles can complement existing supervision practices in teacher education, typically directed at (retrospective) reflection. The findings tie in with recent articles describing deliberate practice as necessary, but perhaps not sufficient for (student) teacher expertise development.

Session A 24

29 August 2017 13:15 - 14:45

Main Building A - A05

Invited Symposium

Cognitive Science

Effects of non-invasive brain stimulation on learning

Keywords: Achievement, Cognitive development, Cognitive skills, Language (L1/Standard Language), Learning and developmental difficulties, Learning disabilities, Learning Technologies, Mathematics, Neuroscience

Interest group: SIG 22 - Neuroscience and Education

Chairperson: Roland H. Grabner, University of Graz, Austria

Chairperson: Nienke van Atteveldt, VU University Amsterdam, Netherlands

Organiser: Roland H. Grabner, University of Graz, Austria

Organiser: Nienke van Atteveldt, VU University Amsterdam, Netherlands

Discussant: Martijn Meeter, VU University Amsterdam, Netherlands

In educational neuroscience, there is rapidly growing interest in non-invasive brain stimulation by means of transcranial electrical stimulation (tES). In tES, a small electrical current is applied through electrodes on the scalp, which can modulate the activation of cortical regions, and thereby, influence cognitive functions. The possibility to improve cognition through tES has great potential to be relevant for education, as it could be a future means to support skill acquisition in individuals with learning disabilities. In addition, tES could have a massive societal impact when used as cognitive enhancer in academic settings, raising ethical issues we need to deal with. The aims of the present symposium are (a) to provide an overview of the current evidence on tES effects on school-related learning and (b) to critically discuss the application of non-invasive brain stimulation in education. The four talks in this symposium focus on tES effects on language processes, numerical cognition, and executive functions, their relevance for the treatment of learning disabilities (in particular dyslexia and dyscalculia), and the impact of tES on neurorehabilitation after stroke. In addition, ethical, legal and societal issues with the focus on the child's wellbeing are addressed that arise from the education-related use of tES. The discussant of the symposium will finally integrate the presented evidence against the background of a recent meta-analysis of tES effects on learning.

The effect of brain stimulation on learning when taking into account the neural correlate

Presenting Author: Roi Cohen Kadosh, University of Oxford, United Kingdom

Fluid cognitive skills, such as working memory, reasoning, and mathematics, are critical in most academic settings. Current attempts to improve cognitive skills in children and adults have yielded mixed results and limited evidence of transfer beyond the immediate cognitive training materials. These failures have led some to suggest that cognitive skills are fixed. Another suggestion is that these failures are due to suboptimal approaches to exploit neuroplasticity. An innovative method to modulate neuroplasticity is using brain stimulation, with the assumption that concurrent brain stimulation and cognitive intervention interact synergistically, enhancing the benefits derived from the intervention. The present experiments examined how progress in learning was related to the effect of brain stimulation at the neural level. The experiments will involve training on arithmetic learning or executive functions. The effect of brain stimulation was not beneficial in all the cases, but varied as a function of the neural system we tried to affect. The results lead to the idea that a consideration of the neurocognitive factors characterising the individuals in the experiment can lead to a much clearer understanding of effects than considering only the group they belong to. This approach yields advancement at the basic and translational level. It would enable the improvement and individualisation of interventions, and produce a better understanding of the underlying neurocognitive mechanisms.

Can Electrical Brain Stimulation (tES) Improve School-related Learning? A Meta-analysis

Presenting Author: Michael Schneider, University of Trier, Germany; **Co-Author:** Bianca Simonsmeier, University of Trier, Germany

The search for more effective learning techniques has been a quest of humanity since time immemorial. Recently, researchers have started evaluating whether stimulating the brain noninvasively with a weak and painless electrical current (transcranial Electrical Stimulation, tES) enhances physiological and cognitive processes. Some studies found that tES has weak but positive effects on brain physiology, cognition, or assessment performance, what has attracted massive public interest. Here, we present the first meta-analytic test of the hypothesis that tES before or during a learning phase is more

effective than tES before or during an assessment, because tES enhances learning through long-term potentiation. The meta-analysis included 246 effect sizes from studies on language or mathematical competence. As predicted, the effect of tES was much stronger for the stimulation during a learning phase ($d = 0.712$) as compared to the stimulation during an assessment phase ($d = 0.207$). The effect was stimulation-dosage specific and, in line with previous meta-analyses, significant only for anodal stimulation. The results provide evidence for the modulation of long-term synaptic plasticity by tES in the context of practically (e.g. school-) relevant learning tasks and highlights the need for more systematic evaluations of tES in educational settings.

tES of the auditory cortex to enhance basic acoustic processing abilities in dyslexia

Presenting Author: Tino Zaehle, Otto von Guericke University Magdeburg, Germany

Transcranial electrical stimulation (tES) has become a valuable research tool for the investigation of neurophysiological processes underlying human action, cognition and perception. In recent years tES has been also successfully applied to alter human auditory cortex reactivity, its related individual spectro-temporal processing abilities and acoustic speech perception (Heimrath et al., 2016a). These findings strongly implicate tES application as a therapeutic tool on auditory and speech-related disorders such as dyslexia. In this presentation I will give an overview over the spectrum from basic research on auditory tES in healthy populations through to pilot data on improved acoustic processing abilities in adults and adolescents with dyslexia.

tES for cognitive enhancement of healthy minors: A complex governance challenge

Presenting Author: Jantien Schuijjer, VU University Amsterdam, Netherlands

The use of cognitive enhancers for educational purposes has drawn increasing academic and public attention over the last years. Currently, pharmaceuticals are the most widely discussed enhancement method in the literature, but new evidence suggests that methods based on Transcranial Electric Stimulation (tES) have some potential as cognitive enhancer as well. Just like pharmaceutical enhancers, the availability and education-related use of tES-devices raises a broad range of ethical, legal and societal issues that need to be addressed by policy-makers. Few studies, however, have specifically studied these issues in relation to child wellbeing. In this systematic review, we explore the issues for child wellbeing that could arise from the availability and education-related use of tES-devices by healthy minors. We demonstrate that the issues form a complex web of expectations and concerns, which are incited by high levels of factual uncertainty and moral diversity. Little is known yet about the working mechanisms of tES and its (long-term) effect on healthy developing brains, and different perspectives towards virtues such as autonomy and authenticity lead to discussions on whether certain enhancement effects would be desirable, and whether potential risks would be acceptable. We argue for a responsible innovation approach, which encourages an adaptive attitude towards emerging knowledge and dynamic societal values, to deal with the identified issues regarding tES-based enhancement appropriately.

Session A 25

29 August 2017 13:15 - 14:45

Pinni B - B1097

Invited Symposium

Learning and Instructional Technology

Measuring and supporting students' self-regulated learning in adaptive educational technologies

Keywords: Artificial intelligence, Educational Technology, Learning analytics, Learning Technologies, Metacognition, Motivation, Self-regulation

Interest group:

Chairperson: Inge Molenaar, Radboud University Nijmegen, Netherlands

Organiser: Roger Azevedo, North Carolina State University, United States

Organiser: Sanna Järvelä, University of Oulu, Finland

Organiser: Maria Bannert, Germany

Discussant: Dragan Gasevic, University of Edinburgh, United Kingdom

In this panel discussion, we will discuss the aim and current activities of the EARLI-Centre for Innovative Research (E-CIR) "Measuring and Supporting Student's Self-Regulated Learning in Adaptive Educational Technologies". The aim is to develop our understanding of multimodal data that unobtrusively capture cognitive, meta-cognitive, affective and motivational states of learners over time. Triangulation of multichannel data provides a fundamentally new approach, objective and subjective means, through which to capture critical phases of SRL and SSRL as they occur in learning situations. The goal of this panel is to discuss: a) How can we gather and analyze multimodal trace data using different channels (e.g., verbalization, physiology) to measure students' cognitive, metacognitive, emotions and motivation during learning? and b) How can these measurements be used to enhance current adaptive learning technologies supporting learners' self-regulated learning? Addressing these questions demands for a concerted interdisciplinary dialogue combining findings from psychology and educational sciences with advances in computer sciences and artificial intelligence. The participants in this E-CIR are leading international researchers who have articulated different emerging perspectives and methodologies to measure cognition, metacognition, motivation, and emotions during learning. The

participants recognize the need for intensive collaboration to accelerate progress with new interdisciplinary methods including learning analytics to develop more powerful adaptive educational technologies. During the panel current activities of the ECIR members will be shortly outlined after which the panel would like to go into discussion about this work with the audience.

Multimodal data to measure students' cognitive, metacognitive and motivation during learning

Presenting Author:Sanna Järvelä, University of Oulu, Finland

The members of this ECIR all collect different data channels to measure students' cognitive, metacognitive, emotions and motivation during learning. First, physiological data indicate students' bodily responses during learning. Examples are students' heart rate (IBI), Electro Dermal Activity (EDA), Blood Volume Pulse (BVP), and skin Temperature. Second, students' eye movements indicating what students are look at during learning. These data can be used to detect reading behavior, asses use of multimedia sources and tools in online learning environments. Additional, wearable eye trackers are used to assess students' interaction with physical objects and social interaction during learning. Moreover, students' pupil dilation can be used as indicator of students' effort and cognitive load. Thirdly, the students' face during learning can captured and used to analyze facial expressions. These are used to automatically detect the presence and intensity of expressions, such as happy, sad and angry. Finally, students clicking, typing and browsing behavior are captured in logs. During the panel, members of the ECIR will present the different data collected and the value of the different data streams to investigate students' cognitive, metacognitive, emotions and motivation during learning.

Combining and analyzing multimodal data

Presenting Author:Maria Bannert, Technical University of Munich (TUM), Germany

Bannert and colleagues are using process mining techniques to analyse verbal protocols collected during self-regulated learning. Especially, they are interested if instructional scaffolds affect not only the amount of different SRL activities but also the temporal structure and if so, whether the temporal structure of learning events corresponds with different dimensions of learning performance. Molenaar' s group studies time and order in self and socially regulated learning using single or multiple data streams. Recently, this group has begun to analyze logs of adaptive technologies to assess students' regulation of effort and learning over extended time periods. Azevedo and colleagues' research has focused on examining the role self-regulatory processes during learning with advanced learning technologies. More specifically, the overarching research goal has been to understand the complex interactions between humans and intelligent learning systems. Järvelä and colleagues have been exploring what multimodal data can tell us about SRL processes in authentic collaborative learning tasks. They have investigated how multichannel data can be used for identifying markers that characterize successful SRL and learning progress and help in understanding. Finally, Gašević and his colleagues have been working on analytical methods for the theory-informed study of self-regulated learning. Their work involves a broad range of methods for analysis of clickstream, discourse, and more recently psychophysiological data. The methods are based on unsupervised and supervised machine learning, sequence and process mining, automated text analysis, and social and epistemic network analysis. During the panel ECIR members will elaborate on their research results.

Challenges analyzing multimodal data

Presenting Author:Dragan Gasevic, University of Edinburgh, United Kingdom

Eventhough the multimodality trace data can enhance our understanding of students' processes during learning, we need to increase our methodological and theoretical understanding to properly analyse these data (Azevedo, 2014). This demands for a concerted interdisciplinary dialogue combining findings from psychology and educational sciences with advances in computer sciences and artificial intelligence. The participants in this E-CIR are leading international researchers who have articulated different emerging perspectives and methodologies to measure cognition, metacognition, motivation and emotions *during* learning. The participants recognize the need for intensive collaboration to accelerate progress with new interdisciplinary methods to overcome challenges of analyzing multimodal data. The combination of these insights is needed to accelerate progress with new interdisciplinary methods to understand how multiple data streams can support the measurement of SRL. During the pannel discussion different challenges of anylzing multimodal data will be adressed.

Applications of multimodal data for instructional decision making

Presenting Author:Roger Azevedo, North Carolina State University, United States

The goal of this ECIR is to develop measurements of students' cognition, metacognition, emotion and motivation *during* learning in order to support the development of more powerful adaptive educational technologies. Novel personalised support for learners to support self-regulated learning can be developed based on trace and multimodality data measures of students' states during learning. Moreover, tools can also be developed for teachers to enhance their instructional decision making and ability to support learners' individual needs in real-time, based on their multimodal multichannel data. Thus, we aim to make a significant contribution to the current debate about *how* learning analytics and multimodality data

can improve education. Panel members will present their ideas about application of the data.

Session A 26

29 August 2017 13:15 - 14:45

Main Building C - C7

Invited Symposium

Higher Education

What do we know about academic work today?

Keywords: Assessment methods and tools, Doctoral education, Mixed-method research, Neuroscience, Qualitative methods, Researcher education, Workplace learning, Writing / Literacy

Interest group: SIG 24 - Researcher Education and Careers

Chairperson: Kirsi Pyhältö, Finland

Discussant: Anna Sala-Bubaré, Ramon Llull University, Spain

This invited symposium addresses different aspects and recent changes of academic work and their implications for early career researcher education. The symposium brings together different perspectives on these two questions: what do we know about academic work today? And what are the implications of the empirical results for the preparation of early career researchers? The symposium bridges three communities of scholars who while sharing an interest in examining academic work rarely converse: those investigating a) workplace learning, b) academic communication, and c) pedagogies of research education. The invited symposium consists of four co-authored papers that draw on and represent our collective and extensive knowledge of the three fields in order to synthesize what is known, to make visible what has been overlooked, and to attend to implications for preparing early career researcher, in order to draw out future lines of research and to contribute to the researcher education. Each of the papers addresses a specific aspect of academic work in order to develop a future research agenda. The invited symposium displays a novel approach. We will suggest to those attending that they access a link to a suggested paper from each of the panelists to read before the session. In this way, we can have a more informed discussion about the issues in the plenary after the panelists have presented their studies.

Writing and Faculty Identity Development

Presenting Author: Montserrat Castelló, Ramon Llull University, Spain

This presentation focus on results from two recent studies aimed on understanding how faculty identity development is related to a differential use of teaching and research writing genres and whether this development follows different paths, on the basis of faculty perceptions regarding what they consider their main goal at university and their preferred sphere of activity (teaching or research). Participants ($N=67$) answered the online survey *Faculty identity and academic writing* focused on three dimensions: genres use (Likert scale), spheres of activity participation (multiple-choice) frequent activities performed in each of the spheres (open-ended). A mixed-method design combining quantitative and qualitative data analysis was used. Two non-consecutive steps of analysis were followed to establish a) the frequency of the genres used by faculty, the main goal at University and their preferred sphere of activity; b) whether they were significant differences between those variables (Mann-Whitney U). Qualitative data analysis implied a bottom-up content categorization analysis. Results showed that faculty's perceptions regarding their main goal at university (research) were not in alignment with their preferences (teaching). Writing genres used and activities reported closely mirror preferred spheres of activity and mismatch faculty's perceptions of their main goal at universities. This mismatch generate tensions and contradictions in the development of their professional identity that should be taken into account in institutional career development initiatives.

Forming academics in practice: acknowledging multiple trajectories and expectations

Presenting Author: Angela Brew, Macquarie University, Australia; **Co-Author:** David Boud, University of Technology Sydney/ Deakin University, Australia

What shapes academics? What influences their development, and how do they interpret feature of the environment in which they operate? A large-scale survey and interviews with academics in England and Australia focused on how academics interpret features of the university context as either encouraging or inhibiting their development demonstrates how they negotiate tensions arising from different discourses and experiences. This paper argues that academic career development needs to take account of artisanal academic work which lies between teaching and research. Academics' focus of attention and their modes of reflexivity vary and these affect how they respond in shaping their jobs. Career development takes place within work. There are mismatches between intended developments and how they are perceived on the ground. It suggests that changes in workplace practices may be more effective in career development than training courses.

Dynamics of Decision Making in Grant Panels

Presenting Author: Inge Van der weijden, Leiden University, Netherlands

External grants are ascribed a very high symbolic value in academia as they provide researchers with both financial and symbolic resources, consequently affecting career opportunities. However, difficulties arise in the process of panel

decision-making, when selection criteria need to be concrete and explicit to enable comparison. Having to choose between many applicants of similar quality makes the selection process liable to subjectivity, arbitrariness, and randomness. In addition, panel reviewing entails social interaction which suggests that group dynamics could influence the selection process. By interviewing scholars and adding insights from social psychology literature we identified factors affecting decisions in grant panels. Examples are panel composition, group norms, motivation, and information distribution. The outcomes of the study could be used to improve transparency, fairness and legitimation of talent selection processes.

The completion of an interdisciplinary PhD and the professional trajectories

Presenting Author:Karri Holley, University of Alabama, United States

Interest in interdisciplinary programs in STEM-related fields at the graduate-degree level is widespread across higher education. Such programs are seen as innovative, offering students, faculty, and future employers new ways to engage in the production and dissemination of knowledge. Using longitudinal qualitative interviews, this article considers the early career experiences of scholars who hold an interdisciplinary PhD in neuroscience. The scholars were interviewed first as doctoral students and then six years later. The initial and follow-up transcripts provided insight into individual decision making, external influences, and professional trajectory. The findings illustrate the challenges of marketability, professional development, and balancing personal and career demands for interdisciplinary PhD recipients in STEM-related fields.

Session B 1

29 August 2017 15:15 - 16:45

Pinni B - B3107

Single Paper

Instructional Design

Instructional Design

Keywords: Comprehension of text and graphics, Computer-assisted learning, E-learning / Online learning, Educational Psychology, Educational Technology, Higher education, Instructional design, Learning analytics, Meta-analysis, Mixed-method research, Multimedia learning, Quantitative methods

Interest group: SIG 06 - Instructional Design

Chairperson: Marion Reindl, University of Augsburg, Germany

A Meta-Analytic Review of Signaling Effects on Cognition and Learning

Keywords: Educational Psychology, Instructional design, Meta-analysis, Multimedia learning

Presenting Author:Maik Beege, Chemnitz University of Technology, Germany; **Co-Author:**Sascha Schneider, Chemnitz University of Technology, Germany; **Co-Author:**Steve Nebel, Chemnitz University of Technology, Germany; **Co-Author:**Günter Daniel Rey, Chemnitz University of Technology, Germany

The *signaling effect* states that learners profit from cues that highlight organization or relevant information. This meta-analysis includes 95 studies and $N = 11,499$ participants. One hundred thirty-one retention, 67 transfer performance and 23 cognitive load measures were used to determine separate mean effect sizes. Additionally, nine possible moderators (e.g., type of signaling) were identified. The retention ($g = .52$, 95% CI [.44, .60]) and transfer ($g = .31$, 95% CI [.22, .40]) sizes support the positive effect of signaling learning. Prior knowledge was identified as a moderator. Interestingly, cognitive load was not significantly affected by signaling ($g = .25$, 95% CI [-.04, .55]). The results were interpreted using media learning theories. General problems of aggregating cognitive load measures and recommendations for future studies are included herein.

Promoting digital wisdom through students' involvement in pedagogical design of an academic course

Keywords: Computer-assisted learning, Educational Technology, Higher education, Instructional design

Presenting Author:Tamar Shamir Inbal, Open University of Israel, Israel; **Co-Author:**Ina Blau, the Open University of Israel, Israel

Technological learning environments enable implementation of the constructivist approach, with learners actively involved in the construction and design of knowledge and learning processes through the use of educational technologies. This warrants a reconsideration of the instructional design in academia. This study examined how instructional design, based on listening to students' voice, transforms students into active co-partners in teaching and learning processes and how this concept influences the development of digital wisdom among students and lecturers. This case study analyzed 22 reflections of graduate students from an Israeli University. Qualitative analysis was carried out, indicating that students felt they were co-partners in the pedagogical course design, determining the content and shared digital activities. The expression of "students' voice" was exhibited in students' activities aimed to develop a sense of competence, personal strength and leadership skills, as well as in activities that required collaboration between members of the learning community, with students and lecturers having equal levels of participation. Such involvement contributed to students' digital wisdom and perceptions of the role of the lecturer as a leader in this process. This was accompanied by perceptions of technology as facilitating learning processes, improving flexibility, enabling greater accessibility, and supporting teacher-student communication.

Learning from videos: Effects of Subtitles, Complexity, and Language proficiency

Keywords: Comprehension of text and graphics, E-learning / Online learning, Educational Technology, Multimedia learning
Presenting Author:Tim van der Zee, Leiden University, Netherlands; **Co-Author:**Wilfried Admiraal, Leiden University, Netherlands; **Co-Author:**Fred Paas, Erasmus University Rotterdam/University of Wollongong, Netherlands; **Co-Author:**Nadira Saab, Leiden University, Netherlands; **Co-Author:**Bas Giesbers, Erasmus University Rotterdam, Netherlands

Open online education has become increasingly popular. In Massive Open Online Courses (MOOCs) videos are generally the most used method of teaching. While most MOOCs are offered in English, the global availability of these courses has attracted many non-native English speakers. To ensure not only the availability, but also the accessibility of open online education, courses should be designed to minimize detrimental effects of a language barrier, for example by providing subtitles. However, with many conflicting research findings it is unclear whether subtitles are beneficial or detrimental for learning from a video, and whether this depends on characteristics of the learner and the video. We hypothesized that the effect of 2nd language subtitles on learning outcomes depends on the language proficiency of the student, as well as the visual-textual information complexity of the video. This three-way interaction was tested in an experimental study. No main effect of subtitles was found, nor any interaction. However, the student's language proficiency and the complexity of the video do have a substantial impact on learning outcomes. These results question the generalizability of earlier findings which showed either a positive or negative effect of subtitles on learning.

Constructive Retrieval by Prompted Recall

Keywords: Instructional design, Learning analytics, Mixed-method research, Quantitative methods
Presenting Author:Tino Endres, University of Freiburg, Germany; **Co-Author:**Shana Carpenter, Iowa State University, Department of Psychology, United States; **Co-Author:**Alf Martin, University of Freiburg, Institute of Psychology, Germany; **Co-Author:**Alexander Renkl, University of Freiburg, Institute of Psychology, Germany

Retrieval fostering learning is a quite robust finding in memory research. When applying retrieval practice in educational settings the used task can be very different. Several studies have shown that memory can be enhanced using tasks that promote learners to link new learned contents to their prior knowledge. This pattern of results could also be used for retrieval practice. In this study we used simple retrieval tasks and enriched them with the requirement to link the retrieved contents to what learners already know. Fifty-six undergraduate students learned from a video-recorded lecture. Afterwards they were randomly assigned to either a free-recall condition, as used in many studies on learning by retrieval, or a prompted recall condition in which learners were required to recall the information and apply it to their lives. A one week delayed posttest comprised a fact recall and comprehension scores. Learners in the prompted recall group used more elaborative strategies in their answers. There was no significant difference between groups regarding the fact scores. The prompted recall group outperformed the free recall group on comprehension scores. The effect on comprehension was mediated by the use of elaborative strategies. This results underline the findings that retrieval is most effective when it involves constructive elaboration. This finding should encourage instructors to combine elaboration and retrieval in their learning environments.

Session B 2

29 August 2017 15:15 - 16:45

Main Building D - D10B

Single Paper

Instructional Design, Learning and Social Interaction

Teaching and Instruction

Keywords: Assessment methods and tools, Content analysis, Educational Psychology, Educational Technology, Experimental studies, Game-based learning, Instructional design, Mathematics, Peer interaction, Qualitative methods, Secondary education, Teaching / instruction

Interest group: SIG 06 - Instructional Design, SIG 10 - Social Interaction in Learning and Instruction

Chairperson: Susan-Marie Harding, The University of Melbourne, Australia

Developing better educational videogames: optimising gameplay and difficulty within leaderboards

Keywords: Educational Psychology, Educational Technology, Experimental studies, Game-based learning
Presenting Author:Steve Nebel, Chemnitz University of Technology, Germany; **Co-Author:**Sascha Schneider, Chemnitz University of Technology, Germany; **Co-Author:**Maik Beege, Chemnitz University of Technology, Germany; **Co-Author:**Günter Daniel Rey, Chemnitz University of Technology, Germany

The inclusion of leaderboards is a frequently used mechanism within the process of gamification or within the method of game-based-learning. However, research regarding the underlying processes when including leaderboards within learning environments is still scarce. To address this gap, this study introduces competitive effort and perceived difficulty as central concepts for educational leaderboards. Furthermore, the connected gameplay mechanics are investigated. More specifically, penalties were included to influence the most successful learner behavior. The two facets were manipulated independently to investigate how leaderboards should be designed to support learning. Students played an educational

videogame especially designed for this research while being randomly assigned to a cell of a 2 (low vs. high difficulty) x 2 (with or without penalties) between-subjects design. Following, data on retention and detail knowledge, learning efficiencies and goal orientations were collected. Results revealed that participants with penalties scored higher on retention tests than participants without penalties. Additionally, detail knowledge is enhanced by a low difficulty in contrast to a high difficulty. Furthermore, students within the penalty condition were more outcome-efficient. An additional explorative analysis of goal orientations revealed several significant connections between individual dispositions and affective responses. In addition, several positive correlations with performance goals could be observed. Finally, with the impacts of gameplay characteristics and individual gameplay experiences, the connections of learning outcomes and individual traits highlight the significance of this study, the potential of educational videogames in general and the need for further research in the field.

Instruction after problem solving: Learning by elaborating on errors

Keywords: Educational Psychology, Experimental studies, Instructional design, Mathematics

Presenting Author:Katharina Loibl, University of Education Freiburg, Germany; **Co-Author:**Timo Leuders, University of Education Freiburg, Germany

Students, who engage in problem-solving activities targeting yet to-be-learned concepts, usually generate erroneous or incomplete solution attempts. These erroneous student solutions can form the basis for acquiring valid target concepts during subsequent instruction. Literature on conceptual change as well as studies on 'Productive Failure' and 'Inventing to prepare for future learning' indicate that elaborating on typical errors and comparing these erroneous solutions to canonical solutions may be crucial for learning in settings that set problem solving prior to instruction. In an experimental study with 200 students, we investigated the effect of elaborating on erroneous solutions when learning fractions by comparing three conditions: Students of all conditions first engaged in an identical problem-solving activity (problem-solving phase). Afterwards students worked on elaboration tasks that introduced canonical solutions (instruction phase). In this phase, students worked with a) only canonical solutions (control condition), b) canonical and typical erroneous solutions without prompts, c) canonical and typical erroneous solutions with prompts to compare these solutions. The comparison prompts aimed at focusing students' attention on relevant aspects. Results indicate that including erroneous solutions is beneficial for learning. However, only students who were prompted to compare the erroneous solutions to the canonical solutions significantly outperformed students in the control condition on posttest.

Developing a framework for the teaching of collaborative talk

Keywords: Peer interaction, Qualitative methods, Secondary education, Teaching / instruction

Presenting Author:Ruth Newman, University of Exeter, United Kingdom

ABSTRACTThis paper draws on the findings of an ESRC and British Telecom funded study which investigated the efficacy of an instructional intervention designed to support the development of collaborative talk in the secondary (L1) English classroom. The intervention adopted dialogic principles and, drawing on research in educational linguistics, emphasised the role of metatalk in developing students' awareness of the interpersonal processes of collaborative talk. Underpinning the 3-week intervention and informing subsequent data analysis, a framework was devised which described collaborative talk as a process of *participating, understanding and managing*. The intervention was implemented in two secondary schools: in one year 9 class (age 13-14) of 28 pupils and one year 10 class (age 14-15) of 32 pupils. For the duration, pupils were audio and video recorded in the same groups of 4, enabling a temporal investigation of their talk. 135 hours of video data was analysed systematically to examine the development of students' collaborative and meta-talk and the efficacy of instructional dialogue. Using transcript data, this paper will illustrate how the framework strands are enacted in students' collaborative talk. It will also show how the framework can be utilised as a pedagogical tool to support metatalk about collaborative talk processes, drawing attention to the role of metalinguistic understanding in talk development.

Pedagogical Usability Assessment of Digital and Non-digital Learning Objects

Keywords: Assessment methods and tools, Content analysis, Educational Technology, Instructional design

Presenting Author:Leonardo Madariaga, Pontificia Universidad Católica de Chile, Chile; **Co-Author:**Isabelle Burq, Pontificia Universidad Católica de Chile, Chile; **Co-Author:**Faustino Marañón, Pontificia Universidad Católica de Chile, Chile; **Co-Author:**Miguel Nussbaum, Pontificia Universidad Católica de Chile, Chile

Usability evaluation in education has been mostly devoted to the study of transactional artifacts such as websites, mobile and desktop applications, on-line learning systems, among others. Little attention has been given to evaluation of traditional information items provided to students like study guides, podcasts, demonstrations, step-by-step solutions and any other supporting materials. Furthermore, a considerable interaction between educators and students occurs in the process of usage of these conventional digital and non-digital learning objects. The Usability study of these items becomes a primary objective in terms of supporting their effective use, redesign or eventual process of discard. In this research, we developed a model in which Usability is not only an inquiry process directed from the information provider to the user, but rather a process of contrast between the Usability goals of the educator with the perceptions of the students. The first evaluation, deploys a contextualized Usability benchmark allowing the measurement of the possible Usability gap. We developed an on-line platform to assess the Usability of lecture materials provided to engineering students enrolled in a physics course in a Chilean university. The study involved 5 lecturers and 150 students. We observed that the model was able to respond to different types of study materials (conceptual through a podcast versus a problem solving paper guide). Analysis shows that the model clearly identifies the dimensions where the gap is present; this gap defines the redefinition of the learning

objects.

Session B 3

29 August 2017 15:15 - 16:45

Main Building E - E222

Single Paper

Learning and Social Interaction

Social Interaction in Learning and Instruction - G

Keywords: Attitudes and beliefs, Collaborative Learning, Competencies, Environmental education, Inquiry learning, Learning and developmental difficulties, Mathematics, Out-of-school learning, Primary education, Qualitative methods, Secondary education, Social aspects of learning and teaching, Teacher Effectiveness, Teaching / instruction

Interest group: SIG 10 - Social Interaction in Learning and Instruction

Chairperson: Hanni Muukkonen, University of Oulu, Finland

Teachers' insights on connected learning networks: Emerging activities and forms of participation

Keywords: Inquiry learning, Out-of-school learning, Qualitative methods, Social aspects of learning and teaching

Presenting Author:Henriikka Vartiainen, University of Eastern Finland, Finland; **Co-Author:**Saara Nissinen, University of Eastern Finland, Finland; **Co-Author:**Sinikka Pöllänen, University of Eastern Finland, Finland, Finland; **Co-Author:**Petteri Vanninen, University of Eastern Finland, Finland

The aim of this socioculturally informed study is to explore teachers' insights on connected learning activities and networks. An instructional approach based on design-oriented pedagogy (DOP) was carried out on a teachers' in-service project in Finland, which aimed to connect teachers, researchers, and experts to advance students' meaningful participation and inquiry activities around forest-related phenomena. An open-ended design task for the participating teachers and educators from kindergarten (N = 27), primary school (N = 2), and secondary school (N = 3) was to design, implement, and document a forest-related learning project with their own students or kindergarten children. In total, 11 learning projects were implemented with the support of the in-service project and shared in an OpenForest wiki environment. A deductive content analysis of openly published project presentations revealed that the teachers and educators working with children and youth of various ages all harnessed learners' interest as a basis for connecting with extended learning networks. Learners' interest and questions were cultivated by connecting with peers, family, external experts, and extended environments through diverse physical and digital information resources, tool-mediated activities, and by the externalization of evolving object-oriented ideas. In this study, the teachers' insights on emerged learning activities are bridged to form a more expanded notion of the extended participatory learning system.

Prerequisites of Primary School Students' Attitudes Towards Peers with Social or Emotional Disorders

Keywords: Attitudes and beliefs, Learning and developmental difficulties, Primary education, Teacher Effectiveness

Presenting Author:Marwin Felix Löper, Paderborn University, Germany; **Co-Author:**Frank Hellmich, Paderborn University, Germany

In the present study N=743 third and fourth grade primary school students' attitudes towards peers with emotional or social disorders and towards peers with learning disabilities were examined. The attitudes towards peers with special educational needs were assessed by using a short version of the "Chedoke-McMaster attitudes towards children with handicaps scale" (Bossaert & Petry, 2013). The results indicate neutral to slightly positive attitudes towards peers with special educational needs. In detail, primary school students' attitudes towards peers with emotional or social disorders are significantly less positive than towards peers with learning disabilities. Furthermore, the outcomes of a structural equation model in Mplus reveal that children's attitudes towards peers with social or emotional disorders can be explained by their perceived teacher behavior towards children with special educational needs, their contact experiences and their self-efficacy beliefs concerning their interpersonal skills. The effects of the perceived teacher behavior on children's attitudes towards peers with emotional or social disorders are mediated by their self-efficacy beliefs.

Scaffolding Mathematics Discussion vs Conventional Teacher Help in a Collaborative Setting

Keywords: Collaborative Learning, Mathematics, Secondary education, Teaching / instruction

Presenting Author:Sharon Calor, University of Amsterdam, Netherlands; **Co-Author:**Rijkje Dekker, University of Amsterdam, Netherlands; **Co-Author:**Jannet van Drie, University of Amsterdam, Netherlands; **Co-Author:**Bonne Zijlstra, University of Amsterdam, Netherlands; **Co-Author:**Monique Volman, University of Amsterdam, Netherlands

Scaffolding enhances learning outcomes. However, how teachers can scaffold small groups and how scaffolding of small groups affects mathematical learning, has not yet been investigated. We investigated whether scaffolding small heterogeneous student-groups at group level in a collaborative setting would have a greater effect on students' mathematical knowledge than conventional support. A quasi-experimental study (pre- and post-test) was conducted in four 7th grade classes. Participants were four teachers and 109 students working collaboratively in 28 small heterogeneous student-groups on the topic of Algebra. Two classes (14 groups) were scaffolded according to a Small-Group Scaffolding Model (SGS Model). The lessons were designed (in a previous study) with the specific aim to invoke mathematical discussions and raise the level of mathematical knowledge (Math Discussion Lessons). Results showed a larger difference

in mathematical knowledge gain for the Scaffolding condition. Interaction processes in four groups were analyzed. Analysis showed that approximately half of all group interactions in both conditions consisted of task-related utterances. One fifth of all group interaction in the Scaffolding condition existed of mathematical discussions and more mathematical discussions took place in the Scaffolding condition. Activities that are known to contribute to mathematical level raising took place relatively more in the Scaffolding condition. Scaffolding small heterogeneous student-groups at group level during Math Discussion Lessons in the 7th grade seems to result in more mathematical level raising and more mathematical discussions.

Nature as a Setting and Resource to Promote Learners' Agency and Competences in Education

Keywords: Competencies, Environmental education, Out-of-school learning, Primary education

Presenting Author:Marjaana Kangas, University of Lapland, Finland; **Co-Author:**Hanna Vuojärvi, University of Lapland, Finland; **Co-Author:**Pirkko Siklander, University of Lapland, Finland

Educational reform in Finland is concerned with how to shift school practices to foster students' agency and active participation. We investigated how nature, specifically a hiking course in Finnish wilderness, can enable students' agency and how it promotes their skills and competences. Agency is considered a social action that emerges in relation to associating with other people, including peers and teachers. Twenty-one eighth-grade upper secondary students and their two teachers participated in the research. All participants and a researcher hiked 35 kilometers during the hiking trip that lasted for three days, including two nights outdoors. Various qualitative research data were gathered: unstructured student and teacher interviews, audio-recorded field notes and photos, and the students' digital diaries. The focus of the analysis was on the descriptions and representations of activities that reflected agency, and the various competences needed for the learning activities. The findings indicate that the students' agency emerged as *accountability, resiliency, collectivity* and *success*. The students were responsible for their own and others' well-being; they were highly satisfied with the experience although the hiking activity was very tiring; they collectively contributed on common activities, which became evident in reciprocity and equality; and they felt a joint satisfaction and joy resulting from their success. In terms of competence areas, the hiking trip in nature enabled the students to exercise collaboratively skills for negotiation, problem-solving, and personal and social responsibility. Pedagogically, critical methods based on giving students freedom, ownership, and trust enabled a sense of agency for the students.

Session B 4

29 August 2017 15:15 - 16:45

Main Building D - D13

Single Paper

Developmental Aspects of Instruction, Motivational, Social and Affective Processes, Teaching and Teacher Education

Attitudes and Beliefs

Keywords: At-risk students, Attitudes and beliefs, Conceptual change, Educational Psychology, Emotion and affect, Phenomenography, Primary education, Self-regulation, Social aspects of learning and teaching, Student learning, Teaching / instruction, Teaching approaches

Interest group: SIG 08 - Motivation and Emotion, SIG 09 - Phenomenography and Variation Theory, SIG 10 - Social Interaction in Learning and Instruction

Chairperson: Fredrik Mørk Røkenes, Norwegian University of Science and Technology, Norway

A Phenomenographic and Variation Theory Study of Lower Secondary Students' Personal Finance

Keywords: Attitudes and beliefs, Conceptual change, Phenomenography, Student learning

Presenting Author:Hua Loon Ling, The University of Hong Kong, Hong Kong

This study aimed to understand the financial education needs of ethnic minority (non-Chinese ethnicity) lower secondary students in Hong Kong. Improving the financial well-being of students has been recognised as an important endeavour. But beyond teaching knowledge and skills, it has been suggested that financial education should be focused on values and behaviours. Values can be understood as the evaluative and prescriptive beliefs wherewith individuals see the decision-making process and make judgments to guide behaviours. As discussed in phenomenographic theory, more powerful ways of seeing can lead to more powerful ways of acting. In this study, 99 Secondary 1 students (24 intervention group; 75 control group) from one secondary school in Hong Kong took part in a one-year longitudinal mixed-methods design study with three phases: baseline, intervention, and follow-up. At the baseline, all students completed a self-completion questionnaire with quantitative and qualitative components. The intervention group students were interviewed. Phenomenographic analysis was carried out on the qualitative data and findings of the critical aspects and features informed variation-theory design of financial education lessons that were taught to the intervention group students. Data was collected through student work, audio-recordings of class discussions, and interviews. At the follow-up phase, all students answered a similar questionnaire survey again. Findings were compared and contrasted between groups through quantitative statistical analysis of the phenomenographic outcome spaces and self-reported financial behaviours to evaluate effectiveness of the lessons to develop more powerful ways of seeing personal finance in the intervention group.

Describing the internal and external horizons: evidence from graduates' conceptions of price

Keywords: Conceptual change, Phenomenography, Teaching / instruction, Teaching approaches

Presenting Author: Guy Durden, University College London, United Kingdom

In Phenomenography/Variation Theory (PVT), most research has focused on identifying differences in conceptions of phenomenon *within* the internal horizon, without making explicit reference to the context, or external horizon (e.g. Pang & Marton 2003). The interaction between the external and internal horizons (Marton & Booth, 1997) could mean that this has limited the power of these research findings in applications to student learning. This study presents evidence of graduates' conceptions of the phenomenon of price in terms of a combination of aspects of the external and internal horizons. The study found that the external horizon was structured in terms of qualitative differences, in the same way as the internal horizon. These findings allow educators to more crisply delimit the context from the phenomenon, and to focus on a more clearly defined object of learning (Kullberg, Mårtensson & Runnesson, 2015). The importance of this is indicated in the study's findings that the external horizon has a powerful effect on revealed conceptions. The study raises questions about the nature of the relationship between aspects of the internal and external horizons in terms of the phenomenon of price, and the 'correct' way to sequence variation in order to trigger conceptual change.

The Accuracy of Teacher Expectations: Implications for Equal Educational Opportunities

Keywords: At-risk students, Attitudes and beliefs, Primary education, Social aspects of learning and teaching

Presenting Author: Christine Rubie-Davies, University of Auckland, New Zealand; **Co-Author:** Kane Meissel, University of Auckland, New Zealand

The accuracy of teacher expectations is important because when expectations are inaccurate, teachers plan inappropriate learning experiences for students; some are given challenging tasks and whereas others receive lower level assignments. In two samples, this study explored the accuracy of teacher expectations in a number of ways. First, whether expectations were accurate overall was examined. Second, whether some teachers were more accurate than others was explored. Third the accuracy of teacher expectations for different groups (ethnicity, SES and gender) was explored. Finally, whether teacher inaccuracy predicted end-of-year mathematics achievement was investigated. Only one-third of expectations for students were accurate and some teachers were more accurate than others. Ethnic minorities and those from low socioeconomic backgrounds were more likely to be underestimated. Teacher inaccuracy predicted end-of-year achievement such that those who were overestimated achieved at higher levels and the opposite. The educational and theoretical implications of the findings are discussed.

School Stress among Sixth-Grade Students – Associations with Academic Buoyancy and Temperament

Keywords: Attitudes and beliefs, Educational Psychology, Emotion and affect, Self-regulation

Presenting Author: Riikka Hirvonen, University of Jyväskylä, Finland; **Co-Author:** Laura Yli-Kivistö, University of Jyväskylä, Finland; **Co-Author:** Timo Ahonen, University of Jyväskylä, Finland; **Co-Author:** Noona Kiuru, University of Jyväskylä, Finland

The aim of the study was to examine to what extent sixth-grade students' academic buoyancy and temperamental effortful control and negative affectivity predict their experiences of school-related stress, after controlling for gender, GPA, and previous stress level. A total of 678 students (55% girls; mean age 12.3 years, SD = 0.33) participated in the study. The students rated their school-related stress in the fall and spring of the sixth grade. In the fall, they also rated their academic buoyancy and reported GPA from their most recent school report. Students' temperament was rated by their parent. A set of hierarchical regression analyses was conducted to examine the research questions. The findings showed that high academic buoyancy predicted low stress level after controlling for previous stress level, gender, and GPA. Moreover, high negative affectivity was related to a high level of stress after controlling for previous stress level, gender, and GPA. Effortful control and its interaction with negative affectivity did not predict students' stress. The findings suggest that interventions aiming at supporting students' academic buoyancy could also reduce their experiences of stress at school. Training of coping strategies and stress management techniques could be beneficial already among sixth-graders, especially among those with high negative affectivity.

Session B 5

29 August 2017 15:15 - 16:45

Pinni A - Paavo Koli

Single Paper

Motivational, Social and Affective Processes

Motivation and Emotion

Keywords: Assessment methods and tools, Competencies, Educational Psychology, Emotion and affect, Goal orientation, Motivation, Motivation and emotion, Multimedia learning, Parental involvement in learning, Teaching / instruction

Interest group: SIG 08 - Motivation and Emotion

Chairperson: Carla Quesada-Pallarès, Spain

When parents support students' choices: Parents' role in students' choice of a high school major

Keywords: Educational Psychology, Motivation, Parental involvement in learning, Motivation and emotion

Presenting Author: Idit Katz, Ben-Gurion University of the Negev, Israel; **Co-Author:** Moran Green-Cohen, Ben-Gurion

University of the Negev, Israel; **Co-Author:**Rinat Cohen, Ben Gurion University of the Negev, Israel; **Co-Author:**Suzi Morsiano-davidpur, Ben-Gurion University of the Negev, Israel

The goal of this longitudinal study is to examine how parents' involvement in the decision making process of choosing a high school major, is associated with the type of motivation, wellbeing and success of their children in studying the major. The study employs Self-Determination Theory as the theoretical framework for the investigation. Two hundred and twenty-nine 10th-grade students completed questionnaires at the very beginning and at the end of the school year. Through path analysis, the findings indicated that students' who perceived their parents as supportive during the process of choosing, chose a subject for autonomous rather than controlled reasons, had autonomous rather than controlled motivation to learn the subject, and had higher well-being, higher self-perception of ability and higher grades. The results highlight the positive role that parents can play in their children's choices in order to enhance autonomous motivation, wellbeing, and success.

Is Confusion leading to frustration or engagement? An emote-aloud study on achievement emotions

Keywords: Assessment methods and tools, Emotion and affect, Motivation and emotion, Multimedia learning

Presenting Author:Hannes Muenchow, University of Würzburg, Germany; **Co-Author:**Christoph Sonnenberg, University of Würzburg, Germany; **Co-Author:**Maria Bannert, Technical University of Munich (TUM), Germany

Learning-related achievement emotions appear frequently and change dynamically while learning (e.g. D'Mello, 2013). According to the cognitive disequilibrium framework proposed by D'Mello and Graesser (2012), the learner's perceived confusion due to obstacles while learning can lead to feelings of eureka and engagement if the obstacle was overcome. Otherwise, the model assumes that ongoing confusion can enhance feelings of being frustrated or bored. The present study examines the model's assumptions by the help of process analyses. Because of difficulties in measuring emotional dynamics while learning sufficiently using retrospective questionnaires, an emote-aloud procedure in which learners had to verbalize emotional states during periods of learning was used (D'Mello, Craig, Sullins & Graesser, 2006). A total of N = 20 university students were asked to freely express changes of their emotional experiences during a 30-minute learning phase on 'probability theory'. As a guide, the participants were given a list of 13 learning-related emotional states that were derived from the literature. Other emotional states should also be verbalized. The statements were recorded and classified categorically (Cohen's kappa = .75). Descriptive results show that confusion (19%), boredom (15%) and frustration (15%), but also joy (11%) and Eureka (10%) were verbalized most frequently. Process mining analyses taking into consideration the sequential order of the verbalizations indicate important relations between confusion and eureka as well as frustration. These findings are in line with the cognitive disequilibrium framework. Additional analyses for conformance checking will be presented.

Developmental Interplay of Temperament and Motivation During the Early School Years

Keywords: Educational Psychology, Goal orientation, Motivation, Motivation and emotion

Presenting Author:Anna Rawlings, University of Helsinki, Finland; **Co-Author:**Anna Tapola, University of Helsinki, Finland; **Co-Author:**Markku Niemivirta, University of Oslo, Norway

As yet, little is known about the antecedents to inter-individual differences and change in students' goal orientations over the school years. While approach and avoidance temperaments are known to predict students' achievement goals, research into the effects of temperament on the development of goal tendencies remains sparse. This study examined the development and reciprocal predictions of temperamental reward and punishment sensitivities and achievement goal orientations, in a longitudinal framework over three years. Participants were students from 16 elementary-school classes (N = 286, 52.4% girls). In the spring of the 1st, 2nd, and 3rd grades, class teachers rated the students' reward and punishment sensitivities, and achievement goal orientations on four dimensions (mastery, performance-approach, performance-avoidance, avoidance). An autoregressive cross-lagged panel model was used to examine the development of the latent constructs and their reciprocal predictions over time. Findings showed relatively high stability over time for all constructs. Reciprocal negative predictions were found between reward sensitivity and mastery orientation, and positive between performance-approach orientation and reward sensitivity. Reward sensitivity in the first and second grades predicted performance-avoidance orientation in the following year. Avoidance and mastery orientations were found to have negative reciprocal predictions. Our findings provide new knowledge on the development of students' temperamental sensitivities and motivation, and how they may become linked already in the early school years.

The effect of classroom processes on reading comprehension: the mediating role of mastery goals

Keywords: Competencies, Goal orientation, Motivation, Teaching / instruction

Presenting Author:Desiree Theis, German Institute for International Educational Research (DIPF), Germany; **Co-Author:**Natalie Fischer, Universität Kassel, Germany

Transition to middle school is generally associated to decreases in student motivation and achievement. The stage-environment fit approach postulates that the maladaptive development of students in middle school is due to a misfit between students' basic needs for autonomy, social relatedness, and competence and the school context. Research confirms that classroom processes significantly affect students' achievement and motivation. The aim of this study is to investigate the association between perceived need fulfillment during German lessons, students' reading motivation (namely mastery goals) and performance. Moreover, we investigate whether the adoption of mastery goals mediates the effect of perceived quality of instruction on reading performance. 2.105 fifth grade students answered questionnaires about their mastery goals and the amount of perceived autonomy, competence and social support by the teacher as indicators of

quality of instruction in German lessons. Reading performance was assessed by a reading comprehension test. The association between perceived quality of instruction, students' mastery goals and reading performance was tested by latent regression analysis. Perceived need fulfilment was positively related to students' mastery goals. Mastery goals, perceived support by the teacher predicted higher values on the reading test. In terms of perceived autonomy and competence the effect on academic achievement was mediated by the students' mastery goals. Our findings underline the importance of the students' basic needs and their support and indicate that perceived classroom processes are mediated by the students' motivation.

Session B 6

29 August 2017 15:15 - 16:45

Main Building D - D11

Single Paper

Teaching and Teacher Education

Teacher Professional Development

Keywords: Action research, Collaborative Learning, Educational policy, Educational Technology, In-service teacher education, Primary education, Reflection, Teacher Professional Development, Teaching / instruction

Interest group: SIG 11 - Teaching and Teacher Education

Chairperson: Thomas Gallagher-Mitchell, Liverpool Hope University, United Kingdom

On the path to dialogic teaching: Learnings from action research

Keywords: Action research, Reflection, Teacher Professional Development, Teaching / instruction

Presenting Author: Klara Sedova, Masaryk University, Czech Republic; **Co-Author:** Roman Švaříček, Masaryk University, Faculty of Arts, Czech Republic; **Co-Author:** Zuzana Šalamounová, Department of Educational Sciences, Faculty of Arts, Masaryk University, Czech Republic

The paper summarizes the results of an action research project focused on the implementation of dialogic teaching practice. The participants were eight Czech teachers in lower secondary schools who took part in a one-year intensive teacher development programme. *Dialogic teaching* is based on the thesis that spoken language should play a central role in teaching, since it provides an opportunity to influence students' thought processes through their involvement in classroom discourse. The participating teachers attended workshops centred on the indicators and principles of dialogic teaching. A series of nine video recordings of lessons were made for each participant, aimed at analysing whether any gradual change in classroom discourse may be identified. Video-stimulated reflective interviews were conducted in between individual lessons. An analysis of data from the video recordings revealed that the teachers and their classes underwent transformation towards dialogic teaching. At the same time, it showed that the process of change was non-linear. It included stages of regression and stages of progress. Data from reflective interviews demonstrate that these interviews played a key role in the process of change, since they became a vehicle for overcoming the regression and directing the change.

Pedagogy under pressure? Primary school teachers' perceptions of their pedagogical actions.

Keywords: Educational policy, Primary education, Teacher Professional Development, Teaching / instruction

Presenting Author: Michelle Gemmink, University of Groningen / Katholieke Pabo Zwolle, Netherlands; **Co-Author:** Marjon Fokkens-Bruinsma, University of Groningen, Netherlands; **Co-Author:** Jetje Pauw, Katholieke Pabo Zwolle, Netherlands; **Co-Author:** Klaas van Veen, University of Groningen, Netherlands

In Dutch primary schools, pedagogical actions seem to receive much less attention than content knowledge. This is the consequence of several developments and innovations that aimed at enhancing pupils' learning outcomes and at improving teachers' content knowledge and didactic actions. This results in a multitude of tasks and responsibilities for teachers around didactics and seems to constrain time and attention for pedagogical actions. This research explores whether the pedagogical actions of primary school teachers are indeed under pressure in the current educational climate. The goals of this study were threefold; (1) to examine teachers' perceptions regarding their pedagogical actions, (2) to examine how teaching experience, age of the students and the specific school context influence these perceptions, (3) to determine which needs for professionalisation teachers have to increase their pedagogical actions in the classroom. A survey was conducted among a sample of 261 Dutch mainstream primary education teachers in the northern part of the Netherlands. Data were collected with a questionnaire, which consisted of fifteen open and closed questions. Teachers were asked about their perceptions of pedagogical actions in the classroom, the school's vision of pedagogy, their personal vision of pedagogy and background variables of the respondents. Half of the responding teachers (47.5%) indicate that pedagogical actions of primary schools are under pressure. Over 60% of teachers indicated that they would like to pay more attention to this issue. Pedagogical actions of primary school teachers are indeed under pressure in the current educational climate.

Changing pedagogies and practices with digital storytelling: from teachers' perspective

Keywords: Educational policy, Educational Technology, In-service teacher education, Teacher Professional Development

Presenting Author: Marianna Vivitsou, University of Helsinki, Finland; **Co-Author:** Hannele Niemi, University of Helsinki, Finland; **Co-Author:** Veera Kallunki, University of Helsinki, Finland

This study aims to investigate four Finnish primary school teachers' views of how pedagogical and instructional practices change when digital storytelling is the teaching method. Digital storytelling is a new pedagogy aiming for student-driven knowledge creation by making and sharing online stories in video format. In order to meet this end, teachers need to introduce, support and facilitate student collaborative work in groups and/or pairs. In addition, they need to introduce the use of web-based environments, adapt their teaching plan accordingly, and enrich existing instructional material. As this process involves applying new ideas at work, making decisions on the ways of teaching, and developing own work, both the social and material aspects of teaching change (Biesta & Tedder 2007, Priestley et al. 2012). In addition, teacher professional agency also changes (Eteläpelto et al. 2015, Eteläpelto et al. 2013, Vähäsantanen et al. 2009). The focus of this study is to find out how teachers apply new pedagogies and how they expand the teaching plan and own practices in order to deal with the change. To analyze data resulting from teacher interviews we used qualitative methods. The analysis indicated three main categories in teacher definitions of change in their professional agency: contextualization of science-related learning; enabling collaborative work for knowledge building; and expanding available resources.

Making sense and enhancing teachers' collaborative expertise of school well-being

Keywords: Action research, Collaborative Learning, In-service teacher education, Teacher Professional Development

Presenting Author: Tuija Ukskoski, University of Jyväskylä, Finland

This action research examines an intervention aiming to develop teachers' expertise collaboratively. The context of the expertise is focused promoting educational well-being for preventing bullying. The intervention was implemented in two Finnish comprehensive schools, and as teachers' in-service training at workplace. Teachers (n=44) were informants, and the data has been gathered before, during, and at the end of the intervention. The intervention was based on integrative pedagogy. The themes of the training sessions constituted on the theories of well-being and bullying. Theoretical foundation lies here on the socio-cultural theories and studies of expertise, collaborative leadership and the sensemaking process. The mixed-method analysis was on the other hand a deductive, theory-based analysis, and on the other hand an abductive, thematic step-by-step analysis along the process of systematic coding. The process enhanced the collaborative expertise of well-being and revealed the main elements of this sensemaking process. Also, it generated new understanding about bullying from the perspective of the school personnel, and possibilities and limitations of promoting well-being. The research presents an example for organizing teachers' in-service training and novel practice in order to develop the school culture from the perspective of the organizational theory of collaborative leadership and sensemaking process.

Session B 7

29 August 2017 15:15 - 16:45

Pinni B - B4113

Single Paper

Cognitive Science, Learning and Social Interaction

Learning and Professional Development

Keywords: Cognitive skills, Collaborative Learning, Conversation / Discourse analysis, Informal learning, Problem solving, Professions and applied sciences, Qualitative methods, Reasoning, Social aspects of learning and teaching, Social interaction, Teacher Professional Development, Vocational education, Workplace learning

Interest group: SIG 14 - Learning and Professional Development

Chairperson: Kylie Shaw, SORTI, The University of Newcastle, Australia

Team learning and innovative work behaviour in vocational teacher teams

Keywords: Collaborative Learning, Social interaction, Vocational education, Workplace learning

Presenting Author: Andreas Widmann, University of Regensburg, Germany; **Co-Author:** Regina Mulder, University of Regensburg, Germany

In workplaces, innovations are required to address emerging problems and challenges. Also in vocational education there are many challenges in meeting the demands of students, of the labour market and society. In order to meet these demands, teacher teams need to work and learn together to develop innovative solutions such as products, processes and strategies. Research indicates that IWB can be fostered with individual learning processes, but insight in the relation between team learning processes and IWB is lacking. Team learning is defined as a compilation of processes that circularly generate changes for teams, team members or organizations. Inputs from multiple levels can influence team learning processes: structural and cultural work condition, which produce in turn team learning outputs at multiple levels. We examined the relations between team learning inputs, processes and IWB as behavioural output. We conducted a longitudinal survey study with three waves using questionnaires with 315 vocational teachers of 87 interdisciplinary work teams. The results indicate a positive relationship between team learning processes and IWB (ranging from T1: $r=.27$ to $.51$; T2: $r=.27$ to $.56$; T3: $r=.29$ to $.55$, p

Intergenerational relationships in elementary school teams. A social network approach

Keywords: Informal learning, Social aspects of learning and teaching, Teacher Professional Development, Workplace learning

Presenting Author: Kendra Geeraerts, University of Antwerp, Belgium; **Co-Author:** Jan Vanhoof, University of Antwerp,

Belgium; **Co-Author:**Piet Van den Bossche, University of Antwerp, Belgium; **Co-Author:**Nienke Moolenaar, University of Antwerp, Belgium

This paper examines the extent to which teachers' work-related social networks are affected by different generations of teachers. Data were gathered through a survey with socio-metric questions among 301 school team members in 15 elementary schools in the Netherlands ($n=301$). Using social network analysis, in particular p2 modelling, we analysed the effect of being part of a generation on teachers' probability of having relationships in networks such as discussing work, asking and providing advice, and collaboration. Findings indicate that generational cohorts based on chronological age do matter in the formation of work-related ties. These findings also support the importance of focusing on different instrumental networks since different age dynamics can be at play. Our findings also show that school team members of the youngest cohort tend to form intra-generational ties, whereas older generational cohort members form inter-generational ties.

Images of the possible: Leaders' effective interpersonal behaviours in difficult conversations

Keywords: Cognitive skills, Conversation / Discourse analysis, Qualitative methods, Teacher Professional Development

Presenting Author:Frauke Meyer, University of Auckland, New Zealand; **Co-Author:**Deidre Le Fevre, University of Auckland, New Zealand

Principals commonly struggle to have effective conversations about staff performance issues and parental complaints (Authors, 2011, 2014; Cardno, 2007; Yariv, 2009). They tend to tolerate and work around performance issues, sometimes even protecting staff members from further scrutiny, rather than effectively address issues (Bridges, 1992). Principals often avoid dealing with such difficult issues, because they lack the interpersonal skills to have effective conversations addressing these issues (Authors, 2011, 2014, Argyris & Schon, 1974). An earlier paper outlined a model of six specific values and skills that a group of 30 beginning principals struggled with when having effective conversations about performance issues. The model of 'Open-to-learning Conversations' was based on empirical evidence reported in studies of effective and ineffective negotiation, complaint interactions, interpersonal problem-solving and dilemma management. Questioned how exemplary practice in these values and skills would look like, we returned to the data to seek cases that exemplified effective practice. We drew on the analysis of 60 conversations based on two standardised scenarios in which a principal had to address a parental complaint about a teacher's performance or classroom management. Principals were rated on each of the six skills by means of five behavioural indicators which described a progression of effectiveness for each skill. This paper provides examples of principals' behaviour that exemplified the highest level of progression in the given skill. In describing these authentic examples along with key phrases we hope to provide guidance for practitioners themselves and those training and mentoring educational leaders in interpersonal effectiveness.

The role of physicians' experience in experiencing gut feelings in diagnosing ambiguous cases

Keywords: Problem solving, Professions and applied sciences, Reasoning, Workplace learning

Presenting Author:Margje W.J. van de Wiel, Maastricht University, Netherlands; **Co-Author:**Erik Stolper, Maastricht University, Netherlands

Medical expertise is the result of cognitive processes in which patient information and knowledge and experience of physicians interact. Gut feelings may arise from automatic, non-analytical processes and help physicians to navigate in complex and uncertain diagnostic situations. It is unknown in what way gut feelings develop with experience. The present expertise study shed light on this issue by comparing three groups of participants with different experience in general practice (16 experienced physicians, 16 trainees, and 16 clerks) while they diagnosed six patient cases. All cases were considered ambiguous, based on real patients, and elicited different types of gut feelings (sense of reassurance and/or sense of alarm). A clear expertise effect was found for elaborateness of case processing (i.e., clerks were more elaborate), but not for diagnostic accuracy and the gut feelings experienced. The cases were rather hard to diagnose and elicited different types of gut feelings for all participants. Case effects were strong while manipulations of patient information had minor effects and did not interact with participants' experience. This corroborates the case-specificity of knowledge in diagnostic reasoning. The study underscores that the interactions between the available patient information and the knowledge and experience of a physician determine the cognitive processes and outcomes. For training and continuous development this means that physicians must be made aware of their cognitive processes, act upon their uncertainty and sense of alarm, and need to seek feedback on their gut feelings in order to learn from their experiences.

Session B 8

29 August 2017 15:15 - 16:45

Main Building A - A4

Single Paper

Learning and Instructional Technology, Motivational, Social and Affective Processes, Teaching and Teacher Education

Teaching and Instructional Approaches

Keywords: Collaborative Learning, Educational Technology, Experimental studies, Geography, Metacognition, Misconceptions, Mixed-method research, Multimedia learning, Secondary education, Self-regulation, Student learning, Teaching approaches, Technology

Interest group: SIG 11 - Teaching and Teacher Education, SIG 27 - Online Measures of Learning Processes

Chairperson: Maida Mustafic, University of Luxembourg, Luxembourg

Physiological synchrony during monitoring in collaborative learning

Keywords: Collaborative Learning, Metacognition, Mixed-method research, Self-regulation

Presenting Author: Márta Sobocinski, University of Oulu, Finland; **Co-Author:** Jonna Malmberg, University of Oulu, Finland; **Co-Author:** Sanna Järvelä, University of Oulu, Finland

Recent studies have focused on capturing processes of self- and socially shared regulation of learning in a contextualized manner, using novel methods and data sources. This study explores how different group members' cardiovascular signals synchronize during a collaborative learning, with a focus on monitoring activities. High school students worked face to face in groups of 3 during an advanced physics course. Video data and physiological data was collected from 6 lessons. The video data was analyzed using qualitative methods, and instances of monitoring were coded. Using the cardiovascular data, indexes of physiological synchrony were calculated. Physiological synchrony indexes are compared for instances of monitoring, and a timeline of the lessons is presented to contextualize when periods of strong physiological synchrony occur.

Teachers' awareness of students' misconceptions in astronomy. A qualitative analysis in Belgium

Keywords: Geography, Misconceptions, Secondary education, Teaching approaches

Presenting Author: An Steegen, KU Leuven, Belgium; **Co-Author:** Marjolein Cox, KU Leuven, Belgium; **Co-Author:** Mieke De Cock, KU Leuven, Belgium

Where previous studies have shown the existence of misconceptions in astronomy, this research focuses on the level of awareness that teachers have of these misconceptions and the possible strategies they use to change the students' mental models. Through focus group interviews with secondary school teachers and semi-structured interviews with teacher managers, this latent knowledge is made more explicit. The main findings suggest that the level of awareness about misconceptions varies considerably among the teachers. In general, the same pattern is found for the teacher managers. Some mental models, as for example the distance model, are known by all teachers whereas others models are not known at all. Even though teachers acknowledge the importance of students' preconceptions in general, they have difficulties using the students' prior knowledge in an effective way in their teaching practice. According to the teachers, this is mainly due to a lack of time and to difficulties experienced with differentiation. Awareness on misconceptions might therefore grow by organising different teacher training programs for preservice or inservice teachers, and by avoiding further misconceptions via a proper use of images in textbooks.

Designing videos for learning: Separating the good from the bad and the ugly

Keywords: Educational Technology, Experimental studies, Student learning, Multimedia learning

Presenting Author: Jason Lodge, The University of Melbourne, Australia; **Co-Author:** Jared Horvath, University of Melbourne, Australia; **Co-Author:** Alex Horton, University of Melbourne, Australia; **Co-Author:** Sven Venema, Griffith University, Australia; **Co-Author:** Gregor Kennedy, University of Melbourne, Australia; **Co-Author:** Shane Dawson, University of South Australia, Australia

Videos are increasingly being used in all levels of education. Despite this, much of what is thought of as best practice is based on heuristics over evidence from rigorous experimental or quasi-experimental studies. The two studies reported here are an attempt to provide further evidence about what video production methods (if any) actually influence student learning. In two large-scale experiments conducted online, overall video type (text, static image, image and presenter face and full animation) and video design elements (static slides, digital ink, Socratic dialogue) were compared. The results of the two studies suggest that it is features of video design as opposed to overall video type that most influences student learning. These results have implications for video production approaches and for further research examining video use in education. The implications for research and practice will be discussed in relation to Multimedia Learning Theory.

Digital procrastination in secondary schools: triggers and enabling conditions

Keywords: Educational Technology, Secondary education, Technology, Multimedia learning

Presenting Author: Thomas Arnesen, Western Norway University of Applied Sciences, Norway; **Co-Author:** Eyvind Elstad, University of Oslo, Norway; **Co-Author:** Elaine Munthe, Stavanger University College, United States

Youth spend a considerable amount of time every day surfing the internet, and some of the interest-driven activities are arguably educationally desirable (Ito, 2010; Buckingham, 2007). In an effort to capitalize on youth's digital strengths, a growing number of schools offer open net-access. Digital procrastination, however, might undermine any educationally productive potential. In an effort to understand the generative mechanisms of digital procrastination, we explore in depth *the factors that trigger and conditions that enable students' digital procrastination in a Norwegian secondary school classroom with open internet access*. Based on critical realist ontological and epistemological assumptions, we conducted a qualitatively driven, mixed methods sequential design consisting of a small-scale survey (N=108), classroom observations and focus-group interviews. The findings indicated five triggers (net-attraction, loss of subject matter task value, vicarious procrastination, transitions, perceived break entitlement) and six enabling conditions (extensive digital access, extensive student freedom, teacher abdication of responsibility, digital norms adjusted to students' patterns of procrastination, student lack of self-regulatory strategies and efficacy). We argue that at the heart of digital procrastination lies the behavioral design of digital distractions that constantly offers and facilitates educationally debilitating behavior. Further, we categorized

students' delay behaviors as either passive or active in relation to the degree of conscious planning and time management. Whereas passive procrastinators were more or less helpless victims of digital distractions' behavioral design, active procrastinators were instrumental in their behaviors intent on maximization of utility. Implications for policy, practice, and further research is discussed.

Session B 9

29 August 2017 15:15 - 16:45

Pinni B - B1100

Single Paper

Assessment and Evaluation

Assessment and Evaluation

Keywords: Assessment methods and tools, Competencies, Educational policy, Higher education, Intelligence, Motivation and emotion, Quantitative methods, Science education, Secondary education, Teacher Effectiveness, Teaching / instruction, Video analysis

Interest group: SIG 01 - Assessment and Evaluation

Chairperson: Elena Makarova, University of Applied Sciences and Arts Northwestern Switzerland, Switzerland

Coordinated Assessment Design to Explore the Relationship of Teacher Knowledge to Teaching Quality

Keywords: Assessment methods and tools, Educational policy, Science education, Teacher Effectiveness

Presenting Author: Drew Gitomer, Rutgers University, United States; **Co-Author:** Courtney Bell, Educational Testing Service, United States

A substantial body of research has examined the relationships among different measures of teaching quality, including teacher knowledge, classroom observations, classroom artifacts, and student achievement growth. These studies typically have employed a traditional multi-trait, multi-method approach in which correlational analyses are used to examine the extent to which scores on a measure of one construct are related to scores on measures of other constructs. We argue that the methods used to study teaching quality may, in part, account for what are often weak observed relationships. Most studies can be characterized by both a relatively weak theoretical connection among measures and sampling designs that do not support inferences about the nature of relationships among scores on different measures. To support our argument we report the results of a study that uses measures with more explicit theoretical connections and a design that examines knowledge, classroom practice, and student learning within a narrow instructional domain. Specifically, we explore the fundamental question that underlies the construct of content knowledge for teaching (CKT)—what does a teacher know about teaching a particular content area, and how does that knowledge relate to instructional quality and student learning in that content area? Using a theory-based evidence-centered assessment design process (ECD), we develop a broad network of measures, including knowledge assessments, classroom observations and artifact protocols, and measures of student learning, all within the same construct domain, to create and evaluate a coordinated validity argument of CKT.

Thin-Slice Judgements as a Measurement of Instruction Quality

Keywords: Assessment methods and tools, Quantitative methods, Teaching / instruction, Video analysis

Presenting Author: Lukas Begrich, Goethe-Universität Frankfurt, Germany

A drawback of established video-based analysis of teaching lies in its high cost in terms of time and money. The present research examines the possibility of assessing instructional features on the basis of very short observations, respectively first impressions. This procedure which uses judgements based on first impressions has shown high reliability and validity in the assessment of various psychological constructs. In our study untrained raters judged 37 elementary school teachers regarding three dimensions of instructional quality based on 30-second randomly selected sequences from full classroom videos. Both showed very high interrater reliabilities. Further there were significant correlations with ratings of instructional quality given by trained raters based on the full classroom videos. While descriptive analyses indicate a rather undifferentiated judging process, multilevel regression analyses predicting students' achievement gain via ratings of instructional quality indicate a certain predictive validity of first impressions.

How is performance assessment in education set out and its quality measured? A systematic review

Keywords: Assessment methods and tools, Competencies, Higher education, Secondary education

Presenting Author: Liesje Coertjens, Université catholique de Louvain (UCL), Belgium; **Co-Author:** Karen Verswijvel, University of Antwerp, Belgium; **Co-Author:** Alexia Deneire, Antwerp University, Belgium; **Co-Author:** Jetje De Groof, University of Antwerp, Belgium; **Co-Author:** Sven De Maeyer, University of Antwerp, Belgium

To assess students' competences, today's educational institutions increasingly rely on performance assessment. For such performance assessment, students are for example asked to create a product, such as a portfolio, or a presentation. From an educational practice point of view, developing such performance assessment and ensuring its quality is frequently perceived as challenging. A systematic overview of literature on performance assessment and their quality indicators would be suitable to inform educational practice, but is up to present lacking. The present study provides such a systematic literature review of empirical studies on summative performance assessment in primary, secondary and higher education and on the quality indices provided in these studies. From a search in Ebsco and PsychInfo which delivered 4226 unique

articles, 44 were retained. Results indicate a predominance of studies in higher education, on medical education and using Objective Structured Clinical Evaluations or internships. Regarding the quality indices, half of the studies only included indices on reliability, while 36% provided backing for both validity and reliability of the performance assessment.

Accuracy of teachers' judgments of students with consistent and inconsistent profiles

Keywords: Assessment methods and tools, Intelligence, Teaching / instruction, Motivation and emotion

Presenting Author: Anna-Katharina Praetorius, German Institute for International Educational Research (DIPF), Germany;

Co-Author: Anna Suedkamp, TU Dortmund University, Germany; **Co-Author:** Birgit Spinath, Heidelberg University, Germany

Teachers' judgment accuracy is known to differ across teachers, student characteristics and accuracy measures. To what extent teachers' judgment accuracy is stable across sets of student characteristics (i.e., profiles) remains, however, open so far. This is an important question as teachers take a combination of multiple student characteristics into account when fostering student learning, e.g., when choosing instructional activities and material for individual students. In a first step, we analyzed whether groups of students with different ability and motivational profiles can be identified among elementary school children. In a second step, we studied whether teachers judged students with a consistent ability and motivational profile more accurately than students with an inconsistent profile. Overall, $N = 757$ elementary school children and their $N = 41$ classroom teachers participated in the study. Data on students' intelligence, academic self-concept, motivation, and test anxiety as well as teachers' judgments of these student characteristics were available. Using latent profile analyses, we identified two cognitive-motivational profiles. In contrast to our expectations, multi-group regression analyses showed no differences in teachers' judgment accuracy of students with consistent and inconsistent profiles.

Session B 10

29 August 2017 15:15 - 16:45

Virta - 113

Single Paper

Higher Education, Learning and Instructional Technology

Learning and Instruction with Computers

Keywords: Achievement, Assessment methods and tools, Case studies, Computer-supported collaborative learning, Conversation / Discourse analysis, Design based research, E-learning / Online learning, Educational Technology, Emotion and affect, Informal learning, Inquiry learning, Knowledge creation, Motivation, Problem-based learning

Interest group: SIG 07 - Learning and Instruction with Computers

Chairperson: Martin Merkt, Leibniz-Institut für Wissensmedien, Germany

Interpersonal skills in CSCL-environments: Do they predict student individual and group performance?

Keywords: Computer-supported collaborative learning, Conversation / Discourse analysis, Emotion and affect, Problem-based learning

Presenting Author: Bert Slof, Utrecht University, Netherlands; **Co-Author:** Jeroen Janssen, Utrecht University, Netherlands; **Co-Author:** Danique Nijdam, University Utrecht, Netherlands

The effectiveness of Computer-Supported Collaborative Learning (CSCL) heavily depends on whether its members function effectively as a group. Dealing with barriers, such as free riding social loafing, requires the utilization of interpersonal skills. Based on the interpersonal theory, the skills were operationalized in terms of communion (displaying empathic behaviour, e.g., being helpful) and agency (displaying dominant behaviour, e.g., leadership). In this paper we examined to what extent students' utilized and perceived interpersonal skills predict individual and group performance. Secondary education students (87) were, within classes, randomly assigned to 29 triads and had to solve a business-economics problem. The utilized interpersonal skills were measured by coding the chat-utterances of the group discussions. A questionnaire was administered, after task completion, to measure the perceived interpersonal skills. A pre-test and a post-test were administered to measure individual performance. Group performance was measured by coding the quality of the problem-solution. Multi-level analysis, corrected for pre-test performance, revealed that the utilized agency and communion skill positively predict individual performance. Multiple regression analysis revealed that the group level scores for utilized and perceived interpersonal skills and pre-test performance did not significantly predict group performance. The results suggest that students' utilized interpersonal skills significantly predict the degree to which CSCL has an impact student individual performance. Furthermore, possible explanations for the non-significant results for the perceived interpersonal skills as well as the lack of significant findings for the effects on group performance are provided.

The road to hell is paved with good intentions, but what happens to them along the way?

Keywords: Achievement, E-learning / Online learning, Informal learning, Motivation

Presenting Author: Maartje Henderikx, Open University of the Netherlands, Netherlands; **Co-Author:** Karel Kreijns, Open University of the Netherlands, Netherlands; **Co-Author:** Marco Kalz, Open University of the Netherlands, Netherlands

Currently success measurement of MOOCs is certificate- and completion-centric and fails to take student intention into account. While this view of success has been criticized by the research community, no suitable alternative has yet been developed. This study addresses this gap and proposes a theoretically grounded model for measuring success and dropout

in MOOCs. The reasoned action approach (RAA) by Fishbein & Ajzen (2010), which centers around the formation of an intention to achieve certain goals, serves as a theoretical framework for our model, in particular the intention-behaviour gap. A new model for measuring success and dropout in MOOCs is proposed. This model redefines success in MOOCs as all MOOC-takers who achieve their individually intended goals are considered successful. The model also provides insight into the dynamics of the intention-behaviour process on an individual level and therefore into possible reasons that can cause the intention-behaviour gap.

Object-oriented learning activities to innovate Higher Education: a case-study

Keywords: Case studies, Computer-supported collaborative learning, Design based research, Knowledge creation

Presenting Author:Nadia Sansone, Sapienza University of Rome, Italy; **Co-Author:**Donatella Cesareni, University of Rome, Italy

This paper describes a case-study in which the Trialological Learning Approach (TLA) has been applied to a university course for Psychologists. Our aim was to observe how TLA impacts on students' participation, learning and appreciation of the course, thus gathering suggestions on how to improve it, in accordance with the Design-based Research methodology inspiring our study. To this end, it has been provided a double implementation of the course. Fifty-five students participated to the first course, divided in six groups of 9 students in average. Following TLA prescriptions, a set of individual and collaborative technology-supported activities was orchestrated, leading to the creation of a shared and meaningful object. Observational and ethnographic data has been collected so far: 969 web-forum posts; 44 pre-post questionnaire investigating students' perception about the acquisition of knowledge work competencies. On these data we have performed quali-quantitative analysis, by the use of specific codebooks for the content analysis. Preliminary results indicate a generally positive impact in terms of students' participation and satisfaction of the activities. Students of the first course have gradually learnt effective methods of discussion, capable of activating knowledge building and collaboration. However, the analysis allowed us to identify some areas for improvement and to redesign the course – currently ongoing - by reviewing a few activities and introducing new ones. Similarly, we have perfected the method. In the presentation, it will be shown the comparison between the two editions in terms of intervention, method and results.

Children's scientific thinking skills for programming a robotic car

Keywords: Assessment methods and tools, Computer-supported collaborative learning, Educational Technology, Inquiry learning

Presenting Author:Eva van de Sande, Radboud University Nijmegen, Netherlands; **Co-Author:**Tijs Kleemans, Radboud University Nijmegen, Netherlands; **Co-Author:**Ludo Verhoeven, Radboud University Nijmegen, Netherlands; **Co-Author:**Eliane Segers, Radboud University Nijmegen / University of Twente, Netherlands

Although the need and popularity for programming experiences in young children rapidly increase, it is by no means clear how children perform while programming. Moreover, very little empirical studies to date have focused on the widespread claim that programming is a rich learning environment to exercise scientific thinking skills. Such thinking entails the 21st century skills to discover, examine, and reflect during knowledge seeking. The present study therefore examined (1) the processes while children program a route for a Lego Mindstorms © car, and (2) how these processes relate to their scientific thinking. Scientific thinking skills were assessed in 292 children, who then programmed Lego Mindstorms© robots for a required route on a map. Children's programming behaviors were recorded on process and outcome variables, such as programming efforts, testdrives, and endpoint that was succeeded on the map. Results indicate that children used different strategies of varying efficiency to program the robotic car, and that these strategies related to children's scientific thinking skills.

Session B 11

29 August 2017 15:15 - 16:45

Main Building C - C8

Single Paper

Learning and Social Interaction

Social Interaction in Learning and Instruction

Keywords: Achievement, Cognitive development, Cognitive skills, Collaborative Learning, Computer-assisted learning, Conversation / Discourse analysis, Cooperative / collaborative learning, Learning analytics, Motivation, Primary education, Quantitative methods, School effectiveness, Social aspects of learning and teaching, Teaching / instruction

Interest group: SIG 10 - Social Interaction in Learning and Instruction

Chairperson: Frederik Ahlgrimm, University of Potsdam, Germany

Positive effects of physical and mindfulness training on children's attention and academic skills

Keywords: Cognitive development, Cognitive skills, Motivation, School effectiveness

Presenting Author:Christian Müller, Goethe-University Frankfurt, Germany; **Co-Author:**Sven Lindberg, Deutsches Institut für Internationale Pädagogische Forschung (DIPF), Germany; **Co-Author:**Viktoria Sawitzki, Goethe University Frankfurt, Germany; **Co-Author:**Priyanga Kanagalingam, Goethe University Frankfurt, Germany; **Co-Author:**Steffen Scherer, Deutsches Institut für Internationale Pädagogische Forschung (DIPF), Germany; **Co-Author:**Christoph Mickel, Goethe-

Universität Frankfurt, Germany; **Co-Author:** Julia Karbach, Goethe-Universität Frankfurt, Germany

The goal of this study was to investigate effects of a physical training and mindfulness training in the classroom on attention and academic skills of children. Both studies with pretest-training-posttest designs consisted of a ten-minutes-per-day for two weeks standardized intervention. An audio-CD with instructions and music was produced for both studies and played while research assistants of the university performed either physical training exercises (e. g. cardiovascular activation) or mindfulness exercises (e. g. body scans) with children together in the classroom. Different attention skills, one measure for reading and for mathematics and different motivational sub-scales were used as independent variables. The sample in study one consisted of 157 elementary school children aged between nine and ten years visiting urban elementary schools in Germany and the second study consisted of 101 school children aged between ten and twelve visiting fifth and sixth grade. Intervention and control groups did not differ in age, intelligence, sex or pre-test differences for independent variables. Moderate interaction effects between intervention and control group were found for attention speed and visual scanning speed in study one and for reading in study two. In sum results indicate that acute physical training as well as mindfulness training can improve cognitive performance in children and young adults. We will discuss implications of these findings and issues that should be addressed in future work for instance training regimes including both physical training and mindfulness training aspects.

Impact of parental beliefs and teacher expectations on mono- and multilingual students' achievement

Keywords: Achievement, Primary education, Quantitative methods, Social aspects of learning and teaching

Presenting Author: Edith Niederbacher, University of Applied Sciences and Arts Northwestern Switzerland, Switzerland;

Co-Author: Markus P. Neuenschwander, University of Applied Sciences and Arts Northwestern Switzerland, Switzerland

The present research examines how the mother tongue, parental beliefs and teacher expectations influence the achievement development of mono- and multilingual children in primary education. The study investigates if a) the parents' perceived efficacy regarding the support of their child's achievement and teachers' achievement expectations are mediating the impact of the mother tongue on the students' achievement development and b) how those factors are interacting. The sample consists of 541 monolingual German speaking and 274 foreign-language speaking or multilingual students from three Swiss cantons. They completed questionnaires and achievement tests in the subjects Mathematics and German in the 5th and 6th grade of primary school. Questionnaires were also filled in by their parents and teachers. The findings reveal that the mother tongue influences the students' achievement development between the two measurements in the subject German, but not in Mathematics. The effect of the mother tongue on achievement development is significantly mediated by the parents' perception of efficacy regarding the support of their child's achievement, but not by teacher expectations. The direct effects of the parents' perception of their efficacy in school related supporting and teacher expectations on achievement development are significant in both subjects. Furthermore, the perceived support efficacy of parents is fully mediated by teacher expectations in Mathematics and partially mediated in German. Implications for educational practice of these mediation effects will be discussed.

It is great she is really checking she wants us to pass – Facilitating student project work

Keywords: Collaborative Learning, Conversation / Discourse analysis, Social aspects of learning and teaching, Teaching / instruction

Presenting Author: Anders Eklöf, Kristianstad University, Sweden; **Co-Author:** Tina Kullenberg, Kristianstad University, Sweden; **Co-Author:** Lars-Erik Nilsson, Kristianstad University, Sweden

All students in Swedish upper secondary school have to do one mandatory project work course aimed at developing general skills such as independence, initiative, creativity and imagination. The students have to pass the course to receive their upper secondary diploma. Our study aims to investigate how students talk about the task of doing 'independent' project works in the diploma course. Three focus group conversations of totaling twelve students are filmed and analyzed through topic analysis, an analytical approach based on dialogism as theoretical framework. The empirical material is analyzed from a perspective of how the design of the project course and the assessment regime influences the students work. Findings indicate that the students rely heavily on help and instruction from the teacher. They perceive of this help as a crucial asset in passing the diploma course. They state that the kind of help they receive are strongly focused towards the dividing line between pass and fail. Help is hardwired towards the scientific form and the content of their essays are treated as almost uninteresting. Support for independence therefore seems to be significantly restricted in practice. The teacher is in fact working as a facilitator guiding students towards dependence. This is accomplished through framing doing project work as doing template science.

Applying analytics to multimodal data: Methodological challenges and opportunities

Keywords: Computer-assisted learning, Conversation / Discourse analysis, Cooperative / collaborative learning, Learning analytics

Presenting Author: Jonathan White, Dalarna University, Sweden; **Presenting Author:** Sangeeta Bagga-Gupta, Jönköping University, Sweden; **Co-Author:** Giulia Messina Dahlberg, University of Skövde, Sweden

In this paper, we present analyses regarding some of the challenges and opportunities of applying learning analytics to multimodal online discourse. The data come from seminars held through the videoconferencing platform Adobe Connect on a beginners' course in Italian run by a Swedish university. Building on our previous analysis of the blurring of boundaries

between the oral and written modes, this presentation focuses on how this blurring affects students' noticing. What is the role of the written text in an otherwise oral discussion, and how do students notice textual comments? Silence is another issue that is relevant, as reading textchat bring additional instances of silence into the oral discussion. How is this navigated by students? Finally, we discuss issues arising from the methods of learning analytics. What normative challenges arise for the researchers in applying analytics to such a hybrid data form? We argue that analytics can bring a rigor to research into multi-model data, but that there are considerable challenges given that computer-mediated communication in general, and especially multi-modal communication, is changing the norms of research methodology and language use. Such data challenges us as researchers, but equally brings opportunities for insights into new media communication. We will present empirical examples using learning analytics based on discourse analysis, and preliminary findings show that a range of methodologies need to be put to work to create the learning analytics able to study the richness of multimodal environments, requiring in particular a dialogical approach to knowledge creation.

Session B 12

29 August 2017 15:15 - 16:45

Pinni B - B3109

Single Paper

Educational Policy and Systems, Learning and Social Interaction

Social Interaction

Keywords: Conversation / Discourse analysis, Cooperative / collaborative learning, E-learning / Online learning, Educational policy, Language (Foreign and second), Qualitative methods, Science education, Secondary education, Social interaction, Teacher Professional Development, Video analysis, Vocational education, Workplace learning

Interest group: SIG 10 - Social Interaction in Learning and Instruction

Chairperson: Gerda Hagenauer, University of Bern, Switzerland

Shaping participation in vocational training interactions: the case of schisming

Keywords: Conversation / Discourse analysis, Social interaction, Vocational education, Workplace learning

Presenting Author: Laurent Fillietaz, University of Geneva, Switzerland; **Co-Author:** Vassiliki Markaki, University of Grenoble, France

This paper focuses on one empirical field of the school-to-work transition: that of the vocational training of students learning to become early-childhood educators. During internships in early childhood day care centers, students have the opportunity to experience educational activities involving children, under the close guidance of mentors, who are qualified staff members. The paper examines the sorts of interactional competences and institutional demands required from students as they engage in complex forms of participation combining educational and training purposes. In the paper, we focus on a series of empirical cases, recorded through video data and analysed in a conversation analytic perspective (Sacks, Schegloff & Jefferson, 1973; Schegloff, 2007), in which mentors make the decision to intervene, and therefore to guide or shape children's behavior, during a session moderated by the student. Such interventions do not interrupt the student's activity and lead to the emergence of two distinct but not impermeable interactional spaces. This complex participation framework, known as "schisming" (Egbert, 1993), contributes to overcome practical issues within multiparty settings. Our study shows how schisming constitutes a particular sequential phenomenon where participants re-organize the interaction and co-construct a social and cognitive interactional space, thus enabling a shared understanding of the specific training context.

Exploring How Wiki-blogs are constituted as Learning Resources in a Science Project

Keywords: Science education, Secondary education, Social interaction, Video analysis

Presenting Author: Astrid Camilla Wiig, University College of Southeast Norway, Norway; **Co-Author:** Anne Line Wittek, University of Oslo, Norway

Exploring how Wiki-blogs contribute to structuring learning activities, the paper draws on data from an empirical, longitudinal study in a lower secondary school in Norway to analyze dialogues and interactions in a science project lasting for 2 months. The analysis is based on sociocultural and dialogical approaches to learning with mediational means, in which video data, Wiki-blogs and students written laboratory reports is subjected to interaction analysis. The focus of the analysis is on episodes where the teacher encounter the Wiki-blog as a resource for learning and meaning-making. The findings show that the Wiki-blogs to a significant degree structure the learning activities. In line with Wegerif (2010), our findings illuminates that while the Wiki-blog is not itself a dialogic space, it appears to make possible opening, expanding and deepening dialogic space. However, the results show that the potential of the Wiki-blog must be considered in light of several crucial issues. The constitution of the Wiki-blog invites to certain types of activities such as a normative way to construct laboratory reports in a digital manner. In addition, our findings illuminates that the learning activities encountering the Wiki-blog make possible dialogues of what is considered as accountable to the learning community such as sharing and copying. The accountability to knowledge that is accurate and relevant and the accountability to accepted standards of reasoning is negotiated in the classroom dialogues, and make visible *the thinking* with the Wiki-blogs as learning resources.

Integration and language acquisition: a link built by governmental program's makers and other actors

Keywords: Educational policy, Language (Foreign and second), Qualitative methods, Social interaction

Presenting Author:Stéphanie Bailat, University of Lausanne, Switzerland

Adopting a sociocultural approach in psychology, the paper presents a research on a governmental program, which aims to increase the quality of language courses for immigrants in Switzerland. Many studies on legal frameworks of European countries have highlighted a strong relationship between language education for immigrants and their "integration". The public policies and governmental programs, which result from this context, are built on a tension between the will to give access to language learning to immigrants and the will to use their linguistic abilities to evaluate the "level of integration". According to the perspective that designing a governmental program of language education and learning French are not only cognitive processes, but engaged also socio-cognitive processes and processes of meaning making, this paper tries to better understand: 1) how the governmental program's designers define and negotiate the identity of this program, its boundaries, and their own role in it and 2) how they perceive and construct a representation of the French teachers and the immigrants. By recorded and non-recorded observations, interviews and analysis of documents written by the program's designers, the analysis of the discourses and practices seems to show that the designers construct and negotiate among themselves and with other institutional actors the meaning of the program, of their role and of the practices of French teachers. Furthermore, while the program announces the immigrants as principal beneficiaries, they seem seldom take into consideration the immigrants' perspective in the implementation of the program.

Professional identity management in a thematic Facebook group

Keywords: Cooperative / collaborative learning, E-learning / Online learning, Social interaction, Teacher Professional Development

Presenting Author:Louise Peterson, University of Gothenburg, Sweden; **Co-Author:**Annika Lantz-Andersson, University of Gothenburg, Sweden; **Co-Author:**Thomas Hillman, University of Gothenburg, Sweden; **Co-Author:**Annika Bergviken-Rensfeldt, University of Gothenburg, Sweden; **Co-Author:**Mona Lundin, University of Gothenburg, Sweden

Recent research has suggested that it is becoming more common for teachers to participate in social media groups as spaces for collegial discussions. This study examines ways a controversial issue raised in a large self-organised Facebook group of professional character is continued in the discussion that follows. The aim is to study how social support is performed through moment-by-moment online interactions based on empirical data from a large corpus assembled through the Facebook Application Programming Interface. Findings are based on computational content analysis of the corpus of group activity, accompanied by in-depth examination of the communication in one selected discussion thread, initiated by a post describing a critical incident in a teachers' professional practice. Detailed analysis of the selected thread is carried out using the Goffmanian interactional, dramaturgical approach with the notions of *performance team*, together with *supportive* and *remedial interchanges* used as orienting concepts. The findings illustrate how the performance of social support in the thread includes both *supportive* and *remedial interchanges* that reveal an emergent impression management and a mutually shaped professional teacher identity. They suggest that member *performance*, generally relatively neutral in non-controversial discussion threads, changes in relation to the controversial post that challenges the groups collective identity. It engenders cooperative and supportive interchanges that occasion members to perform as a team and cooperate as supportive team-mates.

Session B 13

29 August 2017 15:15 - 16:45

Linna - K109

Single Paper

Assessment and Evaluation, Learning and Social Interaction

Metacognition

Keywords: Attitudes and beliefs, Cognitive skills, Collaborative Learning, Computer-supported collaborative learning, Learning approaches, Mathematics, Metacognition, Pre-service teacher education, Psychometrics, Quantitative methods, Self-regulation

Interest group: SIG 16 - Metacognition

Chairperson: Peter Edelsbrunner, ETH Zurich, Switzerland

Confidence- and conflict-based regulation in individual and collaborative learning

Keywords: Computer-supported collaborative learning, Learning approaches, Metacognition, Self-regulation

Presenting Author:Lenka Schnaubert, University of Duisburg-Essen, Germany; **Co-Author:**Daniel Bodemer, University of Duisburg-Essen, Germany

The regulation of learning processes is a requirement for individual as well as collaborative learning. While metacognitive research is mainly concerned with metacognitive regulation (i.e., based on confidence or judgments of learning), collaborative learning settings include study decisions based on social information, e.g., conflicting assumptions or opinions. Visualising learning-relevant information may foster individual as well as collaborative learning and may support learning processes by signalling relevant information and guiding learning. Thus, over a series of studies (individual study:

$N = 63$; individual study: $N = 61$; collaborative study: $N = 130$ dyads) we investigated the impact of visualising cognitive and / or metacognitive self- and partner-information in individual and collaborative learning settings to assess its impact on metacognitive and conflict-based regulation. We found that visualisations had a strong impact on the usage of the visualised information for regulating learning in both settings with metacognitive self-information fostering metacognitive regulation and cognitive partner-information fostering conflict-based regulation. While the interaction mechanisms of cognitive and metacognitive self- and partner information remain widely unclear, the results suggest that learners attend to metacognitive and conflict-based information independently and to a similar extent.

Modelling the Dual Nature of Epistemic Beliefs

Keywords: Attitudes and beliefs, Metacognition, Pre-service teacher education, Quantitative methods

Presenting Author:Samuel Merk, University of Tübingen, Germany; **Co-Author:**Tom Rosman, Leibniz Institute for Psychology Information, Germany

In the past two decades, there has been a growing interest in investigating beliefs about knowing and knowledge - so called epistemic beliefs. Amongst others, there has been a virulent discussion about the domain-specificity of these beliefs: While some theoretical frameworks and empirical results suggested that there is no within-person variance in epistemic beliefs (in other words, that epistemic beliefs are not domain-specific) other researchers published findings and proposed frameworks that include domain-specificity. Nowadays, a broad consensus has emerged that epistemic beliefs are “dual” (or multilayered) in nature, meaning that they include both domain-general and more specific aspects. However, one may criticise that the corresponding frameworks did not find their way into actual empirical research. In fact, epistemic beliefs are still mainly operationalized as either domain general or more specific (i.e., domain- or topic-specific). We expect that multilevel modelling designs are ideally suited to respect the theoretically proposed dual nature of epistemic beliefs since they can handle within-person variation and between-person differences simultaneously. The paper presentation tests this expectation and exemplifies two applications of the suggested modelling technique. To do so, we assessed topic-specific, domain-specific and domain-general epistemic beliefs of pre-service teachers in two separate studies ($n_1 = 232$, $n_2 = 323$). Results show that the main fraction of variance in topic-specific epistemic beliefs is located at the topic-level and that epistemic beliefs assessed at higher levels predict topic-specific epistemic beliefs. In sum, our results can be interpreted as further evidence for a dual nature of epistemic beliefs.

A Cognitive Diagnostic Model: High-order Thinking and Metacognition involved in Mathematics

Keywords: Cognitive skills, Mathematics, Metacognition, Psychometrics

Presenting Author:Tahsin Oğuz Başokçu, Ege University, Turkey; **Co-Author:**M. Akif Guzel, Middle East Technical University Northern Cyprus Campus, Turkey

The study aimed at identifying the levels of metacognitive skills in the tests that are prepared to facilitate high-order thinking abilities. It specifically retained a goal to empirically assess the level of consciousness that the respondents have on their knowledge in the context of mathematics of both PISA and TIMSS tests. The study, designed as a pre-test of a large-sample study ($N=3684$), tested 224 12 year-old students in total. The study measured the content knowledge of the students as well as their mathematical capabilities. The analyses on the obtained levels of content knowledge and mathematical capabilities were run by utilizing Cognitive Diagnostic Model (CDM). Rejecting the assumption rained in conventional assessments that each item (i.e., question) measures a single attribute only, CDM however allows to associate an item to multiple attributes. Therefore, both content knowledge and fundamental mathematical capabilities can be assessed via using the same items simultaneously. It is also suggested herein that the metacognitive abilities of the latent classes determined by CDM can also be measured by the methods of Type-II Signal Detection Theory (SDT) (i.e., response contingent SDT). The study overall disentangles as well as points out the vitality of revealing not only the cognitive abilities both also the metacognitive ones of the respondents simultaneously, which seems to be neglected in various assessment tools, just like in PISA and TIMSS tests until recently.

Challenges in an Online Collaboration: Effects of Scripting Shared Task Perceptions

Keywords: Collaborative Learning, Computer-supported collaborative learning, Metacognition, Self-regulation

Presenting Author:Aishah Bakhtiar, University of Victoria, Canada; **Co-Author:**Allyson Hadwin, University of Victoria, Canada; **Co-Author:**Mariel Miller, University of Victoria, Canada; **Co-Author:**Rebecca Edwards, University of Victoria, Canada; **Co-Author:**Todd Milford, University of Victoria, Canada

The mark of successful regulation is strategic adaptation in response to challenging situations. In group work, the research to date points to at least five broad types of challenges experienced by groups across a variety of settings: motivational, socio-emotional, cognitive, metacognitive, and environmental (e.g., McCardle, et al., 2011). SRL theory posits that planning, especially having shared perceptions about the collaborative task, is critical in ameliorating group work challenges. Hence, the purpose of this study was to examine the effects of providing different types of planning support—numeric, non-numeric, and no-visualization— on group members’ reported challenges. Transitional probabilities revealed dominant differences across support conditions. Individuals belonging to groups that received some form of planning visualization (either numeric or non-numeric) were more likely to choose appropriate strategies than those given no-visualization planning support. Findings attest to the need to support awareness of group processes for collaborative teams at planning.

Session B 14

29 August 2017 15:15 - 16:45

Pinni A - A1081

Single Paper

Culture, Morality, Religion and Education, Developmental Aspects of Instruction

Moral and Democratic Education

Keywords: Attitudes and beliefs, Citizenship education, Cognitive skills, Content analysis, Culture, Higher education, Mixed-method research, Morality, Multicultural education, Quantitative methods, Values education

Interest group: SIG 13 - Moral and Democratic Education

Chairperson: Karin Heinrichs, Otto-Friedrich-University Bamberg, Germany

Is democratic agency possible? How an international school network puts its 'IDEALS' into practice

Keywords: Citizenship education, Mixed-method research, Values education, Multicultural education

Presenting Author: Rupert Higham, University of Cambridge, United Kingdom; **Co-Author:** Natalie Djohari, Visiting Research Fellow, Goldsmiths' College, University of London, United Kingdom

Round Square is a worldwide network of 170 independent schools committed to promoting the values of Internationalism, Democracy, Environmentalism, Adventure, Leadership and Service, founded in the philosophy of Kurt Hahn. The researchers critically investigated how these IDEALS are interpreted by students, teachers and parents. An extensive survey received 4020 student and 863 teacher returns; data was analysed through theme exploration and comparative ranking. Five case study schools from different continents were chosen: from each, Heads and Round Square leaders were interviewed, pairs of senior students were trained to run two focus groups, and parents engaged in email exchanges. Stakeholders agreed that the IDEALS are interconnected, important to them personally and to their schools, with remarkable consistency across gender, region, age and role; this suggests relative homogeneity of values across this geographically diverse but socioeconomically privileged network. Stakeholders saw the IDEALS as providing students a moral foundation for life, against a perceived cultural tide of competitiveness, selfishness and gratification; they told remarkable stories of children's transformation, particularly through engaging in international projects, conferences and exchanges. They also highlighted tensions. 'Democracy' was rated very important, but poorly implemented; we found it thinly understood by many, intertwined with insular and role-dominated understandings of leadership, and particularly focused on student elections to representative roles. We suggest that Hahn's focus on adolescents' individual moral development is too individualistic; instead we proposed a dialogic, interpersonal, neo-existentialist focus on authentic responses to difference. Round Square is now exploring our suggestions for strengthening the IDEALS through student-led research.

A comprehensive framework for assessing college students' reactions to faculty incivility

Keywords: Content analysis, Higher education, Mixed-method research, Morality

Presenting Author: Dorit Alt, Kinneret College on the Sea of Galilee, Israel; **Co-Author:** Yariv Itzkovich, Kinneret College on the Sea of Galilee, Israel

Incivility in the academic arena elicits a wide range of reactions: it interferes with learning, increases stress, feelings of disrespect and helplessness. Although reactions to incivility were mainly tested in workplaces, an extensive, robust framework to explain and measure responses to faculty incivility (FI) is yet to be offered. This study used facet theory (FT) approach with smallest space analysis (SSA), as well as confirmatory factor analysis (CFA) to corroborate the theoretical structure of reactions to FI. In accordance with the FT strategy used in this study, a mapping sentence was constructed expressing the composite of three individual facets based on the theoretical framework: Facet A including four types of reactions (1)Exit (2)Voice (3)Loyalty and (4)Neglect (EVLN); Facet B reflecting the *destructiveness – constructiveness* theoretical dimension, and Facet C illustrating a dimension ranging from *passive* to *active* responses. Data were gathered by a scale measuring students' reactions to FI, and finally, a multidimensional statistical technique of SSA was applied. According to the findings, the CFA result presented four relatively interpretable factors (EVLN) while the SSA allowed for the examination of these factors as well as additional facets (B and C). The findings clearly indicated that the latest theoretical variation of the EVLN model is valid as a framework for explaining and measuring reactions to FI. Methodologically, the use of the SSA unrestrictive approach in this exploratory study helped revealing insights that the CFA technique has not revealed.

Shaping the Resilient Subject: Professional Interventions, Culture and Politics in Israeli Schools

Keywords: Citizenship education, Culture, Morality, Quantitative methods

Presenting Author: Galia Plotkin Amrami, Ben-Gurion University of the Negev, Israel

While the concept of resilience has attracted a great deal of academic interest, less attention has been paid to the particular traits of the resilient subject. In this presentation I extract the prototype of the resilient student as constructed through mental health projects that build resilience in Israeli schools in the context of the Israeli-Palestinian conflict. Drawing on sociological scholarship that interweaves the domains of therapeutic discourse and cultural context, I describe the resilient subject not only as a psychological but also as cultural prototype. Based on analysis of the manuals of resilience building projects that were designed and implemented by leading mental health centers in Israeli schools, I demonstrate that the design of the resilient student is actualized primarily through emotional, physical and cognitive work.

The professional practices foster the ability to process feelings, think rationally and control instinctive and potentially damaging emotional reactions. I argue that the prototype of the resilient subject emerges as one characterized by the avoidance of violent behavior. This ethics of non violence draws on the western cultural ideal of a normative personality and status of emotions in western therapeutic culture rather than on a particular political context. However the impact of professional interventions on the design of students' civil beliefs regarding the conflict might warrant consideration.

Children's epistemic beliefs for moral reasoning in elementary school: a longitudinal study

Keywords: Attitudes and beliefs, Citizenship education, Cognitive skills, Values education

Presenting Author:Jo Lunn Brownlee, Queensland University of Technology, Australia; **Co-Author:**Susan Walker, Queensland University of Technology, Australia; **Co-Author:**Eva Johansson, University of Stavanger, Norway; **Co-Author:**Laura Scholes, Queensland University of Technology (QUT), Australia; **Co-Author:**Donna Berthelsen, Queensland University of Technology, Australia

In recent years, issues related to citizenship education and values for democracy have been emphasised in educational policies worldwide. In promoting children as active citizens, we need to understand how children reason about social and moral values. The capacity to reason about others' perspectives reflects individuals' epistemic beliefs, which are the beliefs we hold about knowing and knowledge. The study investigated changes in children's epistemic beliefs in the context of moral reasoning for active citizenship. Scenario-based interviews explored children's epistemic beliefs across the early years of elementary school (Years 1, 2, and 3) in 10 independent and public schools in Queensland, Australia. Children provided their perspectives in response to conflicting opinions expressed in three scenarios across domains requiring judgements about moral values, ambiguous facts, and personal taste. The use of three judgement domains enabled comparisons to be drawn between moral values and the other domains of reasoning. The data showed changes in epistemic beliefs occurred between Year 1 and 2 for personal taste and between Year 2 and 3 in the moral and ambiguous judgment domains. The findings showed that children were more likely to accept that people can hold different beliefs about personal taste at an earlier age than for ambiguous facts and moral judgements in which there is only one correct answer. We argue that it is important for teachers to pay attention to children's beliefs about knowledge and knowing in the process of scaffolding their reasoning, especially in domains related to moral values for active citizenship.

Session B 15

29 August 2017 15:15 - 16:45

Pinni B - B3118

Single Paper

Cognitive Science, Instructional Design, Motivational, Social and Affective Processes

Metacognition - B

Keywords: Cognitive skills, Comprehension of text and graphics, Early childhood education, Metacognition, Misconceptions, Motivation, Pre-service teacher education, Reading comprehension, Self-regulation, Teaching approaches, Technology

Interest group: SIG 16 - Metacognition

Chairperson: Kaisa Jokiranta, University of Jyväskylä, Finland

Misconceptions Impede Text Comprehension and Metacomprehension Accuracy in the Domain of Statistics

Keywords: Metacognition, Misconceptions, Reading comprehension, Self-regulation

Presenting Author:Anja Prinz, University of Freiburg, Germany; **Co-Author:**Stefanie Golke, University of Freiburg, Germany; **Co-Author:**Joerg Wittwer, University of Freiburg, Germany

Prior research shows that misconceptions have detrimental effects on text comprehension. However, whether misconceptions also impair metacomprehension accuracy, that is, the accuracy with which one self-assesses one's own text comprehension, has received far less attention. Yet, this ability usually affects whether learners engage in further learning activities to eliminate problems of understanding. We conducted a correlational study with $N = 49$ university students with varying levels of statistical misconceptions and examined the extent to which their misconceptions affected their comprehension and metacomprehension accuracy when reading an expository statistics text. Comprehension and metacomprehension accuracy referred to both conceptual and procedural aspects of statistics. The results showed that misconceptions not only impaired students' conceptual text comprehension but also prevented them from accurately self-assessing their text comprehension as indicated by overconfident predictions of their conceptual and procedural comprehension. This finding suggests that students with misconceptions would fail to engage in further learning activities that would correct and enhance their text comprehension. The results call for methods to overcome misconceptions in the service of improving text comprehension and metacomprehension accuracy.

Does visualization affect text comprehension monitoring, restudy choice, and comprehension scores?

Keywords: Cognitive skills, Comprehension of text and graphics, Metacognition, Self-regulation

Presenting Author:Danny Kostons, University of Groningen, Netherlands; **Co-Author:**Björn de Koning, Erasmus University Rotterdam, Netherlands

In the present study, we investigated how 116 fourth and fifth grade students' monitoring skills were associated with restudy

choices and explored whether drawing was a useful intervention to improve monitoring accuracy, restudy choice, and reading scores. During the first session, all students read a text, judged their comprehension of the information within that text, selected paragraphs to reread, reread those parts, and then made another judgment of comprehension before doing a post-test. Positive correlations were found between the posttest and Judgments of Learning, posttest and JOL-accuracy, and number of paragraphs reread and JOL-accuracy, as well as negative correlations between effort and JOLs, and JOLs and number of chapters reread. For the second session, students were split-up into three conditions: a control condition and two drawing conditions. In the long-drawing condition, students were allowed to draw throughout the whole second session, including post-test. In the brief-drawing condition participants only got to draw the first time they read the second text. We did not find the expected differences between conditions on the post-test. And contrary to our findings, having the drawing available all the time, led to significantly lower accuracy on judgments of learning and higher mental effort compared to the other two conditions. Drawing more elements was positively correlated with the posttest scores and JOLs, whereas drawing more details was negatively correlated with posttest scores and did not correlate with JOLs.

Immediate and Long-Term Effects of Training in 'Learning by Teaching' on Knowledge of Cognition

Keywords: Cognitive skills, Pre-service teacher education, Teaching approaches, Technology

Presenting Author: Mary Gutman, Efrata College, Israel

Learning By Teaching (LBT) programs for pre-service teachers in two different environments (technological and face-to-face) were compared using 100 pre-service teachers as subjects. Both programs were based on the IMPROVE instructional method (Mevarech & Kramarski, 1997) which provides explicit metacognitive steps for LBT with a dual perspective (2P): that of teacher and that of learner. The dependent variables Knowledge of Cognition (KC) in learning and teaching were tested for their immediate and long-term effects in a technology-based system group (TBS+2P), and Face-to-Face group (F2F+2P). Post-test results of KC indicate that the TBS+2P group showed a higher level of conditional and procedural knowledge of teaching. The TBS+2P group also outperformed in measures of long-term effects of declarative knowledge in teaching. Both theoretical and practical implications of this study are discussed.

Help-seeking and private speech during a problem-solving task in 2-5 year olds

Keywords: Early childhood education, Metacognition, Motivation, Self-regulation

Presenting Author: Loren Marulis, Connecticut College, United States; **Co-Author:** Lindsey Nelson, Connecticut College, United States

Private speech and help-seeking behaviors have found new traction through Zimmerman's conceptualization of self regulated learners as "metacognitively, motivationally, and behaviorally active participants in their learning....and are aware when they know a fact or possess a skill and when they do not and, unlike passive classmates....proactively seek out information when needed and take necessary steps to master it" (1990, p. 4). Likewise, Vygotsky noted that young children use private speech while trying to understand new situations, problem-solve, and plan. Essentially, young children's private speech is an early type of self-regulation (Manning et al., 1994; Winsler et al., 2005). The current study is a follow-up of Metacognitive Processes in Development [MinD], through which we analyzed metacognitive skills (i.e., knowledge; behavior) using a puzzle task in a College lab school (2-5 year olds), by examining associations to executive functioning (EF) and motivation. Many of the children used private speech during the puzzle task, particularly when it got challenging to self soothe, problem-solve, and speak about prior experiences/ knowledge.

We propose that expressive language (to self or others) is a critical mechanism enhancing self-regulated learning particularly for children at risk for learning difficulties. Specifically, we are investigating private speech and help-seeking behaviors as predictors of metacognitive skills, EF, motivation, and task performance and examining whether demographic variables (e.g., SES, race, family structure) moderate these learning-related skills. Preliminary results indicate that children who used more private speech during the puzzle task had higher metacognitive, EF, motivation, and performance skills.

Session B 16

29 August 2017 15:15 - 16:45

Pinni B - B0039

Single Paper

Cognitive Science, Culture, Morality, Religion and Education, Teaching and Teacher Education

Argumentation, Dialogue and Reasoning

Keywords: Argumentation, Assessment methods and tools, Attitudes and beliefs, Cognitive skills, Culture, Developmental processes, Literacy, Primary education, Reasoning, Science education, Social aspects of learning and teaching, Student learning, Teacher Professional Development

Interest group: SIG 26 - Argumentation, Dialogue and Reasoning

Chairperson: Hadley Solomon, University of New Hampshire, United States

The Argumentation Rating Tool: Supporting Systematic Reflection on the Quality of Classroom Talk

Keywords: Argumentation, Assessment methods and tools, Primary education, Teacher Professional Development

Presenting Author: Alina Reznitskaya, Montclair State University, United States; **Co-Author:** Ian A.G. Wilkinson, The Ohio State University, United States

This paper discusses the Argumentation Rating Tool (ART), an observational rating scale designed to help practitioners assess the quality of teacher facilitation and student argumentation during group discussions of texts in elementary language arts classrooms. Users of the ART watch short segments of videotaped discussions and apply a set of evaluation criteria. We describe the theoretical and empirical foundations of the ART and discuss several validation studies. In these studies, we analyzed teacher reactions to using the ART during a year-long professional development program designed to help teachers acquire knowledge and skills to facilitate discussions that engage students in collaborative and rigorous argumentation. We also examined the psychometric properties of the ART. The results show high inter-rater reliability and internal consistency of the ART scores. We also confirmed the ART's sensitivity to experimental manipulation of talk and documented medium-to-high correlations with scores on two criterion measures. In conclusion, we found the ART to be a promising assessment and instructional tool that can be used as part of a comprehensive professional development program to help distill research-based practices and support systematic reflection on the quality of classroom talk.

Effects of learning about evolution on religious belief: Israeli schools as a natural experiment

Keywords: Argumentation, Attitudes and beliefs, Culture, Social aspects of learning and teaching

Presenting Author:Eli Gottlieb, Mandel Leadership Institute, Israel

This year's EARLI conference theme challenges us to connect research on learning and instruction to contemporary political debates. Evolution is a key concept in biological sciences and yet, in many societies, also one of the most controversial. Several studies have examined how students' religious beliefs affect their learning about evolution. This study examines the effects of learning about evolution on students' religious beliefs. Israel is a natural laboratory for exploring these effects because its public school system includes both religious and secular schools, all of which are required to teach evolutionary theory as part of the national biology curriculum. In individual interviews, 200 fifth, eighth, and twelfth graders from religious and secular schools in Israel were asked to justify their beliefs about whether or not God exists. Many of the arguments that students offered referred explicitly to creation and evolution. Analyses of how these arguments were distributed across the sample indicate intriguing patterns of divergence between the two types of school, despite the fact that evolution is taught in both of them. These differences indicate that contemporary political debates about the teaching of evolution in public schools mistakenly cast scientific and religious thinking as polar opposites. In practice, students find a variety of ways to accommodate religious and scientific argumentation and to assimilate what they learn about evolution with their other beliefs.

The Development of Relational Reasoning in Children and Youth

Keywords: Cognitive skills, Developmental processes, Reasoning, Student learning

Presenting Author:Patricia A. Alexander, University of Maryland, United States; **Co-Author:**Sophie Jablansky, University of Maryland, United States

The purpose of this investigation was to explain the relational reasoning of 59 K-12 students in New Zealand engaged in the analysis of form and function of familiar and unfamiliar technological objects. These reasoning data were gathered at two time points. Time 1 was at the outset of these students' participation in a curricular innovation intended to increase their technological literacy. Time 2 took place almost two years later at the conclusion of the curricular program. For analytic purposes, the sample was divided into three groups (i.e., Early, Middle, and Late) corresponding to grade level. The longitudinal data for 59 students revealed the presence of relational reasoning at all grade levels for both time points. However, the frequency and form of that reasoning varied by group, and there were differential shifts in reasoning patterns over the period of this study. In addition, there were unique patterns in students' use of relational reasoning for familiar versus unfamiliar objects, although the role of familiarity was more influential for younger versus older students. The implications of this longitudinal investigation of relational reasoning will be considered.

A perfect match? Studying the role of source expertise and evidence type in claim evaluation

Keywords: Argumentation, Literacy, Reasoning, Science education

Presenting Author:Eva Thomm, University of Erfurt, Germany; **Co-Author:**Rainer Bromme, University of Münster, Germany

Laypeople increasingly need to reason about science-related knowledge claims. A prime example are claims about health-related topics. Prior research underscores the relevance of particularly two evidence types: both statistical and narrative evidence are shown to impact individuals' assessments of claims. However, facing complex health-related topics, laypeople usually lack expert knowledge to directly assess claim validity. Instead they need to consider the credibility of the claim's source. Accordingly they may assess evidence also in light of its origins. The present study aims to examine whether and how laypeople may link their understandings of evidence and of its source in order to make reasoned claim assessments. The study follows a 2x2 repeated-measures design with the within-participants factors source expertise and evidence type. In each condition undergraduates with low prior topic knowledge read an argument that consisted of a causal claim that was supported by either empirical or narrative evidence. Additionally each argument was said to be stated by either an expert or a layperson. Prior knowledge, claim credibility, claim agreement and source credibility are measured. The findings are analyzed regarding differences in assessments of claim credibility and source credibility depending on the interaction of evidence type and source expertise. Analogously differences in personal claim agreement are tested and related to credibility assessments. The findings contribute to current research which underscores the educational value for fostering individuals' science literacy as the means to evaluate both knowledge claims and their sources. Educational

implications will be deduced and discussed with regard to science education.

Session B 17

29 August 2017 15:15 - 16:45

Main Building A - A3

Single Paper

Higher Education

Higher Education - C

Keywords: Argumentation, Assessment methods and tools, Case studies, Communities of learners, Cooperative / collaborative learning, E-learning / Online learning, Educational Psychology, Higher education, Mathematics, Out-of-school learning, Qualitative methods, Self-regulation, Social interaction

Interest group: SIG 04 - Higher Education

Chairperson: Niklas Harring, University of Gothenburg, Sweden

Do students' subjective theories agree with Boekaerts' Dual Processing Self-Regulation Model?

Keywords: Assessment methods and tools, Educational Psychology, Higher education, Self-regulation

Presenting Author: Sarah Grabler, Paris-Lodron University Salzburg, Austria; **Co-Author:** Jean-Luc Patry, University of Salzburg, Austria

In this paper the students' subjective theories about self-regulated learning when working on their Master's thesis will be compared with the Dual Processing Self-Regulation Model (DPSRM, Boekaerts, 2011). For most students, writing a Master's thesis is the first major piece of work which they have to do with only little support and supervision. Therefore, self-regulation is crucial to be successful. This can only be achieved if the students are aware of self-regulation principles, i.e., that they have concepts of self-regulation in their action-guiding subjective theories. In psychology and education, the DPSRM has been quite successful to account for such processes. The hypotheses state that (1) the elements in the students' subjective theories about the regulation of their work on the Master's thesis differ from those of the DPSRM and that (2) the relationships between these elements are comparable. The sample consisted of ten students in education who were working on their Master's thesis. This sample offers the possibility to investigate students at a very high level of self-regulation requirements and even students who have learned a lot about learning itself during their academic studies. The results show some correspondences and some differences between the core elements of the DPSRM and the students' subjective theories of. The students have a clear picture of the Well-Being Pathway and Growth Pathway in their subjective theories. Conclusions are that training students for their Master's thesis using Boekaerts' model might consist in further developing and differentiating their previous concepts.

Challenges of student leaders as facilitators in learning communities

Keywords: Communities of learners, Cooperative / collaborative learning, Out-of-school learning, Social interaction

Presenting Author: Spencer Carlson, Northwestern University, United States; **Presenting Author:** Daniel Rees Lewis, Northwestern University, United States; **Co-Author:** Matthew Easterday, Northwestern University, United States; **Co-Author:** Elizabeth Gerber, Northwestern University, United States

In schools, teacher-led learning communities (LCs) simulate communities of practice to provide students authentic experiences learning disciplinary practices. Undergraduate, student-led LCs might also enable student-leaders to develop leadership skills needed to participate in professional communities of practice. However, there is a paucity of research on student-led LCs. For student-led LCs to teach disciplinary abilities, student-leaders must diffuse—persuade and teach peers to use—new practices. How do student-leaders diffuse new practices in student-led LCs? In this ethnographic case study, we examined student-leaders' attempts to diffuse a professional project management practice in a student-led LC developed to teach design innovation project teams. To promote team progress, student-leaders introduced a new practice of brief weekly project updates so teams would plan, reflect, and seek help effectively. We analyzed leaders' diffusion attempt using a framework based on Rogers' (2003) model of diffusion of innovations, which we augmented with codes from Cialdini and Goldstein's (2004) review of factors that create social influence. We found student-leaders struggled to diffuse the project updates practice because they did not know how to persuade and teach peers to use it. Furthermore, while student-leaders capitalized on social influence to get teams to do project updates, teams also influenced leaders to abandon project updates by voicing negative opinions about the practice. By integrating these findings, we contribute a new causal model for understanding diffusion practices in student-led LCs that identifies key factors we must address to design student-led LCs that teach both disciplinary and leadership practices.

Combining campus education with a MOOC: the case of an Innovation Management course

Keywords: Case studies, E-learning / Online learning, Educational Psychology, Self-regulation

Presenting Author: Bas Giesbers, Rotterdam School of Management, Erasmus University, Netherlands; **Co-Author:** Serge Rijsdijk, Delft University of Technology, Netherlands; **Co-Author:** Sandra Langeveld, Rotterdam School of Management, Erasmus University, Netherlands

We investigated student evaluations and self-regulated learning ($N = 158$) in the context of a blended BSc course on Innovation Management, which combined campus education with a MOOC. Initial results show that there are no

differences in student performance compared to the previous instance of the course. Though students seem quite satisfied with the course, the perceived level of self-regulation is both seen as a merit as well as a threat to learning in such a blended context. Other points for improvement concern the quality of the learning material (namely the quality of narration in some of the videos), and the amount and quality of interaction with teachers and fellow students. The level of self-regulation seems not to have a large influence, though further analysis still is required.

Student Perspectives on the Transition to Proof in Collegiate Mathematics

Keywords: Argumentation, Higher education, Mathematics, Qualitative methods

Presenting Author: Mariana Levin, Western Michigan University, United States; **Co-Author:** John P. Smith, III, Michigan State University, United States; **Co-Author:** Younggon Bae, Michigan State University, United States; **Co-Author:** V. Rani Satyam, Michigan State University, United States

We report a qualitative analysis of 14 undergraduate students' experience in a semester long introduction to proof course in the United States. Half were mathematics majors. Our research aims to characterize, conceptually and empirically, students' transition from a focus on computation to proof in mathematics. Our analysis focused on how students saw the course as different from prior courses, how they described their work in it, and whether being successful in the course required new or different learning activity of them. This approach—targeting students' overall experience of the course—differs from prior research that has tracked students' challenges, focused on their work on specific proof problems, and explored how to support and improve their work (e.g., Selden & Selden, 2003). Our work has promise for informing the design of transition to proof courses and how those courses are organized and taught.

Session B 18

29 August 2017 15:15 - 16:45

Pinni B - B4117

Single Paper

Assessment and Evaluation, Culture, Morality, Religion and Education, Higher Education

Moral and Democratic Education - B

Keywords: Attitudes and beliefs, Case studies, Citizenship education, Emotion and affect, Higher education, Mixed-method research, Morality, Motivation and emotion, Parental involvement in learning, Quasi-experimental research, Science education, Secondary data analysis

Interest group: SIG 13 - Moral and Democratic Education

Chairperson: Clare Newton, The University of Melbourne, Australia

Emotional/moral episodes in university teaching: authenticity, authority, respect and loyalty

Keywords: Case studies, Emotion and affect, Higher education, Motivation and emotion

Presenting Author: Kathleen M. Quinlan, University of Kent, United Kingdom

Although teaching is emotionally and ethically demanding, university teachers' emotions and sense of moral purpose are under-researched. Assuming that teachers' emotions are bound up with their moral purposes, this study investigates emotional/moral episodes in university teaching. The study draws on Graham, Nosek, Haidt, Iyer, & Ditto (2011) moral foundations theory which posits that there are five main moral concerns found across cultures: Harm/Care, Fairness/Reciprocity, Ingroup/Loyalty, Authority/Respect, and Purity/Sanctity. There has been disproportionate attention to concerns related to Care/Harm and to Fairness/Reciprocity in existing literature in moral psychology. Moral foundations theory, therefore, expands research attention to include questions about Ingroups/Loyalty (to country, family and ingroups, which is vital for research on prejudice and identity), Authority/Respect (concerned with traditions, hierarchies, social roles and order), and Purity/Sanctity (concerned with standards of purity, decency, chastity, natural laws, disgust) as part of the moral realm. This paper examines a subset of 18 case examples of university teachers' moral/emotional moments (written as emotionally evocative poems) that deal with authority/respect (n=8), ingroups/loyalty (n=6), or a combination of these two (n=4), drawn from a larger sample of 66 case examples of emotions in university teaching. This pairing of two moral concerns was the most frequent combination found in the larger set, suggesting its importance to the practice of university teaching. These particular moral concerns are also important insofar as identity and respect are central to authentic leadership, a key element in supporting students' holistic development in higher education.

Task dependency of citizenship entitlement through education for responsible research and innovation

Keywords: Citizenship education, Morality, Quasi-experimental research, Science education

Presenting Author: Eleni Kyza, Cyprus University of Technology, Cyprus; **Co-Author:** Yiannis Georgiou, Cyprus University of Technology, Cyprus; **Co-Author:** Andreas Hadjichambis, Cyprus Center for Environmental Research & Education, Cyprus; **Co-Author:** Andria Agesilaou, Cyprus University of Technology, Cyprus

Moral reasoning is a crucial aspect of citizenship education and can contribute to the development of democratic citizenry. Nonetheless, little empirical research exists investigating secondary school students' moral reasoning. This study seeks to contribute to this gap, by examining the task dependency of moral reasoning in two different disciplines (chemistry, biology) at two education levels (lower and upper secondary education). A quasi-experimental design was adopted to investigate task dependency. Four-hundred and seventy-five students participated in this study. The intervention students (n=280)

used materials on complex, socio-scientific issues, which raised opportunities for highlighting and discussing the ethical, societal and scientific dimensions. The four sets of materials (one for each level and discipline) were developed by their teachers who worked in disciplinary co-design groups. The matched control students ($n=195$) did not use any of the new materials but were taught their standard curriculum. Students' moral reasoning was assessed using the validated Global Scientific Literacy Questionnaire (Mun et al., 2015) at two points in time. Statistical comparisons verified the equivalency of the two groups. Results after the implementations mainly indicated no or negative difference for the control group, and positive differences for the intervention students, which were, nonetheless, mediated by the context created by the learning materials. These results suggest that the development of moral reasoning is context-dependent. The analysis of the learning materials, in connection to these results, suggests design principles that can foster the development of moral reasoning in school contexts.

Environmental attitudes in parents and students – a cross-cultural comparison

Keywords: Attitudes and beliefs, Parental involvement in learning, Science education, Secondary data analysis

Presenting Author: Nina Roczen, German Institute for International Educational Research (DIPF), Germany; **Presenting Author:** Nina A. Jude, German Institute for International Educational Research (DIPF), Germany; **Co-Author:** Sonja Bayer, German Institute for International Educational Research (DIPF), Germany

Climate change is regarded as one of the central global challenges. To address this challenge, it is necessary to take action at the political and at the individual level. To advance behavior that aims at combating climate change, different preconditions of that behavior and their interrelations need to be understood. The Programme for International Student Assessment provides data to analyze these interrelations (considering both the family and the school perspective). Our analyses are built on PISA 2006 data from $N = 75.000$ students and parents from 16 countries. We consider questions addressing optimism, awareness and concern regarding environment-related issues as well as interest in the natural sciences. We examine whether these scales can be compared across countries. We furthermore test the anticipated structure of optimism, awareness, concern and interest in parents and students, respectively, using multi group structural equation modeling. Analyses of the intercultural invariance reveal that correlations may be compared between countries (metric invariance), however, it is not possible to compare mean values (scalar invariance). As regards the interplay between different environmental dispositions in parents and students, besides the already known positive correlation between students' and their parents' optimism as well as between interest and awareness and the negative correlation between students' awareness and their optimism, only small connections between students' and parents' optimism, awareness, concern and interest are found in most countries. By offering insights into the interplay between different environmental dispositions, we hope to provide information that helps to more effectively promote sustainable behavior in different contexts.

Assessing Moral Emotions and Moral Functioning - Moving beyond the Happy Victorizer Paradigm

Keywords: Emotion and affect, Mixed-method research, Morality, Motivation and emotion

Presenting Author: Eveline Gutzwiller-Helfenfinger, University of Teacher Education of Lucerne, Switzerland; **Co-Author:** Brigitte Latzko, University of Leipzig, Germany; **Co-Author:** Carmen Amrein, University of Teacher Education of Lucerne, Switzerland; **Co-Author:** Romy Schneider, University Leipzig, Germany; **Co-Author:** Lydia Küttner, University Leipzig, Germany; **Co-Author:** Anne-Mareike Möller, University of Leipzig, Germany

The present contribution discusses approaches for investigating moral emotions in adolescents and adults. Research on moral emotions and their development has followed several, often unrelated strands within various disciplines. In the developmental literature, one predominant approach has been the so-called Happy Victorizer Paradigm (HVP), encompassing the study of the relationship between moral rule knowledge and moral emotion attributions, mainly in young children. More recently, HV Research has been conducted with adolescents and adults, necessitating a re-consideration of the general measurement paradigm to explain the complexity of moral functioning in adolescence and adulthood. We discuss the need for (a) a developmentally appropriate, enriched measurement approach involving a more profound conceptualisation of the cognitive and emotional dimensions of morality as well as their interplay; and (b) the need of including the biological/physiological dimensions of moral experience and functioning in the context of naturalistic moral conflicts. We introduce two measurement approaches to address these considerations. The first relates to an enriched assessment of adolescents' moral functioning and was implemented in a qualitative interview study (study 1). The second approach focusses on physiological/biological dimensions in the context of naturalistic moral conflicts and is in preparation (study 2). By outlining the limitations of the predominant HVP, we discuss the potentials of enriched assessment methods allowing for a more holistic, developmentally appropriate measurement of adolescents' and adults' moral functioning. This is important for education and teacher education, as socio-moral and socio-emotional functioning has an impact on social relationships in the classroom and students' academic achievement.

Session B 19

29 August 2017 15:15 - 16:45

Linna - Väinö Linna (K104)

Single Paper

Culture, Morality, Religion and Education, Instructional Design

Numeracy, STEM and Values Education

Keywords: Attitudes and beliefs, Citizenship education, Cognitive development, Cognitive skills, Design based research, Early childhood education, Integrated learning, Mathematics, Numeracy, Phenomenography, Quantitative methods, Quasi-experimental research, Reflective society, Religious studies, Values education

Interest group: SIG 09 - Phenomenography and Variation Theory, SIG 19 - Religious and Spiritual Education

Chairperson: Anja Linberg, University of Bamberg, Germany

Do Mathematically Skilled Adults Have a Sense for Irrational Numbers?

Keywords: Cognitive development, Cognitive skills, Mathematics, Numeracy

Presenting Author: Andreas Obersteiner, University of Education Freiburg, Germany; **Co-Author:** Veronika Hofreiter, Technical University of Munich, Germany

Number sense requires at least an ability to assess magnitude information represented by number symbols. Most educated adults are able to assess magnitude information of rational numbers fairly quickly, including whole numbers and fractions. It is to date unclear whether educated adults without training are able to assess magnitudes of irrational numbers, such as the cube root of 41. In a computerized experiment, we asked mathematically skilled adults to repeatedly choose the larger of two irrational numbers as quickly as possible. Participants were highly accurate when reasoning about the exact or approximate value of the irrational number components yielded the correct response. However, they performed at random chance level when these strategies were invalid and the problem required reasoning about the irrational number magnitudes as a whole. Response times suggested that participants hardly even tried to assess magnitudes of the irrational numbers as a whole. We conclude that even mathematically skilled adults struggle with quickly assessing magnitudes of irrational numbers in their symbolic notation. Without practice, number sense seems to be restricted to rational numbers.

Coherence in Pluralistic Societies and Public Education. A Framework Based on Rawls and Habermas

Keywords: Citizenship education, Reflective society, Religious studies, Values education

Presenting Author: Manfred L. Pirner, University of Erlangen-Nuremberg, Germany

The paper is based on the hypothesis that the question of social philosophy of “how citizens who remain deeply divided on religious, philosophical, and moral doctrines, can still maintain a just and stable democratic society” (John Rawls) corresponds with the question discussed in educational philosophy of how a consensus on major objectives of public education can be reached. It is demonstrated, how the two recently most influential social theories, those developed by John Rawls and Jürgen Habermas can provide guidelines for dealing with worldview and cultural diversity in the context of public education. Rawls’ concepts of “public reason” and “overlapping consensus” provide a framework for conceptualizing productive interrelationship between basic (‘thin’) political values, such as international human rights values, and strong (‘thick’) ethical values of particular worldview or religious communities that challenges and demands public education. With his concepts of “complementary learning processes” of religious and nonreligious citizens and inter-worldview “translations” Habermas further develops and concretizes Rawls’ ideas. Both philosophers’ vision of a pluralistic as opposed to a secularistic society and world can encourage the vision of pluralistic instead of secularistic public schools. On the basis of human rights values public education can be open to admit various worldview perspectives and promote critical as well as dialogical processes of learning from one another.

The Effect of an Integrated STEM Intervention on Attitudes towards STEM

Keywords: Attitudes and beliefs, Integrated learning, Quantitative methods, Quasi-experimental research

Presenting Author: Haydée De Loof, University of Antwerp, Belgium; **Co-Author:** Annemie Struyf, University of Antwerp, Belgium; **Co-Author:** Jelle Boeve-de Pauw, University of Antwerp, Belgium; **Co-Author:** Peter Van Petegem, University of Antwerp, Belgium

Despite the sufficient presence of students in STEM-oriented study programs in secondary education, few students are choosing STEM in higher education. Previous research has highlighted the importance of attitudes towards STEM when it comes to choosing a career or study. Research has demonstrated that an integrated approach to STEM-education could increase STEM-literacy, interest, and engagement. However, less attention has been given to attitudes towards STEM as an outcome measure. The goal of this study was to measure the effect of an integrated STEM intervention on attitudes towards STEM. The study involves a quasi-experimental design in which participants ($N = 979$, age = 14-15) attended secondary education in 38 different schools (26 experimental schools and 12 control schools). Outcomes were measured quantitatively through an online questionnaire using an adapted version of the validated PATT-survey, and the obtained data were analyzed relying on a multilevel approach. The multilevel analysis revealed that students in the experimental condition of integrated STEM-education reported more positive attitudes towards STEM than those in the control group. The effect sizes of type of STEM-education were medium to large. This study indicates that integrated STEM-education is an effective way to improve students’ attitudes towards STEM. Suggestions for future research are discussed.

Learning to know how many six are: a preschool intervention study about the relationship of numbers

Keywords: Design based research, Early childhood education, Numeracy, Phenomenography

Presenting Author: Camilla Björklund, University of Gothenburg, Sweden; **Presenting Author:** Angelika Kullberg, University of Gothenburg, Sweden

In this paper we report on results from a one-year intervention with preschool teachers trying to enhance children's knowledge of the first ten numbers and arithmetic skills. The aim of the research was to investigate preschool children's conception of number(s) and how these can be developed through participating in a theoretically driven pedagogical approach. Here we build on previous research and the idea that to avoid mathematics difficulties children need strategies that direct their attention to "manyness" of numbers and numbers' part-part-whole structure. The study consists of task-based interviews with 103 4-5-year-old children aiming to establish children's knowledge of numbers and strategies for arithmetic problem solving, and designed activities conducted by preschool teachers with 65 of the children during one preschool year. This particular paper focuses on the learning outcomes revealed among the participating children, e.g. how children experience the "manyness" of six and its part-part-whole relation before and after the intervention.

Session B 20

29 August 2017 15:15 - 16:45

Pinni B - B1096

Single Paper

Higher Education

Higher Education - H

Keywords: Attitudes and beliefs, Engineering, Higher education, Qualitative methods, Student learning, Teaching approaches, Technology, Writing / Literacy

Interest group: SIG 04 - Higher Education

Chairperson: Esther Ziegler, ETH Zurich, Switzerland

The impact of space on teaching - exploring ways to investigate teaching from a spatial perspective

Keywords: Attitudes and beliefs, Higher education, Qualitative methods, Teaching approaches

Presenting Author: Rie Troelsen, University of Southern Denmark, Denmark

Space works on its occupants and so both students and teachers are influenced by the physical contexts in which learning occurs. However, so far focus on the furnishing of classrooms (and built environment as a whole) in universities as being of importance to the student learning experience has not been overwhelming. In this paper findings from a small-scale research project are presented aiming at investigating the influence of spatial conditions on teachers' views on teaching and learning. The research method for this project builds on Lefebvre's (1991) spatial triad; the perceived, the conceived and the lived space. Semi-structured interviews with four teachers on their expectations, intentions and experiences with a certain learning space were conducted and as part of the interviews, the teachers were asked to describe the learning space by sketching it. Additionally, teaching situations in the learning space concerned was observed. The results show teachers including considerations on space in their planning and conducting of teaching. The four teachers interpret, however, the possibilities and limitations of the same space in very different ways. Some focus on the distribution between floor space and tables in the learning space while others focus on the space's technical devices as opposed to its whiteboards. The findings point to recommendations of creating ownership for teachers and students of a learning space and its resources in order to enhance teaching that uses the full potential of a given learning space.

Do Students' Understandings of Graduate Student Attributes align with Academics' Understandings?

Keywords: Attitudes and beliefs, Higher education, Qualitative methods, Student learning

Presenting Author: Heather Kanuka, University of Alberta, Canada; **Co-Author:** Samira ElAtia, University of Alberta, Canada; **Co-Author:** Summer Cowley, The University of Alberta, Canada; **Co-Author:** Jason Holmes, The University of Alberta, Canada

The purpose of this study was to gain insights on: (a) how academics and undergraduate students understand graduate student attributes and (b) the extent of agreement between undergraduate students and academics on attributes that are acquired in a university education. Using qualitative data collection techniques, this study conducted an open-ended interview with academics and students at a Canadian university ($n=40$). The results suggest that both students and academics have varied understandings of graduate student attributes. Academics in this study tended to believe that student attributes are useful in articulating the value of a university education, though most do not believe they can be measured as outcomes. Without evaluation and assessment data, most academics consider student attributes outside the scope of their mandate and expertise. Alternatively, the students tended to enthusiastically embrace the notion of attributes, believing their attributes are acquired as they progress through their undergraduate programmes. The differences observed between students and academics is important to note: (1) there is a rather wide range of differences in understandings of what student attributes are acquired in an undergraduate programme and (2) whether students acquire these attributes through the course of their programmes of study. Based on the findings of this study, future research needs to begin tackling the difficult issue of evaluating and assessing GSAs in Canada. Such a process might begin with a shared understanding of institutionally initiated GSAs with constructs that have clearly defined meanings and concrete examples of where, and how, GSAs are acquired in the curriculum.

Multi-drafting and procrastination in online learning among L1 and L2

Keywords: Higher education, Student learning, Technology, Writing / Literacy

Presenting Author:Miriam Sarid, Western Galilee College, Israel; **Co-Author:**Yehuda Peled, Western Galilee College, Israel; **Co-Author:**Vered Vaknin, Western Galilee College, Israel

The aim of the current research was to examine L1 and L2 college students' attitudes toward web-based method of learning (based multi-drafting) and the procrastination of academic assignments among Israeli Arab students for whom Hebrew is a second language (L2), compared with those of Israeli students for whose first language is Hebrew (L1). We assumed that on-line Multi-drafting would be more meaningful for students who study in a second language and are likely to have problems in the organization of discourse

Two hundred eighty-four college students participated in the study. Attitudes toward multi-drafting and procrastination were measured using self-report questionnaires.

Unexpectedly, results indicated that L1 are more likely to perceive on-line multi-drafting as a reasonable way of learning than L2 are, mainly in first-year of studies while L2 showed more positive attitudes toward on-line multi-drafting than did L1 in the second/third year. L2 procrastinated in the completion of tasks during their first year of study more than L1 did. The results suggest that in the first year of study L2 students face a language barrier and must adapt themselves to the new academic requirements of the college. Therefore, they cannot take advantage of on-line assistive devices (extra time or repeated submission of papers) to improve their grades.

Active learning methods in higher education (STEM): Systematic literature review

Keywords: Engineering, Higher education, Student learning, Teaching approaches

Presenting Author:Susanna Hartikainen, Tampere University of Technology, Finland; **Presenting Author:**Laura Pylväs, University of Tampere, Finland; **Co-Author:**Heta Rintala, Tampere University of Technology, Finland; **Co-Author:**Petri Nokelainen, Tampere University of Technology, Finland

This systematic literature review provides a current overview of the empirical research concerning active learning in the context of higher education. The study focuses on the EARLI domain of Learning and Instruction in higher education (SIG04) in the field of science, technology, engineering and mathematics (STEM). Active learning is a constructivist learning approach in which, instead of only absorbing knowledge from their teacher the students construct it themselves (Michael, 2006; Tynjälä, 1999; Prince & Felder, 2006). The growing focus on more general skills needed in the today's working life has challenged the higher education institutions to adopt and research new approaches to learning (Park & Choi, 2014; Tynjälä 1999). Altogether 82 peer-reviewed research articles (empirical qualitative and quantitative research) related to the research topic were chosen for complete reading. The initial results indicate that there is variety of different kinds of active learning methods or activities being used in STEM higher education and that in most of the cases active learning methods had a positive effect on student learning outcomes. STEM context in higher education where the traditions are on lecture-based methods, provide an interesting context to examine student learning outcomes in relation to active learning methods. The aim of the research is to provide new information and tools of active learning methods for practice but also to contribute for theoretical debate on new approaches to learning.

Session B 21

29 August 2017 15:15 - 16:45

Linna - K103

Single Paper

Assessment and Evaluation

Assessment and Evaluation - D

Keywords: Assessment methods and tools, Cognitive skills, Higher education, Language (Foreign and second), Learning approaches, Mathematics, Problem solving, Quantitative methods, Second language acquisition, Secondary education, Self-regulation, Student learning, Survey Research, Writing / Literacy

Interest group: SIG 01 - Assessment and Evaluation

Chairperson: Lynne Wyness, University of Plymouth, United Kingdom

Evaluation of Complex Essay Writing Skills at Upper Secondary Level – Results from the MEWS study

Keywords: Language (Foreign and second), Second language acquisition, Secondary education, Writing / Literacy

Presenting Author:Oliver Meyer, University of Applied Sciences Northwestern Switzerland, Switzerland; **Presenting Author:**Maleika Krüger, University of Applied Sciences Northwestern Switzerland, Switzerland; **Co-Author:**Stefan Keller, School of Teacher Education Basel, Switzerland

In this paper we present results from the MEWS project (Masuring English Writing at Secondary Level), a large-scale study of English writing competences currently in progress in Switzerland and Germany (N = approx. 3000; 11th school year). The presented data was collected at the first measurement point of this project, between September and November 2016 in Schleswig-Holstein (Germany) and in six cantons in Switzerland. Students were asked to respond to two composition tasks closely related to the writing section of the TOEFL test, representing an independent (argumentative essay) and an integrated writing task (summary of diverging arguments in a listening and a reading passage). Student responses were scored by two human raters on a 6-level holistic scale and, in addition, analyzed with „Automated Essay Evaluation“ (AEE). These analyses were conducted in co-operation with *Educational Testing Service* (ETS) in Princeton,

USA. Students were also tested on their reading, listening and cognitive skills and asked to answer a questionnaire about their family background and personality traits. In this paper, we show students' competence levels on the holistic scale and discuss the procedures in building the specific AEE evaluation model for this project. We also present some in-depth analyses of so-called "feature scores" concerning different aspects of learners' writing competences both for the independent and integrated writing tasks.

Student roles in effective and ineffective feedback

Keywords: Higher education, Learning approaches, Student learning, Survey Research

Presenting Author:David Boud, University of Technology Sydney/ Deakin University, Australia; **Co-Author:**Phillip Dawson, Deakin University, Australia; **Co-Author:**Michael Henderson, Monash University, Australia; **Co-Author:**Tracii Ryan, Monash University, Australia; **Co-Author:**Michael Phillips, Monash University, Australia

As a learning process, feedback is substantially dependent on what students do. Despite an extensive literature on feedback, including research into the effects of different types of feedback information on student performance, there is limited evidence on the student role in effective (or ineffective) feedback. We undertook a large-scale survey of students in two Australian universities and asked them to give examples in their very recent studies of feedback that was effective or ineffective. Responses were analysed against a framework derived from desirable roles of students identified in existing conceptual models of feedback. Most features of effective feedback were present to some extent in our data; however ineffective feedback was often characterised by poor quality feedback information or designs that inhibited students from taking on these effective roles. This study provides empirical support to existing conceptual models, such as Feedback Mark 2 and sustainable feedback.

Examining Dimensionality in Word Problem Performance and Difficulty of Word Problem Types

Keywords: Cognitive skills, Mathematics, Problem solving, Quantitative methods

Presenting Author:Nonmanut Pongsakdi, University of Turku, Finland; **Co-Author:**Anu Kajamies, University of Turku, Finland; **Co-Author:**Koen Veermans, University of Turku, Finland; **Co-Author:**Minna Hannula-Sormunen, University of Turku, Finland; **Co-Author:**Kalle Lertola, University of Turku, Finland; **Co-Author:**Marja Vauras, University of Turku, Finland; **Co-Author:**Erno Lehtinen, University of Turku, Finland

For many students, word problems are notoriously challenging to solve. In attempts to understand students' difficulties in solving word problems, several cognitive models that identify (required) processes that explain successful performance have been proposed. These models indicate that the processes of solving regular word problems require students to use not only mathematical skills, but also other cognitive skills (e.g., reading comprehension). In some of the more challenging word problems, students also need to apply realistic reasoning in the modeling process. Based on these models, it seems reasonable to assume that students' performance on word problems can be considered as multidimensional constructs, and difficulty level of word problems depends on how complex the cognitive skills required to use. The aim of the present set of studies was to (1) test hypotheses concerning dimensionality of students' performance on word problems, and (2) assess (order of) difficulty of three types of word problems: routine, non-routine, and application word problems by using item response theory (IRT) modeling. Surprisingly, tests of unidimensionality indicate that students' performance on word problems can be explained by one-dimensional construct. Moreover, the results of IRT model do not show a clear distinction among word problem types, and reject the hypothesis that the application word problems, theoretically demanding more complex solution processes, have a higher difficulty level than non-routine word problems.

Assessment and feedback in Higher Education: Findings from an empirical study in Portugal

Keywords: Assessment methods and tools, Higher education, Learning approaches, Self-regulation

Presenting Author:Diana Pereira, University of Minho, Portugal; **Co-Author:**Maria A. Flores, University of Minho, Portugal; **Co-Author:**Ana Veiga Simão, Faculty of Psychology, University of Lisbon, Portugal; **Co-Author:**Alexandra Barros, University of Lisbon, Portugal

This paper draws upon a broader piece of research on assessment in higher education, particularly focusing on issues regarding the fairness and effectiveness of the assessment methods and their implications for the learning process and the students' perceptions of the effectiveness and relevance of feedback in regard to assessment methods and self-regulation of learning. In total, 624 students participated in this study in five Portuguese Public Universities in different areas of knowledge and programmes. Data were collected through questionnaires. Findings suggest that assessment is seen as more effective and fairer when it is done through the use of learner-centred assessment methods rather than by traditional assessment (e.g. written tests or exams). The students also claim that they devote more time to study when assessment is performed through learner-centred assessment methods than by traditional ones. The most used assessment methods are written tests and oral presentations in group. Regarding feedback results revealed that feedback is perceived as more relevant, effective and in a more positive way by students who are assessed through learner-centred methods than by those assessed through traditional methods. Also, participants who are assessed through learner-centred methods or mixed methods perceived feedback as more effective in all phases of self-regulation learning than students who are assessed through traditional methods. Implications of the findings regarding assessment and feedback in Higher Education are discussed.

Session B 22

29 August 2017 15:15 - 16:45
Main Building C - C6
Single Paper
Higher Education, Teaching and Teacher Education

Teaching and Teacher Education - R

Keywords: Cognitive development, Lifelong learning, Literacy, Pre-service teacher education, Primary education, Reasoning, Science education, Student learning, Synergies between learning - teaching and research, Teacher Professional Development, Teaching / instruction

Interest group: SIG 11 - Teaching and Teacher Education

Chairperson: Marlit Annalena Lindner, Leibniz Institute for Science and Mathematics Education (IPN), Germany

Embedding Literacy in Initial Teacher Education

Keywords: Literacy, Pre-service teacher education, Synergies between learning - teaching and research, Teacher Professional Development

Presenting Author:Kirsten Hutchison, Deakin University, Australia; **Co-Author:**Anne Cloonan, Deakin University, Australia; **Co-Author:**Louise Paatsch, Deakin University, Australia; **Co-Author:**Glenn Auld, Deakin University, Australia; **Co-Author:**Maria Nicholas, Deakin University, Australia; **Co-Author:**Andrew Eyers, Deakin University, Australia; **Co-Author:**Angela McNiven, Deakin University, Australia

Despite evidence that integration of theoretical and practical knowledge is essential to effective Initial Teacher Education (ITE), 'business as usual' in ITE continues to reinforce a theory-practice divide, with disciplinary studies predominantly located in universities and professional experience of teaching located in schools. The presentation addresses this crucial issue by exploring potentials and challenges of school-based ITE in literacy education and collaborative inquiry into literacy teaching and research between academics, teachers and Pre Service Teachers (PSTs). In Australia, preparation for literacy teaching has been identified as a particular concern by some stakeholders (National Inquiry into the Teaching of Literacy, 2005). As a relatively new area of research, evidence about the effectiveness of various ITE teaching practices is limited, with concerns regarding graduate teachers' capacities to design and implement research informed practices. With notions of effective literacy education changing to encompass traditional print and formal literacies required for schooling, together with understandings of the literacies entailed in engagement with digital cultures for increasingly diverse learners, this is a complex area. This project reports on research into renewed notions of literacy curriculum and pedagogy through innovative school based approaches to teacher education that align ITE with areas of school improvement and practitioner research.

Designing and evaluating content of physics instruction: Conceptual groundings of electric field

Keywords: Cognitive development, Pre-service teacher education, Science education, Teaching / instruction

Presenting Author:Terhi Mäntylä, University of Tampere, Finland; **Co-Author:**Maija Nousiainen, University of Helsinki, Finland

Electric field is an abstract and complex scientific concept, which is important to understand in the university physics. However, research has shown that the field concept is problematic and difficult to learn. In this study, we first introduce three conceptual groundings called force, energy and source grounding concerning electric field concept for purposes of gaining more coherent and organized view of the electric field concept. Then, the learning results of pre-service physics teachers' understanding of the conceptual development of electric field concept are discussed. The results are based on the content analysis of nodes and links of the pre-service teachers' concept networks presenting the development of electric field concept within and between the three groundings. Further, the connectivities of the pre-service teachers' concept networks was calculated based on the content analysis categories. The results show that students are most familiar with the force grounding and it forms a basis of introducing other groundings. The approach using conceptual groundings gives students structured surroundings in learning the various aspects and complexity of the electric field concept.

Mentor teacher's interventions during student teacher's lessons: Can we predict these?

Keywords: Pre-service teacher education, Primary education, Reasoning, Teacher Professional Development

Presenting Author:Frans Prins, Utrecht University, Netherlands; **Co-Author:**Marieke Jaspers, Utrecht University, Netherlands; **Co-Author:**Paulien Meijer, Radboud University Nijmegen, Netherlands; **Co-Author:**Theo Wubbels, Utrecht University, Netherlands

Abstract Recent studies showed that during student teachers' (STs') lessons, mentor teachers (MTs) intervene quite frequently, mainly by guiding the pupils. Fenstermachers' *practical argument*, consisting of situational, value, and empirical premises, and an intended or actual action (1986), was used to describe mentor teachers' reasoning process for their intervening. In the present study we examined the impact of the situational, value and empirical premises on MTs' intensity and target of intervening during student teachers' lessons. A total of 159 MTs participated in our study. MTs indicated for 12 vignettes, describing ST's teaching MT's pupils and in which the ordinary course of events is interrupted, their intention to intervene (or not). MTs' value and empirical premises were measured with a questionnaire. We analyzed the impact of situational premises (STs' study year, trigger type and trigger degree), value and empirical premises on MTs' intensity and

target (pupil or ST) to intervene. Results showed that STs' years of study, as well as the type and degree of the trigger impacted MTs' intensity and target to intervene. Additionally, MTs' values and empirical premises influenced MTs' intensity to intervene, but not the target. We conclude that MTs' intentions to intervene and the reasons for doing so might be explained by their ingrained habit as teacher of intervening to pupils, and by MTs' unawareness of their mentor role and STs' learning. When MTs become aware of their mentor role and of STs' learning, their ST guidance might improve, which might be beneficial to STs' development.

Pre-service students' reading trajectories

Keywords: Literacy, Pre-service teacher education, Student learning, Lifelong learning

Presenting Author: Anna-Karin Svensson, Malmö University, Sweden

Pre-service students reading trajectories *Anna-Karin Svensson Malmö University, Sweden*
Abstract The present work is an in-depth study of four pre-service teachers own experience of reading in different contexts and for different reasons. The aim is to analyze what the students express as significant on reading in a life history perspective by the use of narratives. The following questions were asked: · What aspects are expressed as significant in the students' narratives in a life perspective, from early reading to the encounter with reading in teacher education? · What aspects are expressed as significant in the narratives of the students' reading during their reading in teacher education? Initial pre-service students' narratives are analyzed in this study. A social-cultural perspective on reading is used in the narrative analysis. The analysis resulted in a description of the students' reading trajectories. As an over- arching result, the students' narratives revealed that reading is a relational process regardless of context and stage of life. In every context in a life perspective reading occurs with significant others. Significant others seems important in every literacy context from new readers in primary school to pre-service teachers' reading in teacher education. **Keywords;** narratives, pre-service teachers, reading contexts, reading trajectories, significant others

Session B 23

29 August 2017 15:15 - 16:45

Virta - 120

Symposium

Cognitive Science, Learning and Instructional Technology, Motivational, Social and Affective Processes

Analyzing and visualizing the dynamic aspects of affect and cognition across contexts

Keywords: Artificial intelligence, Emotion and affect, Interdisciplinary, Learning analytics, Learning Technologies, Metacognition, Multimedia learning, Self-regulation, Social aspects of learning and teaching

Interest group: SIG 27 - Online Measures of Learning Processes

Chairperson: Roger Azevedo, North Carolina State University, United States

Chairperson: Julien Mercier, Canada

Discussant: Reinhard Pekrun, Ludwig-Maximilians-Universität (LMU), Germany

Learning can be attributed to the cumulative effect of temporally fine-grained affective and cognitive events occurring over longer learning episodes. Optimizing learning efforts, for example by better pedagogical design or by improving learners' metacognitive skills, requires causal explanations linking learning with cognition and affect in correspondence with the rate of change of those processes. Current research on learning processes is severely limited by incomplete data of learners' cognitive processes and affective states that are contingent on context-specific factors (e.g., problem complexity, time constraints, situation dynamics, and external regulating agents). Participants in this symposium are invited to present an empirical study on the theme of "online measures of learning" which could contribute theoretical or methodological advances to an emerging research program oriented towards the concomitant behavioral and psychophysiological modeling of cognitive and affective aspects of learning in increasingly authentic contexts. The four presentations constituting this symposium address this issue by proposing theoretical frameworks, types of data, strategies for data analysis as well as technical tools to analyse and visualize process-oriented data about learning. This collection of work provides new insights regarding the notion that learners interact dynamically with aspects of the learning situation, such as the learning task itself, as well as with other agents such as co-learners or intelligent virtual humans. This fine-grained information will enhance our conceptual and theoretical understanding of learners' affect and cognition and subsequently provide evidence for optimizing learning across contexts.

Cognitive Metacognitive and Affective Processes during Learning with an Intelligent Virtual Human

Presenting Author: Roger Azevedo, North Carolina State University, United States; **Co-Author:** Nicholas Mudrick, North Carolina State University, United States; **Co-Author:** Michelle Taub, North Carolina State University, United States; **Co-Author:** Garrett C. Millar, North Carolina State University, United States; **Co-Author:** Amanda E. Bradbury, North Carolina State University, United States; **Co-Author:** Megan J. Price, North Carolina State University, United States

The evolution of learning technologies has led to the use of intelligent virtual humans (IVHs) to facilitate problem solving, reasoning, and learning across domains. Despite results in rapport building, cultural training, and informal science learning, IVHs have not been used to support learners' cognitive, affective, and metacognitive (CAM) self-regulation during multimedia learning. The objective of this study was to investigate how an IVH, capable of facially expressing emotions (e.g., confusion, joy, neutral), can trigger learners' ability to monitor and regulate their CAM self-regulatory processes and

therefore enhance their science learning with multimedia. Evidence from multichannel data (e.g., log files, eye tracking, facial expressions of emotion, physiological data, and screen capture of learner-system interactions) analyses indicates that the IVH's facial expressions triggered monitoring of students' CAM SRL processes during complex science learning with multimedia materials.

How physiological data visualizations can be used to track socially shared regulation of learning

Presenting Author:Jonna Malmberg, University of Oulu, Finland; **Co-Author:**Sanna Järvelä, University of Oulu, Finland; **Co-Author:**Ilkka Juuso, University of Oulu, Finland; **Co-Author:**Iman Alikhani, University of Oulu, Finland; **Co-Author:**Tapio Seppänen, University of Oulu, Finland

A core of collaboration is a construction of shared understanding through interaction with others, where the participants are committed to or engaged in shared goals and problem solving. Learners also need to engage in socially shared regulation of learning (SSRL) to progress in their collaboration. What triggers socially shared regulation to occur is a result of individual monitoring, which is often invisible, but can be shared with the group members in a social plane. As a result of individual monitoring, learners have increased possibilities to change the course of their learning by engaging in regulation of cognition, motivation, emotions or behavior as a shared activity. New technological solutions on data collection and visualizations has opened up new ways to characterize the core mechanisms of SRL which are often invisible, and, therefore difficult to capture. In this study we explore how physiological data visualizations of one case group, that combines videodata codings on individual learners metacognitive monitoring and their physiological signals of affective reactions can be used to track socially shared regulation of learning in an authentic and challenging collaborative learning situation.

Visualizations to support Self Regulated Learning based on data from Adaptive Education Technologies

Presenting Author:Inge Molenaar, Radboud University Nijmegen, Netherlands

Many students in primary education regularly learn using adaptive educational technologies (AET) on tablets. Driven by developments in the emerging field of learning analytics, these technologies successfully adjust instructional events (instructional texts, assignments, tools) to learners' performance. Hence AETs support learning efficiency, but it is unclear how AETs influence learner effort, emotion and related learning effectiveness. An important concern is that AETs eliminate the need for learners to regulate their own learning. Research showed that learners' control and monitoring activities are an important driver for learner effort, which is essential for retention and transfer of knowledge (learning effectiveness). Thus adaptive learning technologies enable efficient learning, but are likely to be detrimental to learner effort, and consequently effectiveness. At the same time AETs gather vast amounts of data that can be used to support learners. In this contribution, I discuss how visualizations can be established using data from AETS and how this supports learners' self-regulated learning. The visualizations are specifically designed to adjust learner effort and to support learners to effectively regulate their own learning.

Conceptual & methodological challenges in studying the interplay of affect and cognition in learning

Presenting Author:Julien Mercier, University of Quebec (Montreal), Canada; **Co-Author:**Pierre Chalfoun, User Research Lab – Ubisoft Montreal, Canada; **Co-Author:**Babak Khosravifar, University of Quebec in Montreal, Canada; **Co-Author:**Kamran Shaikh, University of Quebec in Montreal, Canada

Learning involves cognitive and affective processes unfolding moment by moment over the entire activity. However, traditional data such as observations and self-report measures are not sufficient to accurately model how cognition and affect unfold in time. Self-report measures cannot be administered according to the rate of change of constructs of interest, while concurrent verbalizations are incomplete and can impede learning performance. To more fully explain the requirements for a successful learning episode, ways to measure and link those processes over time are needed, accompanied by an appropriate modeling of the learning context, which can also be seen as dynamic. The goal of this presentation is to illustrate an innovative cross-disciplinary methodology to measure aspects of affect and cognition as they unfold in time during an initial episode of play with a video game, which aims specifically at developing a minimal level of mastery of the game's various mechanics (combat, economy, etc.) while keeping the learner engaged in the activity at hand. The suggested methodology should inform the selection of appropriate constructs, provide adequate definitions and operationalisations, and enable the empirical study of how affect and cognition fluctuate over time and how they interact dynamically during learning efforts. Appropriate formalism for pertinent fixed and dynamic features of the context are also needed. The characterization of learning as the dynamic interplay of affect and cognition in a changing context that this approach should make possible could inform the design of multiple contexts of learning, including entertainment and education.

Session B 24

29 August 2017 15:15 - 16:45

Pinni B - B3116

Symposium

Cognitive Science

The number line revisited: new insights into strategy use and training

Keywords: Cognitive development, Cognitive skills, Game-based learning, Mathematics, Numeracy

Interest group:

Chairperson: Anne van Hoogmoed, University of Groningen, Netherlands

Discussant: Evelyn Kroesbergen, Utrecht University, Netherlands

In the last decades, researchers have shown an increasing interest in number line estimation (NLE) and its development with age. Whereas much of this research has focused on performance on the NLE task, less attention has been paid to strategies used in NLE. New knowledge on strategy use can deepen our understanding of number processing in children and lead to new trainings and interventions using the number line. The current symposium will contribute to our knowledge of both strategy use and training in NLE. The first two papers by Simms et al. and Baten et al. will discuss strategies used in NLE by children. Both papers show that strategies can be promoted by specific instructions and labeling benchmarks. The third paper by Van Hoogmoed and Kroesbergen will discuss strategy use on different types of number lines in individuals with and without mathematical learning disability (MLD). This will give insight into which specific instructions may help those with MLD in number line estimations. The last contribution by Ninaus et al. will discuss the use of a game-based NLE task to assess knowledge of fractions. The papers will be discussed by Evelyn Kroesbergen, a well-known researcher in the area of number line estimations. Together, the contributions expand our knowledge on how individuals represent and process numbers. This can serve as a base for further research into applications of number lines to train components of mathematics, both at the lower level of number sense as well as the higher level of understanding fractions.

Number Line Estimations: An exploration of children's response strategies

Presenting Author: Victoria Simms, Ulster University, United Kingdom; **Co-Author:** John Towse, Lancaster University, United Kingdom; **Co-Author:** Kevin Muldoon, Herriot Watt University, United Kingdom

Research into number line estimation is burgeoning. Whilst most research focuses on estimation as a response, we consider the underlying process that yields response patterns. Twenty-eight children (mean age 73 months) completed both a 0-10 and 0-20 number line estimation task. We identified three entry point strategies that children spontaneously exhibit when making estimations; that is, the position on the number line where they first make a move from in order to give their response. We then examine children's flexibility by modelling the two most common of these strategies in a set of multiple task sessions over the course of a day. The data confirm the prevalence and frequency distribution of two spontaneous response strategies. Our interventions also confirm that these need not be immutable; we find that for different estimation ranges children do sometimes change their strategy having merely seen another use it. We conclude that number line estimations must be mediated by performance strategies as well as children's knowledge of the number system.

The effect of labeled benchmarks on number line estimations

Presenting Author: Elke Sekeris, KU Leuven, Belgium; **Co-Author:** Dominique Peeters, KU LEUVEN, Belgium; **Co-Author:** Lieven Verschaffel, KU Leuven, Belgium; **Co-Author:** Koen Luwel, KU Leuven, Belgium

Number line estimation (NLE) studies have shown that children can use benchmarks to position numbers on a number line (Barth & Paladino, 2011). Peeters et al. (2016) however demonstrated that the provision of additional benchmarks at 25% and 75% of the number line did not lead to better NLE performance in young children. In the present study we investigated whether labeling benchmarks (i.e. giving a numeric label to the benchmark) has an effect on children's NLE accuracy and benchmark-based strategy use, and whether this differs between grades. Eighty-three third graders and 72 sixth graders were randomly assigned to one of three conditions: (a) a *control* condition with labeled benchmarks at the origin (0) and endpoint (1000), (b) an *unlabeled* condition with additional unlabeled benchmarks at 25%, 50% and 75% of the number line, and (c) a *labeled* condition in which these benchmarks were labeled with, respectively, 250, 500 and 750. Findings showed that third graders estimated more accurately in the labeled condition than in the unlabeled one, while the estimation accuracy of sixth graders did not differ between these two conditions. Trial-by-trial verbal reports and model fits showed that the majority of third graders were fitted best with the four-cycle power model (i.e. using benchmarks at 25% and 75%) in the labeled condition only. Whereas the majority of sixth graders fitted best with this model in both the unlabeled and labeled condition. These findings have implications for the amount of support that should be provided to children learning NLE.

Strategy use in bounded and unbounded number lines in MLD

Presenting Author: Anne van Hoogmoed, University of Groningen, Netherlands; **Co-Author:** Evelyn Kroesbergen, Utrecht University, Netherlands

Number line estimation (NLE) tasks typically measure number placements on a bounded number line. Recently, the unbounded NLE task was introduced in which only the starting point of the number line and unit are given, but no endpoint. This type of task is thought to be a more direct measure of understanding numerical quantity. Performance, development, and strategy use differ between the bounded and unbounded NLE tasks in the general population. Research has shown that individuals with mathematical learning disability (MLD) lag behind in bounded NLE tasks. In the current research, we examined whether they also lag behind in the unbounded NLE task and whether they use different strategies as compared to individuals without MLD. In the first qualitative study, four strategies were identified for estimations on the unbounded NLE task. These strategies were used by adults with and without MLD. In the second study, performance and strategy use of children with and without MLD on the unbounded number line is compared. The results of these studies give additional

insights into the deficits in adults and children with MLD and possible strategies that may improve their number line estimations.

Using a game-based number line estimation task to assess conceptual fraction knowledge

Presenting Author:Korbinian Moeller, Leibniz-Institut für Wissensmedien, Germany; **Co-Author:**manuel Ninaus, Leibniz-Institut für Wissensmedien (IWM), Germany; **Co-Author:**Kristian Kiili, Tampere University of Technology, Finland; **Co-Author:**Jake McMullen, University of Turku, Finland

Serious games gain increasing research interest as tools to augment traditional instructional approaches on scholastic learning, especially in mathematics education. In the present study, we investigated whether a game-based approach may not only be useful to foster numerical learning but may also be valid as an assessment tool. Thus, a total of 54 Finnish fifth graders played a math game on tablet computers using tilt-control to maneuver an avatar along a number line for 30 minutes. Findings indicated that hallmark effects of fraction magnitude processing typically observed in basic research, such as the numerical distance effect, were successfully replicated using the game-based assessment. Moreover, in-game performance measures, such as fraction comparison performance as well as fraction estimation accuracy, correlated significantly with students' math grades. The results of the current study, thus, suggest that game-based learning environments for fraction education (even using tilt-control) also allow for a valid assessment of students' fraction knowledge.

Session B 25

29 August 2017 15:15 - 16:45

Pinni B - B1097

Symposium

Higher Education

Research competence as part of scientific thinking in university education

Keywords: Higher education, Misconceptions, Researcher education, Student learning

Interest group: SIG 04 - Higher Education

Chairperson: Tuike Iiskala, University of Turku, Finland

Discussant: Heidi Hyytinen, University of Helsinki, Finland

University education aims at high quality thinking skills that aid students in their future working life. University students are, however, found to have various problems in their learning of these higher order thinking skills, especially on research methodology courses. This symposium focuses on students' learning of research competence and asks whether we have suitable theories for explaining students' development of higher order thinking skills. Our central claim to be discussed in the symposium is that the prior theories, such as the traditional theory of scientific thinking, critical thinking and epistemic beliefs, are too narrow alone in describing the breadth of higher order thinking skills needed in higher education. On the basis of the research findings of the individual papers, this symposium suggests that scientific thinking should be redefined for the purposes of higher education by including research competency and the theories of critical thinking and epistemic beliefs, and the traditional theory of scientific thinking. In addition we state that research education should not just cover the teaching of specific methods, but instead focus more on students' understanding of the "big picture" of research.

Undergraduates' Conceptions of Research Methods Learning

Presenting Author:Kieran Balloo, University of Roehampton, United Kingdom

A range of conceptions held about research methods learning have previously been identified. The current study aimed to examine in-depth shared conceptions among groups of undergraduate students, since individual conceptions are unlikely to exist in isolation. Utilising Q methodology, which links both quantitative and qualitative methodologies to uncover the subjective viewpoints that a group of individuals hold towards a particular domain, participants ranked statements reflecting different conceptions of research methods learning. Ranks were then factor analysed and seven distinct profiles of student conceptions were identified, labelled and described in qualitative detail: *Big Picture Students (Aspiring Researchers)*, *Big Picture Students (Non-Aspiring Researchers)*, *Other-Focused and Superficial Learners*, *Calm and Dismissive Learner vs. Anxious and Concerned Learner*, *Unconvinced Students vs. Converted Student*, *Side-choosing Researchers*, and *Relaxed and Reductionist Learners*. A significant association was found between these profiles and the students' year of study; final year students displayed more 'big picture' views of research, while first year students showed a more superficial understanding. There was also a significant association between profiles and performance on research assignments; students who exemplified 'big picture' narratives performed better than those who exhibited superficial perspectives. Findings are considered in terms of how some conceptions take longer to develop and appear to be more beneficial or problematic to hold than others.

First Year College Students' Emerging Understandings of Evidence

Presenting Author:Kieran Balloo, University of Roehampton, United Kingdom; **Co-Author:**Rebecca Shargel, Towson University, United States; **Co-Author:**Lisa Twiss, Towson University, United States

This qualitative research study examines first year college students' abilities to think critically in a large state university in the United States. By emphasizing a typology of evidence that includes both quantitative and qualitative research as

evidence, we track students' growth over the course of the semester to see in what ways their thinking develops. Findings included an increase in sophistication in preparing a research paper that included critically evaluating sources, combining types of evidence, increased skepticism towards online information, particularly social media sources. Most importantly, students shifted from seeing information as a commodity to be consumed, to them producing accurate information. This study adds to the field by examining students' perspectives on critical thinking and also shedding light on the complex process of teaching students to view information through more critical eyes.

Teacher education students' conceptions of theory

Presenting Author:Margaret Kiley, Australian National University, Australia; **Co-Author:**Heidi Salmento, University of Turku, Finland

Some University students have problems with understanding the concept of theory. This study explored teacher education students' conceptions of theory at the beginning and at the end of their five year master's education. In this study, 127 students' conceptions of theory were analysed and a six-category model of conceptions was created. The categories were named as (1) *Conceptions of theory as explaining practice*, (2) *Conceptions of theory as modelling phenomena*, (3) *Conceptions of theory related to research*, (4) *Subjective conceptions of theory*, (5) *Conceptions of theory as a fact or truth* and (6) *Conceptions of theory as separate from practice*. When comparing the student groups, first year student saw theory more often as explaining practise and as a fact or truth, while more advanced students saw theory as modelling phenomena and being related to research.

Towards a theory of scientific thinking in higher education including research competence

Presenting Author:Mari Murtonen, University of Turku, Finland

Development of higher order thinking skills is an important goal in university education. The question about higher order thinking skills has been studied, for example, under the concepts of scientific thinking, reasoning, critical thinking, and epistemological beliefs. We wanted to explore the question of higher order thinking skills from the perspective of students and teachers by asking them what they think scientific thinking is. University teachers ($N = 37$) and students ($N = 80$) in various disciplines answered the research question. On the basis of their answers, eight categories were formed: broad thinking, basic principles of science, discipline based world view, research skills, reasoning skills, generic skills, epistemic beliefs and technical view. The results expressed both contents of the former theories of higher order thinking skills, but also new, very important aspects, such as research skills. The results thus propose a new, wider theory of scientific thinking for the purposes of higher education that includes research competence in addition to the traditional natural science based scientific thinking and critical thinking factors.

Session B 26

29 August 2017 15:15 - 16:45

Linna - K108

Symposium

Understanding variability in math anxiety and its impact on math performance

Keywords: Achievement, Cognitive skills, Game-based learning, Mathematics, Motivation and emotion, Pre-service teacher education, Secondary education

Interest group:

Chairperson: Delphine Sasanguie, KU LEUVEN, Belgium

Discussant: Kinga Morsanyi, Queen's University Belfast, United Kingdom

Math anxiety (MA) and math performance are negatively associated (e.g., Hembree, 1990; Ma, 1999). However, evidence for the direction of this link is mixed. Variable results could be due to the fact that MA consists of different components and is related to other forms of anxiety (Dowker, Sarkar, & Looi, 2016). This symposium aims to address how MA and math performance are interrelated, when taking MA components and the specificity of MA into account. Paper 1 discusses the relation between implicit versus explicit MA and math performance and contrasts these types of MA to implicit and explicit English anxiety and trait anxiety. Paper 2 further illustrates that children with specifically elevated anxiety about math and tests performed worse on math and reading tests compared to those who had elevated MA and test anxiety alongside general anxieties. Paper 3 provides insight in the relation between the cognitive versus affective component of MA and math didactics in pre-service preschool teachers. Finally, Paper 4 addresses the causal link between MA and math performance with an intervention study in which children were trained with a math game. Together these papers provide insights into the different components and interrelations between MA and other forms of anxiety on the one hand and math performance on the other – information that is crucial with regards to the development of (educational) interventions.

Investigation of the specificity of math anxiety, using both implicit and explicit measures

Presenting Author:Eva Schmitz, University of Amsterdam, Netherlands; **Co-Author:**Brenda Jansen, University of Amsterdam, Netherlands; **Co-Author:**Reinout Wiers, University of Amsterdam, Netherlands; **Co-Author:**Elske Saleminck, University of Amsterdam, Netherlands

Math anxiety has been conceptualized as a negative emotional response evoked by (the prospect of) math-related situations that disrupts performance. Mathematics anxiety peaks in adolescence, a critical period in which it might

negatively influence career choices. Math anxiety is often assessed using explicit measures. Possibly, also implicit processes play a role and learn us more about the mechanism underlying the relationship between math anxiety and math performance. The first research question is whether an implicit association between math and anxiety exists and whether assessing this adds to predicting math performance. The second research question concerns the specificity of the association between anxiety and math in comparison to English and on a more global level to the self. In this study a sample of 189 secondary school students completed explicit (questionnaires) and implicit (Single-Category Implicit Association Task) measures on anxiety in three contents, that is math anxiety, English anxiety and trait anxiety. This multitrait-multimethod approach is used to investigate the relation between implicit association between math and anxiety in relation to explicit math anxiety and to investigate the specificity of implicit and explicit math anxiety in contrast to implicit and explicit English and trait anxiety.

Maths anxiety and other anxiety forms in secondary school performance

Presenting Author: Emma Carey, University of Cambridge, United Kingdom; **Co-Author:** Denes Szucs, University of Cambridge, United Kingdom

Individuals with high levels of mathematics anxiety are more likely to have other forms of anxiety, such as general anxiety and test anxiety, and tend to have some math performance decrement compared to those with low math anxiety. However, it is unclear how the anxiety forms cluster in individuals, or how the presence of other anxiety forms influences the relationship between math anxiety and math performance. We measured math anxiety, test anxiety, general anxiety and mathematics and reading performance in 913 secondary school students in the UK. We conducted latent profile analysis of students' anxiety scores in order to examine the developmental change in anxiety profiles, the demographics of each anxiety profile and the relationship between profiles and academic performance. We found that whilst girls exhibited higher scores on all forms of anxiety, boys were more likely to fall into a group whose academic anxieties were raised relative to their general anxiety levels. This suggests that whilst girls have higher absolute levels of maths anxiety, boys are vulnerable to anxiety specifically in the academic domain rather than more generally. Furthermore, we found that those whose academic anxieties were relatively high compared with their general anxiety had a more impaired academic performance than those who scored highly on all forms of anxiety, once accounting for the effects of maths anxiety. We suggest that this may be because there are different factors generating anxiety in these different groups of students.

Variability and Effects of Preservice Preschool Teachers' Math Anxiety during the Exam Period

Presenting Author: Lars Jenßen, Freie Universität Berlin, Germany; **Co-Author:** Oliver Thiel, Dronning Mauds Minne Hogskole, Norway

Studies reveal that math anxiety can be seen as a common phenomenon among preschool teachers. In the context of preschool teachers' professional competence in mathematics, especially their mathematics didactical knowledge, math anxiety is discussed as a meaningful negative aspect. Math anxiety is also theoretically assumed to consist of affective as well as cognitive components and to show occasion-specific variability when the occasion is systematically manipulated. Nevertheless, only few studies consider these characteristics of math anxiety, especially in relation to achievement in mathematics (didactics). The present study investigated these theoretically assumed effects by applying models in terms of Latent State-Trait Theory (LST). N=225 preservice preschool teachers from Norway were asked for their math anxiety with the Mathematics Anxiety Scale-Revised in a longitudinal design during their exam period. Based on LST, trait factors as well as occasion-specific factors for each component were modelled. Results indicate that no occasion-specific variability can be found and that only the cognitive component (trait factor) shows effects on the exam grade in mathematics didactics. The size of the examined regressive relation is in line with findings from other studies. Findings are discussed concerning the utility of LST, theoretical assumptions about math anxiety and their practical implications for possible interventions in the educational context.

The impact of playing a math game at home on children's math anxiety and math performance

Presenting Author: Delphine Sasanguie, KU Leuven, Belgium; **Co-Author:** Fien Depaepe, KU Leuven, Belgium

Recently it has been suggested that there might exist a bidirectional relationship between math anxiety (MA) and mathematics performance, in which MA and mathematics performance can influence one another in a vicious cycle (Carey, Hill, Devine, & Szűcs, 2016). Given this "Reciprocal Theory", we hypothesized that an intervention will evoke the largest outcomes when children train with math content while their math anxiety is reduced. In order to reduce MA, we made use of technology in the form of a math app. A pretest-posttest intervention study with an experimental and control group design was conducted to reduce children's MA and to examine whether training with this math app positively influenced their math performance. In the experimental group, children trained 4 weeks (min 15min/week) with a math app. In the control group, children trained similarly with an app, but not in the domain of mathematics, i.e. a word search app. Both groups registered how much time they played with the app. Pre- and posttest measures consisted of a MA questionnaire and a math performance test. In total, 100 (i.e. 50 per group) fifth graders (11 years) will be examined. Currently, we are halfway data collection (22 children per group) and preliminary results indicated significantly less reported MA and better math performance after the training in the experimental group whereas no significant differences were observed in the control group.

Session B 27

Closing the gaps? Differential Educational Effectiveness as a road to school improvement

Keywords: Educational attainment, Quantitative methods, School effectiveness, Teacher Effectiveness

Interest group: SIG 18 - Educational Effectiveness

Chairperson: Sigrid Blömeke, University of Oslo, Norway

Organiser: Sigrid Blömeke, University of Oslo, Norway

Discussant: Ronny Scherer, University of Oslo, Norway

Discussant: Trude Nilsen, University of Oslo, Norway

Differential effectiveness has been widely neglected in educational research for a long time but there is increasing evidence that the field is moving forward. Whereas research on school effectiveness and improvement has primarily been concerned with overall interactions between learning outcomes, institutional settings, and school environments, taking into account potential group differences can help promoting quality and equity in education. Differential effectiveness research provides thus new research perspectives. This symposium will offer a platform to learn from the international state of research. It has four main objectives: Summarizing the international evidence on differential accountability and effectiveness, creating an awareness of the methodological challenges involved, critically discussing implications of differential accountability and effectiveness as well as proposing suggestion for educational research and practices.

Differential Teacher and School Effectiveness Research: Implications for Promoting Equity

Presenting Author: Leonidas Kyriakides, University of Cyprus, Cyprus; **Co-Author:** Bert (Hubertus P M) Creemers, University of Groningen / GION, Netherlands

This paper provides a review of research investigating quality and equity in education within the field of Educational Effectiveness Research (EER). This review shows that EER gradually moved to giving more emphasis on the quality dimension with the argument that by promoting quality, equity may also be achieved. During the last decade, an emphasis to investigating differential teacher and school effectiveness was given and the extent to which this strand of research can be used to explore the relation between quality and equity is discussed. The paper presents the results of two effectiveness studies conducted to test the validity of the dynamic model of educational effectiveness. These studies were concerned with effectiveness in different phases of schooling (pre-primary and primary education) and revealed that teacher- and school- level factors of the model can explain variation in student achievement in two different subjects (Mathematics and Language). It was also found that the socioeconomic-gap in student achievement tends to be smaller in classrooms and schools which are more effective than others in promoting student learning outcomes. Such relation was not identified when searching for differential effectiveness in terms of gender and ethnicity. Implications for research on promoting quality and equity are drawn.

Evaluating teaching quality: The validity of differentiating performance using multiple measures

Presenting Author: Sandy Taut, Pontificia Universidad Católica de Chile, Chile; **Co-Author:** Daniela Jimenez, Pontificia Universidad Católica de Chile, Chile; **Co-Author:** Jorge Manzi, Pontificia Universidad Católica de Chile, Chile; **Co-Author:** Diego Palacios, Pontificia Universidad Católica de Chile, Chile

Evaluating the quality of teaching has been an important focus of educational research and improvement efforts. While identifying teachers at the extreme ends of the performance distribution is possible at relatively high levels of validity and reliability, arriving at accurate distinctions between teachers in the middle of the distribution constitutes an important challenge. The present study addressed this issue in the context of the Chilean national teacher evaluation system, which has already been subject to extensive validation. A non-random sample of mathematics teachers – N=29 evaluated as “competent” and N=22 as “basic”, constituting the two adjacent middle performance evaluation categories – and their students (N=1781), were examined in the following ways: (a) teaching practices using three videotaped lessons coded with the Classroom Assessment Scoring System for Secondary School (CLASS-S), (b) student learning on standardized grade-level and specific unit tests, (c) students’ perceptions of their teachers, and (d) teachers’ self-perceived practices and self-efficacy beliefs. Although “competent” teachers outperform “basic” teachers on almost all criterion variables, the majority of these differences did not reach significance. However, we found medium effect sizes in favor of teachers evaluated as competent regarding a number of CLASS-S dimensions, student achievement on a unit-specific test, as well as for student perceptions regarding constructivist teaching practices and pedagogical support. Implications for educational research and teacher evaluation policies are discussed.

Combating Disadvantage in the Early Years: Evaluating the impact of Children’s Centres

Presenting Author: Pamela Sammons, University of Oxford, United Kingdom; **Co-Author:** James Hall, University of Oxford, United Kingdom; **Co-Author:** Rebecca Smees, University of Oxford, United Kingdom; **Co-Author:** Jenny Goff, University of Oxford, United Kingdom; **Co-Author:** Kathy Sylva, University of Oxford, United Kingdom

Children's centres are intended to support families with young children in disadvantaged communities in England. They are intended provide integrated and high quality family services and opportunities for children's play and be locally responsive to neighbourhood need. The Evaluation of Children's Centres in England (ECCE 2009-2015) provides evidence about the

delivery of services and families' use of children's centres between 2011 and 2013. The paper focuses on the Impact strand of the evaluation which investigated the effects of families engagement with Children's Centres and their services. The evaluation used a mixed methods design and the Impact strand adopted quantitative approaches (including multilevel modelling) to investigate changes in a range of child, parent and family outcomes across three time points. The study involved over 2600 families and 117 Children's centres. It addressed two overarching research questions (RQs). Does engagement with children's centres improve child, parent and family outcomes? Which aspects of children's centres promote better child, parent and family outcomes? Engagement with children's centres was linked to better outcomes especially in terms of family functioning, including improvements in the quality of the early home learning environment. Analyses by level of family disadvantage (High and Medium versus Low disadvantage groups) indicate children's centres have the potential to lessen the effects of social disadvantage and promote equity.

When does(n't) collaboration work? Evidence on school-to-school collaboration as a strategy

Presenting Author: Daniel Muijs, University of Southampton, United Kingdom

Increasingly, policymakers across the world are looking to school-to-school collaboration as a means of improving schools that is neither top-down, nor leaves school improvement at the mercy of individual schools. In a number of countries in Europe and beyond, including the UK, Belgium, the Netherlands and Spain, government initiatives have promoted the development of networks of school intended to foster collaboration. This of course does beg the question of the extent to which such approaches actually work. In this paper, we will therefore explore the impact of collaboration on school improvement, using analysis from a range of research and evaluation studies carried out in England between 2008 and 2016. These 7 studies have used quantitative and mixed methods approaches to look at the relationship between collaboration and school improvement, as well as at factors that may explain any relationship (or lack thereof). All have used propensity score matching to create a quasi-experimental design, using existing secondary data sources, in some cases combined with surveys and case studies. Findings show differential effects, in that some studies showed a positive relationship between school-to-school collaboration and pupil attainment, while others showed no relationship. The studies did, however, point to a number of factors that could explain this differential effectiveness, which are linked to theories of school improvement and school effectiveness.

Session C 1

30 August 2017 08:30 - 10:00

Main Building E - E221

Poster Presentation

Teaching and Teacher Education

PO: Teacher Professional Development

Keywords: Achievement, Attitudes and beliefs, Case studies, Cognitive development, Content analysis, Developmental processes, Knowledge creation, Learning disabilities, Qualitative methods, Quasi-experimental research, Reading comprehension, Secondary education, Teacher Effectiveness, Teacher Professional Development, Teaching / instruction

Interest group: SIG 11 - Teaching and Teacher Education

Chairperson: Jelena Radisic, University of Oslo, Norway

The projection of the past in the identity formation of teachers with learning disability

Keywords: Attitudes and beliefs, Content analysis, Learning disabilities, Qualitative methods

Presenting Author: Regina Benchetrit, Ben Gurion University / Kaye Academic College of Education, Israel; **Co-**

Author: Idit Katz, Ben-Gurion University of the Negev, Israel

This study aims to understand how past experience projects in the professional identity formation of teachers diagnosed with learning disabilities. Twelve teachers diagnosed as having learning disabilities were interviewed. The data was analyzed using qualitative method within the phenomenological constructivist tradition with narrative elements. The analysis suggests that positive and negative social encounters with peers as well as meaningful meetings with teachers in the past, have shaped the memory of the teachers and have influenced their choice of teaching as a profession. Their experiences have also affected the formation of their professional identity and their approach to teaching and education, as is reflected in their practice. Their presence, as teachers in the classroom, brings the interviewees back to their personal experiences as students. By sounding their current voice as teachers, which is somewhat mixed with their childhood silenced voices, they try to create a different discourse in the teachers' room, one that leads to acceptance and inclusion of students with LD. Now, when they have the power and can influence, the teachers see themselves as agents of social change. They seek to change other teachers' view and practice concerning students with learning disabilities.

Learning to cultivate creativity: a dual perspective of student- teachers' and pupils' learning

Keywords: Achievement, Cognitive development, Qualitative methods, Teaching / instruction

Presenting Author: Paulien Meijer, Radboud University Nijmegen, Netherlands; **Co-Author:** Ida Oosterheert, Nijmegen University, Netherlands

A challenge of (Western) education is support learners to (re)discover and cultivate their creativity. As a consequence, in current teacher education student teachers and their pupils virtually learn jointly. This study combines the learning of

student teachers as teachers/learners and that of their pupils. A course based on this 'dual approach' was tried out in Dutch teacher education. After the course, student teachers demonstrate more trust in pupils' ability to learn creatively. Their awareness of learning experiences and activities related to creative functioning increased, particularly in the affective and regulative domain. Also, several learning activities associated with creative functioning have become (more) meaningful to them. This is largely confirmed by pupils' experiences.

Coherence in mathematics teacher education

Keywords: Qualitative methods, Teacher Professional Development, Teaching / instruction, Knowledge creation

Presenting Author: Andreas Ostermann, University of Education Freiburg, Germany; **Co-Author:** Timo Leuders, University of Education Freiburg, Germany; **Co-Author:** Michael Besser, Leuphana University of Lüneburg, Germany

p { margin-bottom: 0.25cm; direction: ltr; color: rgb(0, 0, 10); line-height: 120%; text-align: left; }p.western { font-size: 11pt; }p.cjk { font-size: 11pt; }A deficit of traditional teacher education, however, is the fragmentation of teachers' professional knowledge in single disciplines. While general measures from questionnaires are available, there is only little knowledge about student teachers' perception of the complex interplay of their study areas, i.e. their perception of coherence. The present interview study investigates student teachers' perception of coherence in mathematics teacher education. While recent studies report findings about coherence between theory and practice, we focus on coherence between *mathematical content knowledge* and *pedagogical content knowledge*. We firstly identify inductively fields of knowledge that student teachers consider as relevant for their future profession as mathematic teachers. By means of qualitative content analysis we confirmed this category system deductively. Secondly we investigate existing or required coherence relations of these categories in teacher education. On the basis of these studies and further theoretical knowledge known from literature, we intend to develop a quantitative instrument to survey student teachers' perception of coherence in teaching.

Effectiveness of researcher- and teacher-trained teachers in the domain of reading

Keywords: Quasi-experimental research, Reading comprehension, Secondary education, Teacher Effectiveness

Presenting Author: Jacqueline Evers-Vermeul, Utrecht University, Netherlands; **Presenting Author:** José van der Hoeven, CED Groep, Netherlands

Observational learning seems to be a successful approach for improving students' performance. For pre-university education, it resulted in positive effects on writing performance: students learn by watching and reflecting on the teacher's or a peer's task performance. This pedagogy seems promising for reading strategy education for pre-vocational students as well. In the current research a first group of pre-vocational teachers were trained by researchers in how to put observational learning into practice in the teaching of reading. These teachers in their turn each trained one or more colleagues in how to apply this approach. Using a cross-legged panel design, we studied the effects of both training conditions on teacher approach and on reading proficiency of pre-vocational students.

From Lone Wolf to Team player: Co-Constructive Cooperation between Teachers in Personalized Teaching

Keywords: Case studies, Developmental processes, Qualitative methods, Teacher Professional Development

Presenting Author: Marco Galle, University of Zurich, Switzerland; **Co-Author:** Rita Stebler, University of Zurich, Switzerland

This study, which is a part of the longitudinal research project on schools with personalized learning concepts in Switzerland, investigates the cooperation between teachers in 10 schools. As a result of various social changes (e.g. heterogeneous pupils), the schools modify their 'grammar of schooling' (Tyack & Tobin, 1994) to implement personalized learning (Prain et al., 2015). Teachers are changing from 'lone wolf' to 'team player' in the course of these developments. The nature of cooperation of teachers may vary. Gräsel, Pröbstel, Freienberg and Parchmann (2006) are three distinguished types of cooperation: first, the *exchange* of professional materials and ideas without a common goal and resource enhancement; second, *work sharing cooperation*, in which tasks are shared under a common objective to make work processes more efficient and third, *co-construction* as an intensive exchange aimed at a common goal to relate knowledge to a common problem solution. The transcribed and semi-structured guidance interviews are analysed with a structured content analysis (Kuckartz, 2016). The survey shows that teachers often report about co-constructive cooperation. Teachers agree that co-construction is a significant factor for personalized teaching. In addition, the co-constructive cooperation objectives show diversity and involve not only developmental tasks but also the day-to-day work of teachers, such as teaching preparation, teaching, and evaluation of teaching.

Towards Personalized Learning – School and Teaching Development in one State School

Keywords: Case studies, Developmental processes, Qualitative methods, Teacher Professional Development

Presenting Author: Marco Galle, University of Zurich, Switzerland; **Co-Author:** Kurt Reusser, University of Zurich,

Switzerland

In the German-speaking region, school development is often initiated at the macro level of the school system. Developments from the micro level, that is, from teachers and school leaders, is rare. Even rarer in state schools are resource-intensive school developments targeted directly at teaching. This contribution presents results part of the longitudinal research project on schools with personalized learning concepts in Switzerland. The development processes in eleven schools are reconstructed and the case of one school is presented on the poster. The results of the qualitative data analysis show that all the schools in the study pursue resource-intensive school and teaching development to evolve school-specific, shared variants of personalized learning concepts and to integrate these into the school and teaching structures. What is required is not only an altered 'grammar of schooling' (Tyack & Tobin, 1994), but also an expanded understanding of teaching and learning as well as new forms and contents of cooperation between teachers. The teachers at the state school have not yet established a significant increase in student performance as a result of the personalized learning concepts, but do report that the students have comparatively high learning motivation, especially in the last school year, to an extent that the teachers had not previously experienced. Likewise, the teachers were able to observe increased autonomy in the students' learning.

Session C 2

30 August 2017 08:30 - 10:00

Virta - 114

Poster Presentation

Lifelong Learning, Motivational, Social and Affective Processes

PO: Motivation, Emotion and Self-regulation

Keywords: Achievement, Assessment methods and tools, At-risk students, Content analysis, Developmental processes, Doctoral education, Educational attainment, Educational Psychology, Educational Technology, Emotion and affect, Higher education, Motivation, Motivation and emotion, Qualitative methods, Secondary education, Self-regulation

Interest group: SIG 08 - Motivation and Emotion, SIG 19 - Religious and Spiritual Education, SIG 24 - Researcher Education and Careers

Chairperson: Erno Lehtinen, University of Turku, Finland

Perception of the Contribution of the Mindfulness Program to Class Climate in Elementary School

Keywords: Developmental processes, Educational attainment, Self-regulation, Motivation and emotion

Presenting Author: Esther Grobgeld, Achva Academic College, Israel; **Co-Author:** Shirley Gelman, Achva Academic College, Israel; **Co-Author:** Ariela Teichman-Weinberg, Achva Academic College, Israel

Mindfulness is the awareness that arises out of paying willful attention, at the present moment, and in a non-judgmental manner. The present study examined the perception of the contribution of the Mindfulness Program to class climate in elementary school. Semi-structured interviews were held with fifth and sixth graders who have been practicing mindfulness for the past two years. The students perceive the mindfulness language as a tool that enables them to delay their reaction, cope with conflicts in a non-violent manner, cooperate and feel efficacious and safe. These skills contribute to the creation of a pleasant and safe climate for the students in the class.

Mediating Role of Need Satisfaction between Classroom Goal Structures and Educational Functioning.

Keywords: Educational Psychology, Higher education, Motivation, Motivation and emotion

Presenting Author: Aysenur Alp, Middle East Technical University, Turkey; **Co-Author:** Aikaterini Michou, Bilkent University, Turkey

The goal-related messages in a classroom are associated with students' experiences and functioning in learning. In the present study, we investigated in a sample of 171 Turkish university students (60% females; $M_{age} = 19.79$, $SD = 1.68$), the relation of classroom goal structures to students' educational satisfaction and state flow through their experience of need satisfaction. Hierarchical regression analysis showed that mastery-approach (MAp) goal structures (i.e., classroom environment focuses on learning and self-improvement) and performance-approach (PAp) goal structures (i.e., classroom environment focuses on normative success) were positively and negatively related to need satisfaction respectively. Hierarchical regression analyses also showed that need satisfaction was related to educational satisfaction and flow in class-related tasks. Bootstrap analyses, finally, indicated the mediation of need satisfaction in the relation of MAp and PAp goal structures to educational satisfaction and state flow. Understanding need satisfaction as a mediator of classroom goal structures and educational outcomes help teachers to reconsider their goal-related messages in the classroom.

Quality of motivation in Japanese secondary school: The first in a three-year cohort study

Keywords: Achievement, Developmental processes, Motivation, Secondary education

Presenting Author: Quint Oga-Baldwin, Waseda University, Japan; **Co-Author:** Luke Fryer, University of Hong Kong, Hong Kong

Background While the literature internationally and in Japan suggest negative or flat trajectories across the rest of compulsory education, recent studies in Japan have shown positive trends in quality of motivation to learn foreign

languages in upper elementary school. However, the question remains whether this trend continues across the transition into secondary school. **Aims** In this longitudinal cohort study, we investigate the antecedents and relationships between three different school subjects (Math, Japanese, and English) as well as students' perceptions of their classroom climate in order to create a model of school motivation in Japan. **Methods** Students' quality of motivation and perceptions of the classroom climate for Japanese, Math, and English were measured at two time points during the 2016 school year. Longitudinal structural equation modeling and person-centered profile analyses will be used to analyze changes over time. **Results** Preliminary results show acceptable internal validity and reliability for the scales. Final results will be presented in light of achievement results at the end of the school year.

Studying the Role Depictions of Academic Information Play in At-Risk Students' Motivation to Succeed

Keywords: At-risk students, Educational Psychology, Educational Technology, Motivation

Presenting Author: Stephen Aguilar, University of Southern California, United States; **Co-Author:** Neil Jacobson, University of Southern California, United States

Spurred on by the growth of data analytics technologies designed to detect, predict, and/or intervene on student learning (i.e., learning analytics), students are increasingly being presented with performance-related information in graphic form. In contrast to traditional modes of academic feedback (e.g., grades), such information is designed to be both personal and information rich. Yet, is more information always better, or can it pull students toward understanding their progress in ways that are motivationally counterproductive? The research on student motivation largely emphasizes detecting the relationships between students' motivational beliefs and their academic outcomes, and suggests that beliefs centered around mastering tasks are more beneficial to learning when compared to those which emphasize peer comparisons. Yet, few studies have examined the role depictions of academic information play in shaping motivational beliefs—especially for students who are academically at-risk. This paper addresses the gap in the literature by examining the various sense-making practices utilized by at-risk students when presented with depictions of academic information. Results of our mixed-methods study found, indeed, that students with higher achievement goal orientation predicted they would perform at lower levels when presented with visually presented information that compared their performance to class averages. No relationship was found between achievement goals and graphs depicting only individual performance. Thus more information is not necessarily better, which has implications for how achievement-related graphic information should, or certainly for some individuals, should not be provided.

Academic stressors and ways of coping: a qualitative approach

Keywords: Assessment methods and tools, Content analysis, Qualitative methods, Motivation and emotion

Presenting Author: Maria Teresa Goncalves, Polytechnic Institute of Viana do Castelo, Portugal; **Co-Author:** Fritz Mende, University of Porto, Portugal; **Co-Author:** João Leite, University of Porto, Portugal; **Co-Author:** Márcia Carvalho, University of Porto, Portugal; **Co-Author:** Marina Lemos, University of Porto, Portugal

Besides negative major life events people have to cope regularly with critical normative developmental stressful events within the various life domains. Within a research project on academic motivational resilience the present study used a qualitative approach to identify, within a specific cultural context: i) the main stressors that children and adolescents face in everyday life and more specifically to obtain their descriptions of stressors in the academic context; and ii) the most typical ways of academic coping. Participants were 30 Portuguese students from 4th, 6th and 8th grades. A semi-structured interview was used to gather descriptions and meanings of children experiences of everyday stressors and more specifically of academic stressors. The interview was based on the principles of the cognitive interviewing using verbal probing techniques and consisted of a set of open-ended questions and a concurrent verbal interviewing while students answered the Multidimensional Measure of Coping (Skinner, Pitzer, and Steele, 2013). Findings confirm the centrality that children attribute to stressors in the academic domain, and contribute to the categorization of types of stressful events in the academic domain, their differential frequency, and the emotional reactivity and perceived controllability associated to the various stressors. The study also contributes to a conceptual analysis of stress and coping in a specific cultural context based on the cognitive interviewing.

Starting a PhD: significant events and the role of the associated emotions along PhD trajectories

Keywords: Doctoral education, Educational Psychology, Emotion and affect, Higher education

Presenting Author: Crista Weise, Autonomous University of Barcelona, Spain; **Co-Author:** Mariela Aguayo, Universitat Ramon Llull, Spain

This research contributed to the understanding of the role of the emotions in the process of becoming a PhD, suggesting that focusing on both in negative and positive emotions in the context of the PhD trajectory is possible to understand better the engagement and involvement of the students. In the sample, the emotions are quite variable, they change along the trajectory, even though some of them remains and appears repeatedly in different SE. The most important are related to specific research factors. The findings showed that students have a positive experience when doing their PhD courses. Most of them associate their experiences with positive emotions rather than negative ones, although they faced challenges with high levels of emotional intensity. It was used a qualitative approach, based on the analysis of 10 semi-structured interviews applied to PhD students from Catalan Universities. Also were used an episodic interview and a journey plot identifying the main significative events they went through during their PhD. Becoming a researcher is an enormous challenge that requires accumulation of experience, specific skills, and formation. People who decide to follow an academic

career should consider that higher cognitive, emotional, personal competencies are needed to deal with a Ph.D. career. The objectives of the study are to identify the emotions that SE embraces, along with Ph.D. trajectories, highlighting the aspects they relate to analyze the dynamics of the PhDs' students emotions along with their trajectory and the role they play when facing the required tasks.

Session C 3

30 August 2017 08:30 - 10:00

Pinni A - A1081

Poster Presentation

Assessment and Evaluation, Lifelong Learning, Teaching and Teacher Education

PO: Teacher Education

Keywords: Assessment methods and tools, Attitudes and beliefs, Competencies, Higher education, In-service teacher education, Lifelong learning, Pre-service teacher education, Primary education, Qualitative methods, Reflection, Science education, Secondary education, Social interaction, Teacher Professional Development, Video analysis

Interest group: SIG 11 - Teaching and Teacher Education

Chairperson: Sue Bennett, University of Wollongong, Australia

Teachers' growth or fixed mindsets and the appraisal of achievement in the context of feedback

Keywords: Attitudes and beliefs, Qualitative methods, Secondary education, Video analysis

Presenting Author: Emmy de Kraker-Pauw, VU University Amsterdam, Netherlands; **Co-Author:** Lydia Krabbendam, Vrije Universiteit Amsterdam, Netherlands; **Co-Author:** Nienke van Atteveldt, VU University Amsterdam, Netherlands; **Co-Author:** Floryt Van Wesel, Utrecht University, Netherlands

Abstract

The pedagogical beliefs (e.g., beliefs or 'mindsets' concerning the malleability of intelligence) that teachers hold may have a far-reaching impact on their teaching behaviour. In general, two basic mindsets can be distinguished with regard to the malleability of intelligence: fixed (entity) and growth (incremental). In this proposal we present two studies investigating the associations between teachers' mindset and 1) their appraisal of students' achievements and 2) the feedback they provide. Study 1 focuses on the associations between mindset and appraisal. The findings reveal an association between growth mindset and the appraisal of increasing student achievements. Study 2 investigates the impact of teachers' mindset on the amount and type of oral feedback they provide to their students. Contrarily to expectations, the findings reveal a significant negative correlation between mindset and the amount of growth-oriented feedback. Additionally, the findings reveal that gender affects both mindset and appraisal.

Using self-evaluation in post-observation conferences between museum educators and museum docents

Keywords: Assessment methods and tools, Reflection, Teacher Professional Development, Lifelong learning

Presenting Author: Mark Schep, University of Amsterdam, Netherlands; **Co-Author:** Carla Van Boxtel, University of Amsterdam, Netherlands; **Co-Author:** Julia Noordegraaf, University of Amsterdam, Netherlands

In this study we investigated how a self-evaluation instrument contributed to a post-observation conference of museum docents (tour guides) and museum educators. First, out of a list of 45 competencies (organized in four categories), defined in a previous study, a self-evaluation instrument and an observation instrument were constructed. Fifteen museum docents, working in an art museum or a history museum, filled in the self-evaluation questionnaire in which they had to rate themselves on all competencies. The docents could use these scores to answer subsequent questions about their strengths and points for improvement, for all four main categories of competence. In the same period an educator observed two tours of the docent, using an observation instrument that focused on the same competencies. Next, the educator and the docent engaged in a (video-recorded) post-observation conference. During the conference the docent was asked to put forward his/her strengths and points for improvement, which deviates from the educator (observation) directed conferences that are prevailing in the participating museums. Afterwards, all participants were interviewed about their experiences with the instruments and the post-observation conference(s). Analysis of the interviews and preliminary analysis of the video-recordings show a perceived agency by the docents, the perceived equality between the participants of the conference, and the reported sense of 'objectivity' as a result of the list of competencies that was used. The instruments can help docents to further professionalize their practice, and help educators to structure post-observation conferences.

Teacher-student relationships: comparing Dutch academic and nonacademic primary school teachers

Keywords: Pre-service teacher education, Primary education, Social interaction, Teacher Professional Development

Presenting Author: Sanne Dijkema, University of Groningen, Netherlands; **Co-Author:** Simone Doolaard, University of Groningen, Netherlands; **Co-Author:** Roel J. Bosker, Rijksuniversiteit Groningen, Dept of Education and GION, Netherlands

In the Netherlands an academic Bachelor's degree program was developed, in 2008, preparing for the profession of primary school teacher. This Bachelor's degree program integrates the traditional higher vocational education program and the academic program of educational sciences and pedagogy. Teachers graduating from this academic trajectory hold a double Bachelor's degree in both higher vocational education and university. Establishing this new degree resulted in

primary school teachers with different educational backgrounds working in the field. This study compared teacher interpersonal behavior, in terms of agency and communion, of beginning academic and nonacademic Dutch primary school teachers. Teacher interpersonal behavior was measured using the Questionnaire on Teacher Interaction for Primary Education (QTI-PE). Both student (N= 1162) and teacher perceptions (N=74) were collected. Since data-collection is ongoing (to be finalized in May 2017), preliminary results provide a first exploration of the development of teacher interpersonal behavior in primary education for teachers with different educational backgrounds.

Profiles of Teachers' Conceptions of the Purposes of Assessment

Keywords: Assessment methods and tools, Attitudes and beliefs, In-service teacher education, Teacher Professional Development

Presenting Author:Helenrose Fives, Montclair State University, United States; **Co-Author:**Nicole Barnes, Montclair State University, United States

AbstractTeachers' conceptions about assessment influence their classroom assessment practices. In this investigation, we examined 179 K-12 teachers' conceptions of the purposes of assessment from a person-centered perspective. An exploratory factor analysis of teachers' responses to the Conceptions of Assessment Instrument yielded a three-factor model: assessment as valid for accountability, assessment as irrelevant, and assessment improves teaching and learning. Next, we used cluster analysis to identify belief profiles of teacher groups: Cluster-1: Moderate, Cluster-2: Irrelevant, Cluster-3: Teaching and Learning. Within and across cluster comparisons revealed significant differences indicating that these are distinct belief profiles thereby suggesting that teachers can, and do, hold multiple beliefs about assessment simultaneously.

Exploring reflective practice in mentor teacher and teacher trainee relationship

Keywords: Higher education, Pre-service teacher education, Reflection, Teacher Professional Development

Presenting Author:Kinga Kaplar-Kodacsy, Eötvös Loránd University, Hungary; **Co-Author:**Helga Dörner, Central European University, Hungary

This paper outlines findings from a research project on mentor teachers' conceptualizations and strategies of mentoring pre-service teachers for reflective practice. The study was conducted with the aim to explore the qualitatively different ways in which mentor teachers conceive of mentoring for reflective practice and also how they translate this into actual mentoring strategies. We interviewed 6 senior mentor teachers who are certified mentors at Hungarian primary and secondary schools. The transcripts were analysed using a phenomenographic approach. Mentor teachers were found to oscillate between fragmented and cohesive conceptions of 'mentoring for teaching' with varying levels of integrating the notion of reflective practice. Based on the results a system of conceptualisations and strategies was created. These findings provide directions for designing a survey tool that will be used in a large-scale research study scheduled for 2017-18.

Evaluating Professional Competencies of Science Teachers Pertinent to Elementary Particle Physics

Keywords: Competencies, Pre-service teacher education, Science education, Teacher Professional Development

Presenting Author:Michaela Oettle, University of Education, Freiburg, Germany

The project aims at designing an instrument suitable for assessing professional competences of science teachers pertinent to elementary particle physics. Motivated by the huge discrepancy between the planned incorporation of particle physics in scholar curricula and the previously lacking effort in exploring the corresponding domain-specific professional competences required by science teachers, the study seeks to give deeper insight into possible issues arising when the topic becomes firmly established in school classes. By portraying the level and nature of those competences, the project targets to establish the status quo as well as an in-depth look into the preconceptions teachers might have themselves. In order to conceptualize the relevant categories subject matter knowledge and pedagogical content knowledge, two different strategies were pursued: The subject matter was modeled by an acquisition of expert knowledge through an online survey and follow-up interviews. The results were analyzed in terms of qualitative explorative and quantitative aspects and provide the basis for the construction of performance test items. The pedagogical content knowledge was conceptualized pursuing a theory-based strategy relying on well-established models in science educational research. The combined results provide the basis for a testing instrument for teachers who have addressed particle physics within their school classes. The research focusses initially on the German-Speaking world. The study design and results on the modelling of the competence fields are being presented and discussed. We expect to define well distinguished categories in the subject matter and pedagogical content knowledge field as well as design testing items accordingly.

Session C 4

30 August 2017 08:30 - 10:00

Main Building A - A06

Poster Presentation

Cognitive Science, Instructional Design, Learning and Instructional Technology, Lifelong Learning, Teaching and Teacher Education

PO: Metacognition

Keywords: Attitudes and beliefs, Cognitive development, Cognitive skills, Computer-assisted learning, Computer-

supported collaborative learning, Goal orientation, Instructional design, Mathematics, Metacognition, Peer interaction, Primary education, Quasi-experimental research, Reflection, Self-regulation, Student learning, Teacher Effectiveness, Teaching / instruction, Writing / Literacy

Interest group: SIG 16 - Metacognition

Chairperson: Viivi Virtanen, University of Helsinki, Finland

Metacognitive control in a memory task in elementary school children

Keywords: Cognitive development, Cognitive skills, Metacognition, Primary education

Presenting Author: Claudia Roebers, University of Bern, Switzerland; **Co-Author:** Natalie Guggisberg, University of Bern, Switzerland; **Co-Author:** Martina Steiner, University of Bern, Switzerland; **Co-Author:** Mariette van Loon, University of Bern, Switzerland

In elementary school children are more and more required to self-regulate their learning, and in order to do so effectively, they have to be able to recognize their errors and correct these to ensure effective learning and good performance. This research examined metacognitive control in elementary school children, and addressed whether children are able to recognize their errors, and control learning by withdrawing incorrect responses and maintaining correct responses. Three age groups were tested, 2nd, 4th and 5th graders learned the meaning of Japanese characters (Kanji), and afterwards they took a recognition test. At the end the children had the possibility to control their own learning. On the basis of traffic lights, they could press the green traffic light to maintain their answer or the red traffic light to withdraw their answer. Findings show a positive relation between response accuracy and control (maintenance or withdrawal) in all three age groups, such that the children accurately adapted their control behavior to their test responses. There were no age-related differences in the metacognitive control, suggesting that 2nd grade children are already capable to accurate control their learning when given the chance to withdraw incorrect answers.

Investigating implicit theories of ability and its relationship to students self-regulated learning

Keywords: Attitudes and beliefs, Goal orientation, Self-regulation, Writing / Literacy

Presenting Author: Yves Karlen, University of Zurich, Switzerland; **Co-Author:** Carmen Hirt, University of Zurich, Switzerland; **Co-Author:** Katharina Maag Merki, University of Zurich, Switzerland; **Co-Author:** Francesca Suter, University of Zurich, Switzerland

Implicit theories of ability highly impact our actions, emotion, motivation, and how we perceive knowledge and ourselves in everyday situations. Research showed that implicit theories about the stability (entity theory) and the malleability of abilities (incremental theory) are of particular relevance (Dweck & Master, 2008). In school and academic contexts, they are especially important in situations where students have to self-regulate their learning (SRL). This study explores the role of implicit theories of writing ability in cognitive, metacognitive, and motivational SRL processes of students who write their first academic paper. N ≈ 1200 students from the upper secondary education level completed an online self-report survey that included measures on implicit theories of their ability in academic writing, achievement goal inventory, and strategy use. Results indicated that the students' individual implicit theory of their writing ability is an important predictor for strategy use. The effects held stable after including achievement goals as moderators. The implications of these findings for research and instruction are discussed.

Outcome Feedback and Reflection to Improve Calibration of High School Students: A Longitudinal Study

Keywords: Instructional design, Metacognition, Reflection, Self-regulation

Presenting Author: Marloes Nederhand, Erasmus University Rotterdam, Netherlands; **Co-Author:** Huib Tabbers, Erasmus University Rotterdam, Netherlands; **Co-Author:** Remigius (Remy) Rikers, UCR / Utrecht University, Netherlands

In this longitudinal study we investigated whether calibration accuracy of high school students could be improved by providing them with outcome feedback and encouraging them to reflect on the (mis)match between their estimated performance and actual outcome. Students of four experimental groups were compared. First a group of students who only had to estimate their performance on each exam (Practice group). Second, a group of students who needed to estimate their performance on each exam just as the Practice group. However, after receiving outcome feedback (how well they performed on the exam) students also had to write down the difference between their estimation and actual exam score (Bias group). The third group of students followed the same procedure as the Bias group, but besides only writing down the difference between their estimation and actual performance, these students also reflected on causes for their mismatches (Reflection group). These three groups were compared to a control group with students who only estimated their performance on the first and the final exam during the experiment. Data are being gathered at the moment and results will be discussed during the symposium.

The effectiveness of journals in educational settings. A review study

Keywords: Metacognition, Quasi-experimental research, Self-regulation, Student learning

Presenting Author: Sabine Fabriz, Goethe-Universität Frankfurt, Germany; **Co-Author:** Charlotte Dignath, Goethe-University Frankfurt, Germany; **Co-Author:** Franziska Perels, Saarland University, Germany

In a literature review of 52 studies, the effectiveness of learning journals as tools to foster self-monitoring in learning is explored. The literature search included records from 2000 to 2016 from several databases (e.g. PsycARTICLES; PsycINFO) and with different denotations (e.g. learning diaries, learning journals). After screening the records and

assessing for eligibility criteria (including pre-post design, control group and a minimum group size of 10), 52 studies remained. We developed a coding scheme to assess the study characteristics and allow for the identification of possible predictors for the effectiveness of the Intervention. The poster will present the developed coding scheme used for the review and a meta analysis to follow as well as the results of the review and their implications.

Development of tools for identifying teacher metacognition

Keywords: Mathematics, Metacognition, Teacher Effectiveness, Teaching / instruction

Presenting Author:Emine Erkin, Bogazici University, Turkey; **Co-Author:**Gursu Asik, Bahcesehir University, Turkey

Teachers' metacognition is principal for both developing students' metacognitive knowledge and skills, and to apply metacognition to their own instruction. In order to develop metacognitive skills and use these skills effectively in educational settings, teacher training needs to focus on three aspects of teachers' professional description: the use of metacognitive skills in teachers' professional development, in teachers' teaching processes, and in how metacognitive processes can be taught to students to improve their learning. This study is an attempt on the development of assessment tools to examine teacher metacognition underlying the instructional practice in mathematics. To this end we have planned to develop three instruments each corresponding to a different aspect of teacher metacognition. 1) For teachers' general metacognitive habits a self-report questionnaire is developed. 2) An observational tool that allows for a systematic examination of teacher's instruction in the classroom is designed. The observation tool is in a checklist format, which allows researchers to assess both the frequency of metacognitive acts and the quality of metacognitive actions during the instructional process. 3) An observation tool for examining the students' metacognition will be the final step. The methodology of the study is based on a design-based research and development of the observation checklist is considered as to be a starting point for the improvement of teachers' metacognition. The data will be collected through observing instructions of middle school math teachers and their students.

Socially Shared Regulated Learning with MetaTutor

Keywords: Computer-assisted learning, Computer-supported collaborative learning, Peer interaction, Self-regulation

Presenting Author:Jolique Kielstra, Radboud University Nijmegen, Netherlands; **Co-Author:**Inge Molenaar, Radboud University Nijmegen, Netherlands; **Co-Author:**Michelle Taub, North Carolina State University, United States; **Co-Author:**Roger Azevedo, North Carolina State University, United States

This poster describes a new study to be executed this winter into how pedagogical agents in MetaTutor can support socially shared regulated learning through reciprocal peer tutoring. In this 2-day study students will be working together in dyads on a shared assignment in a computer based learning environment. The first day students will be trained and informed about the assignment they will be working on in MetaTutor the second day. During the second day the dyads will each execute the role of tutor and tutee while working together on the assignment. Data will be collected through multiple datachannels, such as pre- and posttest measurements, logfiles, eyetracking, video- and audio recordings. This data will provide more understanding on the influence of socially shared regulated learning within a computer based learning environment with and without pedagogical agents. Based on current literature expectations are that reciprocal dialogs between tutor and tutee on the shared assignment will stimulate metacognitive processes. The influence of pedagogical agents within computer based environments on reciprocal dialogs is missing and data from this study will provide more insight on these interactions within such a computer based learning environment.

Session C 5

30 August 2017 08:30 - 10:00

Main Building A - A07

Poster Presentation

Cognitive Science, Learning and Social Interaction, Lifelong Learning, Teaching and Teacher Education

PO: Learning and Professional Development

Keywords: Attitudes and beliefs, Cognitive development, Cognitive skills, Competencies, Higher education, Lifelong learning, Mathematics, Meta-analysis, Pre-service teacher education, Primary education, Professions and applied sciences, Quantitative methods, Reasoning, Reflection, Teacher Professional Development, Vocational education, Workplace learning

Interest group: SIG 14 - Learning and Professional Development

Chairperson: Debora Valcan, Murdoch University, Australia

Instructional preferences and learning (transfer) in further education - a longitudinal study

Keywords: Quantitative methods, Vocational education, Workplace learning, Lifelong learning

Presenting Author:Michael Goller, University of Paderborn, Germany; **Co-Author:**Christoph Fischer, University of Paderborn, Germany; **Co-Author:**Christian Harteis, University of Paderborn, Germany

This contribution analyses determinants that predict learning in formal training courses as well as the potential transfer of the learned knowledge and skills into the workplace. A main focus lies on the effects of a fit between individuals' instructional preferences and the instructional methods that are actually applied in the training courses. A good fit between both is assumed to predict high learning outcomes by being positively related to an increased subjective enjoyment of the

training course as well as a higher perceived usefulness of the training as such (matching hypothesis). An increased knowledge gain is then assumed to predict learning transfer at work as long as the individual is sufficiently supported by both colleagues and supervisors. These theoretically and empirically grounded hypotheses were translated into a mediated and moderated path model. To test this model a two-wave longitudinal study was conducted. Over a time frame of one year each employee of a German university that participated in an in-house training course filled in two separate questionnaires (one directly after the course and one four month after the first one). This contribution presents and discusses the core findings of this study. Practical implications for the implementation of training courses will be given.

Innovative mathematics curriculum and its influences on teachers' knowledge and beliefs

Keywords: Attitudes and beliefs, Mathematics, Primary education, Teacher Professional Development

Presenting Author:Laurinda Lomas, Australian Catholic University, Australia; **Co-Author:**Doug Clarke, Australian Catholic University, Australia

Research focused on the classroom application of a teacher's mathematical knowledge and beliefs and the effect of this on student understanding has highlighted the need for further investigation into professional development strategies which promote deep and flexible teacher understanding of curricular content. As teaching is a cultural activity embedded in a unique context, such opportunities for teachers may be best placed amid the relevance of everyday classroom practice, and supported by curriculum which promotes such change. This paper reports on data collected as part of a doctoral study aimed at observing the changes in mathematical knowledge and beliefs of three Grade 5/6 teachers as they implemented a four-week, innovative curriculum unit based on the tenets of Realistic Mathematics Education (RME). Case study methodology within a constructivist epistemology and an interpretivist theoretical perspective promoted deep understanding of complex classroom interactions. The Interconnected Model of Teacher Professional Growth (Clarke & Hollingsworth, 2002) supported interpretation of growth and change mechanisms. Analysis of the teachers' implementation of this Fractions unit revealed the pivotal influence of teacher's stated and inferred beliefs about mathematics and mathematics teaching on classroom practice. The foregrounded content and pedagogical content knowledge evident in the teachers' pre and post-intervention lessons, their reflections on practice, and the vagaries of didactic contracts in a change environment have the potential to contribute to current research on professional learning in mathematics. Emergent themes about curriculum fidelity, authority and task implementation promote further consideration of the support needed to sustain teacher learning.

Knowledge restructuring through case-processing; a review of studies in three professional domains

Keywords: Cognitive development, Meta-analysis, Professions and applied sciences, Reasoning

Presenting Author:Els Boshuizen, Open University of the Netherlands, Netherlands; **Co-Author:**Hans Gruber, University of Regensburg, Germany; **Co-Author:**Josef Strasser, University of Augsburg, Germany

With increasing levels of expertise development work and learning become more and more intertwined. Processing of cases is the core of much expert work; it heavily depends on activating and applying relevant prior knowledge, and seeking new knowledge when prior knowledge is not sufficient. It was conjectured that this case processing plays a crucial role in connecting working processes and learning. The concepts of knowledge encapsulation and (illness) script development, brought together in a theory of Knowledge Restructuring through Case Processing, emphasize the importance of these processes that would result in a knowledge base that is better tuned to case processing and allows better and faster reasoning/ problem solving. This theory was developed for the medical domain, but researchers in other fields also apply the concepts in their work. We did a review study in which we investigated whether similar effects of case processing can be found in other fields that are also characterized by working with cases, i.e., counselling, business and law. We found 30 studies in counselling, 8 in business and 12 in law. Many studies concerned the quality of the diagnosis or decision, its relation with experience, associated difficulties with information processing and/or knowledge application. In all domains indications for script development and knowledge restructuring were found. Deliberation, reflection and not seeing work as routine had positive effects on present and future decision quality.

Entrepreneurial failure: Is it possible to prevent it?

Keywords: Cognitive skills, Competencies, Vocational education, Workplace learning

Presenting Author:Fritz Oser, University of Fribourg, Switzerland; **Co-Author:**Susan Müller, University of St. Gallen, Switzerland; **Co-Author:**Lara Forsblom, University of Fribourg, Switzerland

Based on the fact that the number of start ups in European countries is quite substantial (especially in Switzerland with more than 40'000 a year) we were looking on failure rates of companies, the psychological meaning of failure and the possible/not possible rescue from failure. Our research project aims to make a contribution to overcome the danger of failure, or to initiate a recovery. In a fine-tuned intervention study we work with a randomized field-design, treating four groups of secondary-II-students, namely a) one with entrepreneurial techniques and failure cases, b) one with entrepreneurial techniques and success cases, c) one with entrepreneurial techniques and no cases, and d) a control group without any pedagogical influence. Since the intervention study lasts until August 2017, we would like to present here the measurement instruments with the respective validation results and their hidden treatment relationships.

Alumni Perspectives on Entrepreneurial Success in Vocational HE

Keywords: Cognitive skills, Competencies, Higher education, Workplace learning

Presenting Author:Timo Nevalainen, Tampere University of Applied Sciences, Finland; **Co-Author:**Pia Hautamaki,

Tampere University of Applied Sciences, Finland; **Co-Author:**Petri Nokelainen, Tampere University of Technology, Finland

In our paper, we present the preliminary analyses and findings from a qualitative study based on narrative interviews conducted with alumni members (n = 15) of a degree programme in entrepreneurship, Proakatemia. Proakatemia is an entrepreneurship education unit and a learning community in Tampere University of Applied Sciences (TAMK) in Tampere, Finland. The study focuses on the experiences of Proakatemia alumni members before, during and after their studies. We were particularly interested in those experiences that the alumni members saw as meaningful in connection with their later success as entrepreneurs. Collected data was analysed collaboratively by using the methods of narrative analysis (Andrews et al., 2013) and descriptive phenomenological analysis developed by the psychologist Amedeo Giorgi (2009). Narrative analysis was done to study events that were experienced as moments of significant learning by the participants and descriptive phenomenological analysis was used to inquire into the structure of those experiences. We also contrasted the findings with the 3-P model of workplace learning (Tynjälä, 2012).

Feedback of pupils as a starting point for teacher reflection – First results of an empirical study

Keywords: Higher education, Pre-service teacher education, Reflection, Teacher Professional Development

Presenting Author:Corinne Wyss, Zurich University of Teacher Education, Switzerland; **Co-Author:**Simone Biaggi, Zurich University of Teacher Education, Switzerland

Feedback from students is an essential, yet rarely used method for teaching development (Kämpfe, 2009). However, the ratings of students are significant since they represent an internal view of the teaching and can thus be very valuable for the reflection of teaching, the teaching quality and the professional competence of the teacher (Hattie, 2009). The intervention project “Student feedback to support teachers’ reflection” at Zurich University of Teacher Education investigates the effectiveness of student feedback for promoting pre-service and in-service teachers’ quality of and attitude about reflection of their lessons. During two terms 200 – 240 students aspiring to become teachers for the first level of secondary education (grades 7 to 9) are advised to get student feedback during their practical training and to work with it in three different ways: The first intervention group a) uses the student feedback to reflect about its own teaching together with a peer, the second group b) uses it to reflect together with an experienced teacher while a third group c) uses the student feedback to reflect by writing a reflective journal. The oral and written reflections are analysed with respect to the three different settings of reflection. In addition, the changes of motivation and volition to work with student feedback were measured pre-post using a written test. The findings of the study can give valuable inputs for teacher education and teacher professional learning concerning the use of student feedback and teacher reflection.

Session C 6

30 August 2017 08:30 - 10:00

Main Building A - A08

Poster Presentation

Educational Policy and Systems, Higher Education, Learning and Social Interaction, Motivational, Social and Affective Processes, Teaching and Teacher Education

PO: Learning and Teaching in Culturally Diverse Settings

Keywords: Case studies, Communities of practice, Content analysis, Cultural diversity in school, Culture, Educational policy, Ethnography, Informal learning, Interdisciplinary, Language (Foreign and second), Learning and developmental difficulties, Learning approaches, Mathematics, Motivation and emotion, Multicultural education, Numeracy, Science education, Social interaction, Teaching / instruction, Workplace learning

Interest group: SIG 21 - Learning and Teaching in Culturally Diverse Settings

Chairperson: Eli Gottlieb, Mandel Leadership Institute, Israel

Mathematics in Latin American Primary Education: diverse contexts, different results

Keywords: Educational policy, Learning and developmental difficulties, Mathematics, Numeracy

Presenting Author:Beatriz Vargas Dorneles, Federal University of Rio Grande do Sul - UFRGS, Brazil; **Co-Author:**Luciana Corso, Federal University of Rio Grande do Sul -UFRGS, Brazil

The primary aim of this paper is to analyze the mathematical performance of students from some Latin American countries and, secondly, identify policies designed to attend the needs of low achievers in mathematics. As Latin America comprises twenty one very different countries, excluding Caribbean countries, with diverse languages, cultural traditions, educational systems and policies, we summarize the situation in the eight Latin American countries (Argentina, Brazil, Chile, Colombia, Costa Rica, Mexico, Peru, and Uruguay) that participated in PISA, in 2012, the latest assessment available at the time of writing. We describe part of the results available in OECD documents, discuss some of the policies in the region, and conclude that the situation varies across the Latin American countries, for example, in Chile approximately 50% of students are very low-achievers in mathematics, while in Peru the figure is 75%, and highlight the Brazilian results in mathematics, which significantly improved from 2000 to 2012. The change resulted from a broad range of policies including investments in improving both teacher quality and resources. Throughout Latin America there are no national documented policies to specifically attend low achievers in mathematics. We conclude that most Latin American students are incapable of using basic mathematical concepts, procedures or rules to solve simple basic number problems, despite the improved results

obtained in mathematics education in recent years.

Exploring informal learning and integration of foreign nurses in Finnish workplaces

Keywords: Communities of practice, Content analysis, Informal learning, Workplace learning

Presenting Author:Pauliina Alenius, University of Tampere, Finland; **Co-Author:**Päivi Vartiainen, University of Tampere, School of Education, Finland; **Co-Author:**Marja Koskela, University of Tampere, School of Education, Finland

The aim of the study was to examine the informal learning experiences and integration of foreign nurses into Finnish social and health care work communities. In recent years nurses have increasingly been recruited to Finland, particularly from the Philippines and Spain. Yet there are only a few studies examining the learning experiences and integration of foreign nurses at Finnish workplaces. International recruitment of foreign health care personnel is increasing also in other European countries. The study applies theoretical concepts and perspectives from the situated learning theory, for example, concerning learning trajectories (Wenger 1998). The data were gathered on the MULTI-TRAIN project funded by the Academy of Finland, and consists of 35 interviews with foreign employees (19 Estonian, 7 Filipino, 9 Spanish) working in five social or health care workplaces in Finland and 59 interviews with their Finnish co-workers and superiors. All interviews were analyzed using qualitative content analysis. The results showed that the foreign nurses' socio-cultural learning and integration into Finnish workplaces was challenging due to formal and informal hierarchies. The nurses' previous education or professional experiences were not fully recognised. The Estonian nurses followed mainly insider learning trajectories and those Estonian nurses working as trainees followed inbound trajectories with the prospect of becoming full participants. However, Spanish and Filipino nurses often remained in peripheral positions in their work communities, following peripheral learning trajectories.

How to arouse the interest of all students in the intercultural EFL classroom

Keywords: Cultural diversity in school, Language (Foreign and second), Teaching / instruction, Multicultural education

Presenting Author:Svenja Vieluf, German Institute for International Educational Research (DIPF), Germany; **Co-Author:**Kerstin Göbel, University of Duisburg-Essen, Germany

The present study aims at contributing to our knowledge base on intercultural teaching and learning in EFL classrooms. Taking account of the importance of motivational processes in this context, it examines which kinds of intercultural EFL lessons are evaluated by students as being interesting. Analyses are based on data from a German video-study of EFL teaching with a sample consisting of 93 EFL classrooms with 2,047 students. Videos were rated by experts with regard to three broad dimensions of teaching quality (classroom management, motivational support, and cognitive activation) including 11 sub-dimensions. Associations of these ratings with students' evaluations of the lesson were analyzed by means of two-level regression analysis, including interactions between lesson features and student competencies. Findings suggest that students judged those lessons as being more interesting in which a positive social climate was realized. The quality of classroom management did not appear to be relevant in this context. The role of the lesson's potential for cognitive activation depended on students' prior level of intercultural sensitivity: Students at higher stages of intercultural sensitivity development evaluated lessons in which a reflection of cultural differences was initiated as being more interesting than less reflective lessons, whereas no such links were observed for all other students.

Opportunities and challenges for a STEM interdisciplinary agenda

Keywords: Educational policy, Interdisciplinary, Mathematics, Science education

Presenting Author:Russell Tytler, Deakin University, Australia; **Co-Author:**Vaughan Prain, Deakin University, Australia

There is increasing global concern about the engagement of students with the STEM subjects, and the need for students to acquire the STEM skills necessary for participation in 21st century societies. Calls for new directions in STEM education amount to a re-thinking of the STEM subject disciplines. Drawing on a comparison of STEM participation across 26 countries, and analysis of the discourse around STEM advocacy, this paper investigates the nature of drivers of a strong STEM interdisciplinary agenda, and the implications for school systems and for the STEM disciplinary subjects. An analysis of integrated STEM innovations in Australian schools raises questions about the relationship between authentic interdisciplinary STEM tasks and the nature of STEM subject epistemes. It is argued that the STEM subject disciplines in schools need to remain the basis of STEM learning, but need to be significantly re-thought if they are to answer the call for critical and creative thinking that underpins STEM advocacy.

Between Two Worlds: Identity Construction Among Haredi University Students in Israel

Keywords: Case studies, Culture, Ethnography, Social interaction

Presenting Author:Naomi Perl, Mandel Leadership Institute, Israel

This study investigates the integration of a social minority group in Israel within a mainstream academic institution, exploring processes of integration and identity. It focuses on the case Jewish-Israeli Haredi (ultraorthodox) students who are attending the specialized Haredi Leadership Development Program within a multicultural, secular university and examines the effects of academic studies and culture on Haredi students' construction of complex identities.

The study applies ethnographic tools to explore student experiences of the cultural clash between their community identity and the academic institution. The research seeks to map tensions and challenges that the students face; shifts in student self-concepts over the course of their studies; and students' strategies for coping with the tensions that arise as a

result. Data were collected and triangulated by: Observing classes that were designed especially for students in the program; analyzing students' writing assignments and digital communications at crucial points in their study program; and interviews with the students. Preliminary analysis revealed four main categories of response to tensions between students' conservative religious identity and their emerging academic and civic identity: 1. Compartmentalization, 2. Conversion, 3. Cynicism, 4. Complexity. The final category – complexity – may indicate the emergence of a threshold elite group with the potential to contribute to broader streams of social and civic integration of this minority group within mainstream Israeli society.

Exploring learning of Mathematics among immigrant youths in Vestfold Norway

Keywords: Cultural diversity in school, Learning approaches, Mathematics, Motivation and emotion

Presenting Author: Sikunder Ali, University College of Southeast Norway, Norway

Main purpose of this project is to understand the complexities of youths with different cultural backgrounds and how they are engaged in the processes of forming their futures through their engagements in educational acts (in schools and outside schools) with special focus on their engagement with learning of Mathematics in Norway. In specific, through this research project I wish to : to explore socio-cultural dimensions responsible for the formations of foregrounds of youths (and their engagement with learning of Mathematics) in Norway. to find out the dominant social representations that shape the lifeworld of these immigrants and subsequently their learning of Mathematics to explore the kinds of symbolic resources that immigrant youths or their parents(families) use in order to enhance their educational and subsequently life possibilities in Norwegian society To draw implications for teacher education (especially learning and teaching of Mathematics) from working on the notion of formation of foregrounds of youths in Norwegian society.

Session C 7

30 August 2017 08:30 - 10:00

Pinni B - B4115

Poster Presentation

Instructional Design, Learning and Social Interaction, Teaching and Teacher Education

PO: Instructional Design and Collaborative Learning

Keywords: Cognitive skills, Collaborative Learning, Computer-supported collaborative learning, Cooperative / collaborative learning, Design based research, E-learning / Online learning, Educational Psychology, Game-based learning, Instructional design, Lifelong learning, Mathematics, Peer interaction, Primary education, Secondary education, Social interaction, Student learning, Teacher Effectiveness, Teacher Professional Development, Teaching / instruction

Interest group: SIG 06 - Instructional Design

Chairperson: Bridget Dever, Lehigh University, United States

Students' textbook strategy use: Effects of utilizing textbooks in mathematics class:

Keywords: Collaborative Learning, Educational Psychology, Mathematics, Teaching / instruction

Presenting Author: Mari Fukuda, University of Tokyo, Japan

For self-regulated learning, it is important to use textbooks when an impasse is encountered. However, It has revealed that students do not use textbooks spontaneously and only use superficial information. This study investigated the effects of utilizing mathematics textbooks in class on students' spontaneous use of textbooks and quality of textbooks strategy use. Thirty-seven 8th-grade students were assigned to either an experimental group, in which they were shown which parts in a textbook were beneficial for overcoming misunderstanding and participated in collaborative learning using textbooks, or a control group (regular math instruction). The results showed marginally significant increase of the frequency of spontaneous textbooks use when an impasse in experimental group. The results also revealed that students in the experimental group reread information about concept knowledge to acquire deep understanding. The result suggested that students' quantity and quality of textbooks use was improved through experimental class. In both classes, teacher taught the effectiveness of textbooks use. It implied that instruction of effectiveness is not sufficient and teacher should utilize textbooks in the class to make students internalize textbooks use strategy.

Involving elementary and secondary school students in co-design: A systematic literature review

Keywords: Design based research, Instructional design, Primary education, Secondary education

Presenting Author: Andria Agesilaou, Cyprus University of Technology, Cyprus; **Co-Author:** Eleni Kyza, Cyprus University of Technology, Cyprus

This study presents a systematic review on the merits of co-designing with elementary and secondary school students. Co-design is an approach to designing and developing innovations that are tailored to the end users' preferences and needs, by involving them in various phases of the design process. Despite the fact that children have been reported to have been involved in various studies during the last twenty years, the literature lacks studies which systematically investigate students' involvement in co-design, including how this can be achieved and what benefits and challenges this process entails. The present study seeks to fill that gap by reviewing empirical studies of elementary and secondary school students, conducted during the last twenty years. Out of the sixty-eight retrieved publications, a total of thirty-three studies met the inclusion criteria. This review reports on: research areas and questions that are being pursued in co-design

studies; participation structures and roles; how the co-design process is organized and supported, and what lessons are learnt. Literature review leads to the conclusion that children's participation in co-design activities has the potential to: improve the current instructional practice; develop technologies that meet children's needs and improve children's collaboration, communicational, emotional and cognitive skills. The present review effort bears significant implications to the process of co-designing with children, as it draws on empirical evidence. Such a framework can contribute to the existing literature and provide implications and practical guidelines to instructional researchers and teachers who want to transform the top-down structures of education.

Do dyads increase the chances of coherence formation with multiple representation material?

Keywords: Collaborative Learning, Cooperative / collaborative learning, Peer interaction, Social interaction

Presenting Author:Christopher Williams, University of Ulm, Germany; **Co-Author:**Tina Seufert, University of Ulm, Germany

When learning with multiple representations, coherence formation is considered an essential cognitive process, which involves learners' attempt to make sense of various written and visual learning material. Working in dyads has shown to affect such cognitive processes such as coherence formation, because group learners have to externalize their comprehension processes and come to an overall common, hence coherent shared representation in a process of grounding. The question to be examined is what effects do dyads working with multiple representation learning materials have on the learners' coherence formation process. We assume better performance for recall and comprehension as well as for local and global coherence formation and we also expect longer time-on-task of dyads. In our experiment, 25 participants were either assigned to learn individually or in a dyad. They were asked to think aloud and were also video-recorded. Results showed that there is an effect of learning in dyads with better scores for almost all learning outcomes and longer time-on-task. Based on these initial results, a closer examination of the social interaction processes in dyads based on thinking aloud protocols and video data will be conducted. We will particularly focus on the learners' grounding process and their co-regulatory occurrences.

Fostering Teachers' Ability to Develop Learning Tasks and Establish Learning Tasks in their Lessons

Keywords: Student learning, Teacher Effectiveness, Teacher Professional Development, Teaching / instruction

Presenting Author:Gregor Damnik, TU Dresden, Germany; **Co-Author:**Antje Proske, TU Dresden, Germany; **Co-Author:**Hermann Körndle, TU Dresden, Germany

Effective teaching particularly means that students are engaged in higher-order thinking processes during the lesson. For this purpose, well-developed learning tasks are required. However, teachers are usually not trained to select and create learning tasks that foster students' engagement in higher-order thinking processes. In the present paper, it is investigated whether or not teachers' ability to develop learning tasks and establish learning tasks in a lesson can be fostered by training. In order to analyze teachers' ability, their knowledge as well as their developed tasks were examined and compared with a control group as well as with learning tasks which were created by an expert on task development. The preliminary results indicate that participants' ability to develop learning tasks can effectively be fostered. However, more analyses are required in order to compare participants' tasks with the tasks which were created by the expert.

Game-based learning arrangements in financial education: A design-based research approach

Keywords: Cognitive skills, Design based research, Game-based learning, Instructional design

Presenting Author:Carmela Aprea, Friedrich Schiller University Jena, Germany; **Co-Author:**Julia Schultheis, Friedrich-Schiller-University Jena, Germany; **Co-Author:**Kathleen Stolle, Friedrich-Schiller-University Jena, Germany

One shortcoming of traditional financial education programs is that they are usually centred on the acquisition of factual knowledge, whereas higher order learning goals are mostly omitted. They often also do not sufficiently consider students' motivation, needs and practices. Based on instructional research studies confirming the positive cognitive and motivational effects of game-based learning in other domains, we assume that serious games can offer one possibility to overcome these obstacles. However, these benefits do not come naturally but require careful design of respective learning arrangements (i.e., game design and design of game-related instruction). In addition, none of the studies has addressed financial education. Consequently, the aim of our study is to investigate how game-based learning should be designed in order to be successfully used in financial education. The study employed a design-based research approach. Among others, it included the formative evaluation of four game-based learning arrangements in a secondary school financial education program in Switzerland, which intended to test the practicability of these arrangements and to get a first impression on their effectiveness in terms of learning and motivation. The study supports the claim that well-designed and instructionally integrated serious game can support secondary school financial education, but that sufficient time is needed for students and teachers to familiarise with the requirements of this type of learning. Its findings can be used for further development of the game-based learning arrangements and for experimental research on their effectiveness. They also indicate a need for teacher education/development in this context.

Keywords: Collaborative Learning, Computer-supported collaborative learning, E-learning / Online learning, Lifelong learning

Presenting Author:Elsebeth Korsgaard Sorensen, Aalborg University, Denmark

Abstract Many flexible designs of online learning offer no possibilities for interaction and collaboration among students. Others do so, but have problems - even when interaction occurs – in qualifying a truly collaborative knowledge building dialogue. This paper deals with the question of how to qualify a knowledge building dialogue as a result of providing meta-awareness around the functions of comments in the dialogue. The paper suggests that meta-awareness around this actually contributes to qualifying a knowledge building process in online collaborative learning. The data and methodology used are hermeneutic-phenomenologic content analysis of student-generated knowledge building comments in evolving tapestries of dialogue. Wittgenstein's notion of language games is used as framework to capture and identify the analytical units of the dialogic threads. **Keywords:** collaborative learning, knowledge building, dialogue, meta-communication, reflection, inclusion, digital

Session C 8

30 August 2017 08:30 - 10:00

Main Building E - E222

Poster Presentation

Assessment and Evaluation, Higher Education, Learning and Instructional Technology

PO: Online Measures of Learning Processes

Keywords: Collaborative Learning, E-learning / Online learning, Educational Psychology, Experimental studies, Higher education, Informal learning, Learning analytics, Learning approaches, Learning Technologies, Metacognition, Mixed-method research, Motivation, Problem solving, Reading comprehension, Self-regulation, Student learning, Survey Research, Technology, Video analysis

Interest group: SIG 27 - Online Measures of Learning Processes

Chairperson: Daphne van Weijen, University of Amsterdam, Netherlands

Predicting learners' motivation from their typing behaviour in web based learning environments

Keywords: Learning analytics, Learning Technologies, Metacognition, Self-regulation

Presenting Author:Markus Hörmann, Technical University of Munich (TUM), Germany; **Co-Author:**Maria Bannert, Technical University of Munich (TUM), Germany

Adaptive learning systems support learning by fitting the presented environment to learners' diverse prerequisites. To make reasonable adaptations, valid sources should give us relevant and accurate information about learners. Capturing the typing behaviour while learners work on exercises offers an unobtrusive, non-reactive real-time source that could contribute such information. In a field study, we analysed the typing behaviour of 38 undergraduates who learned about programming with a web-based environment for 60 minutes. Typing behaviour was recorded while writing program-code (six coding-tasks) and regular text (recall-task). We linked different indices of typing behaviour (e.g. frequency of corrections or pauses) with measures of motivational states. Initial motivation was assessed before learning using the Questionnaire of Current Motivation (QCM, Rheinberg, Vollmeyer, & Burns, 2001) and current motivational state before each of the typing tasks using a short measure of three items. Results reveal significant correlations between different typing-indices and the motivational measures. Correlations were positive for typing in recall-tasks and initial motivation ($r = .374$). In addition, negative correlations were found for writing program-code and current motivation ($r = -.540$ to $-.354$). This indicates that typing behaviour has to be interpreted task-specifically. Following the indications of this study, mining the keyboard-data could be used to assess different learner states and hence to offer a range of possibilities to support learners in future adaptive learning environments.

The Relationships between Exploration and Learning Strategies in a Problem-Solving Environment

Keywords: Higher education, Learning approaches, Motivation, Problem solving

Presenting Author:Gyongyver Molnar, University of Szeged, Hungary; **Co-Author:**Eniko Bus, University of Szeged, Hungary; **Co-Author:**Erzsébet Korom, University of Szeged, MTA-SZTE Science Education Research Group, Hungary; **Co-Author:**Benő Csapó, University of Szeged, Hungary

In this paper, we examined the relationships between exploration strategies and different learning styles in a problem-solving environment. The aims of the study were to determine (1) qualitatively different exploration strategies by analysing log files and investigating the number of latent profiles into which first-year university students could be meaningfully divided and (2) the relationships between the quality and effectiveness of the exploration strategy used and different learning styles, including different learning strategies (memorization, elaboration and control), and levels of mastery motivation (task persistence, preference for challenge, task-related pleasure, self-efficacy, task absorption and motivation level during testing). The samples for the study were drawn from first-year university students ($N=1729$, $M_{age}=19.5$, $sd_{age}=1.87$). The instruments were a complex problem-solving test (20 items) and a learning style questionnaire (45 items, including questions on learning strategies and mastery motivation). Latent class analyses, ANOVA, factor analyses and bivariate correlations were used for the analyses. The reliability of the instruments is high ($\alpha_{CPS}=.90$;

$\alpha_{\text{learning_style}}=.92$). Four qualitatively different class profiles were identified: proficient explorers (65.6%), low-performing explorers (13.7%), rapid learners (9.9%) and non-persistent explorers (10.8%). Students who often use memorization strategies in their learning proved to be less developed explorers and problem-solvers ($r=-.20$, p

Electrodermal Activity Arousal throughout a Full Physics Course: A Clue for Learning Regulation?

Keywords: Collaborative Learning, Learning analytics, Self-regulation, Technology

Presenting Author:Héctor Javier Pijera Díaz, University of Oulu, Finland; **Co-Author:**Paul A. Kirschner, Open University of the Netherlands, Netherlands; **Co-Author:**Sanna Järvelä, University of Oulu, Finland; **Co-Author:**Hendrik Drachler, Open University of the Netherlands, Netherlands

Self-regulated learning (SRL) research has been searching for data which is complementary to self-reports and simple digital traces, techniques recognized for their limitations in reliability and representative sufficiency. One approach gaining attention is physiological data. Electrodermal activity (EDA) is a physiological response indicating cognitive, affective and/or physical arousal (i.e., states of activation such as stress or anxiety). Peaks in EDA might indicate perceived challenges which are known to invite self-regulation activities. Although extensively used in psychophysiology, studies have rarely focused on EDA in authentic learning situations. This paper reports on one student (of 12) who was tracked in the 19 collaborative learning sessions of a regular high school advanced physics course, known to be cognitively demanding. EDA peaks showing arousal were detected. The number of peaks ranged from 12 to 337 per session and the amplitudes from 1.78 to 11.13 μ Siemens across sessions. Lower session values might indicate boredom or lack of interest while higher ones might show stress, engagement and/or high cognitive/emotional load in the respective sessions. These results point to a potential for teacher intervention and a more balanced instruction design across lessons.

Reading on Paper or on Tablet: An Eye-tracking Study

Keywords: Educational Psychology, Experimental studies, Learning Technologies, Reading comprehension

Presenting Author:Pablo Delgado Herrera, University of Valencia, Spain; **Co-Author:**Ladislao Salmeron, University of Valencia, Spain

While a wide-spread assumption considers that reading on digital mediums induces shallower processing than on paper (e.g. Ackerman & Lauterman, 2012), previous literature reveals inconsistent results regarding the effects of medium on text comprehension (e.g., Kretschmar et al., 2013). As a way to understand such effects, we analysed the on-line reading processes on the different mediums. We tested two complementary hypotheses: (1) Strategic hypothesis: Participants will show less strategic reading on tablet than on paper, specially when reading the structurally relevant parts of the texts, e.g. titles (Hyönä, Lorch, & Kaakinen, 2002); and (2) Easiness processing hypothesis: Participants will show a higher global reading rate on tablet than on paper (e.g. shorter fixation times, less number of fixations). In a within-subject study, 35 undergraduates read three expository texts on paper and three on tablet, while their eye-movements were tracked. For each text, they rated their expected comprehension scores and answered a set of multiple-choice comprehension questions. Even though eye-tracking data revealed no differences when looking at participants' reading of the text paragraphs, results indicated that participants' first-pass fixation time, first-pass number of fixations and lookback fixations on texts' titles were longer and higher when reading on paper than on tablet. We also found longer first-pass fixation duration when participants read the last sentence of each paragraph on paper. This pattern of results supports the strategic hypothesis. Notwithstanding, no differences between mediums were found in the scores in comprehension questions or in the metacognitive judgements.

Cue detection of emergency care clinicians during a simulation based critical incident

Keywords: Informal learning, Mixed-method research, Problem solving, Video analysis

Presenting Author:Anneke van der Niet, Maastricht University, Netherlands; **Co-Author:**Ellen Kok, Utrecht University, Netherlands; **Co-Author:**Jeroen Van Merriënboer, Maastricht University, Netherlands; **Co-Author:**Anique de Bruin, Maastricht University, Netherlands

The aim of this study is to examine the detection of relevant information by expert and competent non-expert emergency care clinicians during two simulated diagnostic scenarios. One scenario involves a situation that all clinicians encounter frequently and can be executed more or less routinely, while the other scenario will involve a critical incident that requires a more effortful mode of acting. In both scenarios, the information acquisition pattern of experts and competent non-experts will be examined using eye tracking, video observation and cued retrospective reporting. It is expected that during the routine scenario both groups of clinicians will display quite similar gaze patterns, due to the experience of both groups with this particular situation. Also, execution of the tasks will show similarities. However, during the scenario involving a critical incident, it is hypothesized that experts will show a different gaze pattern compared to the competent non-experts. Experts most likely will direct their attention to more relevant cues that will guide their actions.

Online learning students in Russia: who are they?

Keywords: E-learning / Online learning, Higher education, Student learning, Survey Research

Presenting Author:Polina Pekker, Lomonosov Moscow State University, Russian Federation; **Co-Author:**Lyudmila Popova, Lomonosov Moscow State University, Russian Federation

Massive open online courses (MOOC) have become popular around the world because they provide access to education to students from different social groups. Russian National platform «Open education» started to work in September 2015 and eight leading Russian universities downloaded 47 courses (107 courses in October 2016). We analyzed the reasons, why

students choose online-course and also identified average characteristics of Russian online students (Case of «Modern environmental problems and sustainable development»). This study was based on quantitative research, a freewill survey was used (156 respondents (59% of students who finished the online-course in 2015)). The results of the study showed that the majority of MOOC students were 21-25 years old (45%) and 26-30 years old (19%). The respondents were mostly women (75%) and significantly less men (25%). MOOC students were students from Russian universities (59%). Their purpose of learning was to get the course certificate and to credit course at their university. The course choice was determined by several factors: a professional interest, the ability to study online, the ability to take a course with professor from different university and to understand the actual problems. 28% of online students were employees and they trained to enhance their knowledge, despite the fact that they had no free time. The results of research showed that MOOC students were mainly from Moscow region (54%), while online learning provides equal opportunities to all residents from different social groups from any Russian region and all over the world.

Session C 9

30 August 2017 08:30 - 10:00

Pinni B - B4117

Poster Presentation

Teaching and Teacher Education

PO: Teaching and Pre-service Teacher Education

Keywords: Assessment methods and tools, At-risk students, Competencies, Literacy, Mixed-method research, Pre-service teacher education, Primary education, Qualitative methods, Quantitative methods, Special education, Teacher Professional Development, Teaching / instruction, Teaching approaches, Technology, Video analysis

Interest group: SIG 11 - Teaching and Teacher Education

Chairperson: Omid Noroozi, Iran

Estonian pre-service teachers' evaluations on their knowledge areas according TPACK framework

Keywords: Competencies, Pre-service teacher education, Quantitative methods, Technology

Presenting Author: Piret Luik, University of Tartu, Estonia; **Co-Author:** Merle Taimalu, University of Tartu, Estonia

In this presentation we discuss about the pre-service teachers evaluations on their knowledge areas according to TPACK framework, which integrates content, pedagogy and technology. Longitudinal study was carried out in Estonia. The sample of this study consisted of 381 first year pre-service teachers, who filled in questionnaires. The second data collection was when the pre-service teachers started their second year studies. 123 students answered twice. CFA reached on three-factor model: integration of technology, pedagogy and content. Data was analyzed using MANOVA and t-test. Both the TPACK framework and this study help to develop teacher training curricula and indicates, that pedagogical knowledge needs to be enhanced in teacher education in Estonia.

Teachers' Professional vision and its effect on their classroom management

Keywords: Mixed-method research, Qualitative methods, Teacher Professional Development, Video analysis

Presenting Author: Saskia Brand-Gruwel, Open University of the Netherlands, Netherlands; **Co-Author:** Johan van Strien, Open University of the Netherlands, Netherlands; **Co-Author:** Sharisse van Driel, Open University, Netherlands; **Co-Author:** Charlotte Wolff, Open University, Netherlands; **Co-Author:** Halszka Maria Jarodzka, Open University of the Netherlands, Netherlands

Classroom management is challenging for many teachers, yet crucial for pupils' learning. Important for classroom management is teachers' professional vision, including noticing/seeing and interpreting of relevant events. Previous studies showed that student and expert teachers differ largely in their professional vision with respect to classroom management. However, in these studies, teachers' professional vision was investigated by watching videos of *other* teachers; Thus far, little is known about teachers' professional vision with respect to their *own* classroom management and how this relates to their level of teaching expertise. This proposal describes the set-up and to-be-collected data (i.e., a data paper) of a research project which seeks to investigate how the professional vision of teachers-in-training differs from beginning and expert teachers, and what is the longitudinal development of in-training-teachers' professional vision. Four studies will be conducted among 60 teachers (20 teachers-in-training; 20 beginning; 20 experienced teachers): two in teachers' actual classrooms, in which teachers conduct a 1-hour lesson while wearing mobile eye-track glasses After the lesson, teachers will select four events from their recordings that they consider as having been crucial for their classroom management. During retrospective verbal reports teachers will watch each event and report on what they see and why it is relevant for classroom management. Two other studies will use video recordings of other teachers' teaching. Eye-tracking data, verbal data, video recordings, and teacher characteristics will be collected and analyzed. Together, these studies will provide more insight into the development of teachers' professional vision.

Study about School Career: Generation 2012-2016

Keywords: Assessment methods and tools, Competencies, Pre-service teacher education, Primary education

Presenting Author: Edith Arévalo Vázquez, Escuela Normal Miguel F. Martínez, Mexico; **Co-Author:** Hilda Alicia Guzmán

Elizondo, Secretaría de Educación Pública, Mexico; **Co-Author:**Nancy Bernardina Moya González, Secretaría de Educación Pública, Mexico; **Co-Author:**José Luis Domínguez Aguirre, Escuela de Graduados de la Escuela Normal Superior "Profr. Moisés Sáenz Garza", Mexico

In the present study we explore the school career of the first generation of graduated from the Study Plan 2012 implemented in Mexico for the Normal Schools of the Country. The generation is made up by 268 students of the Bachelor Degree in Primary Education and of 96 students of the Bachelor Degree in Pre-school education. The instruments used for this analysis were a public-opinion poll applied to teachers, documentary review on the academic career of the graduated students and statistical information on their insertion to the professional educational service. According to the statistical results on the academic behavior is observed that the initial educational formation that the students received during his professional career is coherent with the expected profile of the graduate, due to 95.77 % of the graduated students is incorporated in the Professional Educational Service, getting a job at basic education by means of examination of opposition. This research takes part of an investigation about the evaluation of the Curriculum 2012, in its first generation. The results will offer useful information for the taking of decisions and the strengthening of the curriculum. Key words: Initial educational formation, school career, curriculum.

Inclusive teamteaching - A theoretical review

Keywords: At-risk students, Competencies, Special education, Teaching approaches

Presenting Author:Teija Koskela, University of Eastern Finland, Finland; **Co-Author:**Hanna-Maija Sinkkonen, University of Tampere, Finland, Finland

The purpose in this theoretical paper is to create a framework to develop further the idea of teamteaching for more multiprofessional meaning in inclusive context. The national core curriculum in Finland underlines multiprofessional co-operation and listening to students. The issue is current in teacher education. Making full participation possible for all students is the meaning of our reconsideration of the concept of teamteaching. Especially the role of class assistant seems to be crucial. When teachers organize their work listening to students own voice is important. In everyday school work the assistant is the person who has tight relation to students considering their special educational needs. On that account, there is need to create more dialogical interaction between teachers and assistants. In this paper we transform the model of prequisites for inclusive teamteaching as a tool of meeting all students' educational needs. Strengthening the position of school assistants as a part of teamteaching is an issue we scrutinize in our theoretical review. We focus on working methods which best enable utilizing assistants knowledge of students' abilities and needs in teamteaching. We present a model which includes collaborative approach to planning, awareness of guidance, effective use of learning methods and teaching arrangements.

Teachers' subject-specific language awareness in technical vocational education

Keywords: Literacy, Qualitative methods, Teaching / instruction, Technology

Presenting Author:Elly Wildeman, Fontys University of Applied Sciences, Netherlands; **Co-Author:**Maaïke Koopman, Eindhoven University of Technology, Netherlands; **Co-Author:**Douwe Beijaard, Eindhoven University of Technology, Netherlands

Teachers' Language Awareness (TLA) is essential for improving students' subject-specific language development. This study focuses on the development of instruments to investigate Teachers' Subject-specific Language Awareness (TSLA) in technical vocational education. For this purpose, interview data were collected about teachers' general knowledge and beliefs about TLA, their learning objectives of lessons they taught, their interactions with students through classroom observations, and video-stimulated interview data to capture their knowledge underlying fragments of their observed teaching behaviour. Based on these data sources, portraits were constructed to see if these data, in their combination, could provide a rich picture of technical teachers' TSLA in terms of their knowledge, beliefs and behaviour concerning language development of their students when teaching their subject. The study concludes that these portraits provide a comprehensive and coherent insight into technical teachers' Subject-specific Language Awareness. The instruments made it also possible to discriminate among teachers' level of TLA. Teachers appeared to differ in their knowledge about relevant subject-specific language skills and functions, in their responsibility concerning their students' language development and in the way their instructional behaviour supports student subject-specific language learning. This indicates that, in their combination, the data sources underlying the portraits are not only comprehensive and coherent, but that they are also detailed in the picture they provide.

Introducing an Instrument for Measuring Academic Integration in Pre-Service Teachers

Keywords: Assessment methods and tools, At-risk students, Pre-service teacher education, Teacher Professional Development

Presenting Author:Sandra Dietrich, University of Leipzig, Germany

Low retention rates in teacher training for secondary schools are a challenge of the German educational system. Finishing rates are as low as 50% and even lower in the high demand STEM-subjects. Failed academic integration could be a predictor for drop out from teacher education. Hence, this presentation aims at introducing and discussion a new instrument for measuring academic integration in pre-service teachers.

Academic integration is defined by the extend to which a student engages in social interactions with fellow students (Social

Belonging) and whether she is putting effort into education related activities (Academic Dedication). The scales were tested for factorial validity and reliability on a sample of 140 students (female =103; mean age = 21 (SD = 3.54)) in an online survey. Unfortunately, only the scale Social Belonging showed adequate reliability and could be used for further preliminary analysis. For the scale Academic Determination further adjustments are needed, for one increasing the number of items. Further directions and ways to improve the scales will be discussed.

Session C 10

30 August 2017 08:30 - 10:00

Pinni B - B3110

Poster Presentation

Motivational, Social and Affective Processes

PO: Motivation and Achievement

Keywords: Achievement, Arts, Assessment methods and tools, Attitudes and beliefs, Conceptual change, Developmental processes, Emotion and affect, Goal orientation, Intelligence, Mathematics, Motivation, Motivation and emotion, Parental involvement in learning, Self-regulation, Student learning

Interest group: SIG 08 - Motivation and Emotion

Chairperson: Barbara Roosken, Fontys University of Applied Sciences, Netherlands

The place for music education among school subjects in students' views

Keywords: Arts, Assessment methods and tools, Attitudes and beliefs, Emotion and affect

Presenting Author:Tünde Pintér, University of Szeged, Hungary; **Co-Author:**Csaba Csíkos, University of Szeged, Hungary

The aim of this study was to assess the recent prestige of music education among students in Hungary, as well as to reveal their opinion about the quality of music lessons. Data were obtained from questionnaires filled out by 501 elementary school students aged 7–14 from one school. Questionnaires focused on the attitudes and satisfaction of students regarding school subjects. It can be concluded from these results that music is rarely selected by students as their favourite school subject. Furthermore, younger students reported more positive attitude towards music, but with increasing age their attitudes decreased. Many students complained about the unanimity of music lessons, and they considered the quality of teaching inappropriate.

Goal theory and impostor phenomenon during surgery residency: Does self-doubt make me a fraud?

Keywords: Achievement, Goal orientation, Motivation, Self-regulation

Presenting Author:Michael Dempsey, Boston University, United States; **Co-Author:**Douglas Kauffman, Boston University, United States

Impostor phenomenon characterizes persons who feel like intellectual frauds, and for whom achievement tasks can elicit anxiety and emotional distress. Empirical research related to the phenomenon is scant in Graduate Medical Education, though it is often referenced indirectly in studies of personality traits across diverse medical fields. We sought to better understand how residents experience impostor phenomenon during residency training. We conducted in-depth qualitative interviews with 16 resident physicians from two tertiary-care academic medical institutions. Participants were asked to reflect on team leadership experiences in a trauma setting, which we anticipated would elicit rich descriptions of cognitive and emotional behavior. An interdisciplinary team subjected transcriptions to phenomenological thematic analysis through an iterative, rigorous process. Analysis revealed three major themes related to impostor phenomenon in residents' experiences with team leadership: Transition Events, Achievement-Related Competence and Coping Strategies. A modified member-checking strategy confirmed these themes were consistent with surgical residents' experiences.

Implicit beliefs about giftedness and intelligence among Finnish high achieving students

Keywords: Achievement, Conceptual change, Intelligence, Motivation

Presenting Author:Elina Kuusisto, University of Helsinki, Finland; **Co-Author:**Sonja Laine, University of Helsinki, Finland; **Co-Author:**Kirsi Tirri, University of Helsinki, Finland

This paper presents the results of a study in which Finnish high achieving upper secondary school students' (N=151) implicit beliefs about giftedness and intelligence were examined. The theoretical background of the study lies in Carol Dweck's theory of implicit beliefs, and accordingly the study utilized Dweck's instrument. The results indicated that the students saw intelligence as malleable ($M=4.24$, $SD=0.96$), but giftedness more as fixed ($M=3.21$, $SD=1.31$). The study identified potentially vulnerable group of high achieving students, having fixed orientation toward both intelligence and giftedness. One fourth of the students had this orientation and might be at risk of avoidance of challenges and even underachievement. The research highlights the importance of future research about how implicit beliefs affect students learning success during challenging upper secondary school years.

Effects of a Gender Stereotyped Math TV Show on Girls' and Boys' Math Achievement and Attitudes

Keywords: Achievement, Attitudes and beliefs, Mathematics, Motivation

Presenting Author:Eike Wille, University of Tübingen, Germany; **Co-Author:**Hanna Gaspard, University of Tübingen,

Germany; **Co-Author:**Kerstin Oschatz, University of Tübingen, Germany; **Co-Author:**Benjamin Nagengast, Eberhard Karls Universität Tübingen, Germany; **Co-Author:**Ulrich Trautwein, University of Tübingen, Germany

Women are underrepresented in mathematically-intensive STEM domains, which can be linked to early emerging gender differences in math motivation. Based on expectancy-value theory, there is ample research on how socialization influences girls' and boys' math motivation differently (c.f., Wigfield et al., 2015). Furthermore, there is extensive work on stereotype threats, indicating that negative math stereotypes affect females' math perceptions, motivation, and achievement (c.f., Steele et al., 2002). Television shows are a central factor in children's socialization, which contain also specific gender stereotypes. However, it is unclear to what extent television shows influence children's motivation and achievement in math. We therefore conducted an experimental study with a pretest-posttest control-group design to investigate differential effects of a gender stereotyped math television show on girls' and boys' math achievement, motivation and attitude as well as their stereotype endorsement. To this end, 335 fifth graders watched a television show about math either with or without an explicit gender-stereotyped section. We specified multiple regression analyses and tested main effects of gender and experimental condition as well as their interaction on all outcomes. Results indicate that watching a gender stereotyped television show affected girls' attitudes in math as well as their stereotype endorsement negatively. Positive effects were found on boys' attitudes in mathematics. Results offer first insights on how television shows influence girls' and boys' motivation and achievement for math, and how they may constitute one contributing factor to gender differences in the STEM fields.

The nature of students' pride and its interplay with motivation and learning

Keywords: Achievement, Parental involvement in learning, Student learning, Motivation and emotion

Presenting Author:Kerstin Helker, RWTH Aachen University, Germany; **Co-Author:**Judith Fraenken, RWTH Aachen University, Germany; **Co-Author:**Marold Wosnitza, RWTH Aachen University, Germany

Pride as a positive activating emotion is thought to promote both extrinsic and intrinsic motivation. Prior research has shown that students' pride in the school context mainly focuses on task- and school related topics. Based on this, the present study focuses on the interplay between students' pride and motivation and the effect on academic performance. Furthermore, it is examined if there are different types of students with regard to their pride and if there are further differences between them.

Pride statements of 42 school students were collected over a whole school year (=40 weeks) and were coded into an emerging category system. Additionally, students filled a survey about inter alia their responsibility ascriptions, motivation, test anxiety, sense of competence and whether they felt they were fulfilling their parents' expectations. In another survey, students' parents were asked inter alia to rate their child's ability and parents' expectations for their child.

Results show that there are two types of students in the light of what they state to be proud of. One of them focuses more on outcomes and achievement and furthermore feels competent and good in math. Additionally the parents of this type of student expect their children to be good in math and find parent involvement important. In contrast, the other type of students focuses more on the learning process. Those students have to try hard to get good grades in math and have bigger test anxiety. Their parents also think that their children have to exert themselves in math.

Dual trajectory of academic motivation and perceived competence: a longitudinal study

Keywords: Achievement, Attitudes and beliefs, Developmental processes, Motivation

Presenting Author:Nadia Leroy, Université Grenoble Alpes, France

The aim of this study is twofold: exploring the evolution of the different components of motivation during junior high school and analyzing the relationships between motivational trajectories and students' perceived competence trajectories in a dual model.

Based on the recent development of group-based trajectory model (Jones & Nagin, 2007; Jones, Nagin & Roeder, 2001 ; Nagin, 1999 ; Nagin & Tremblay, 2001), we address the role of perceived competence trajectories in motivational trajectories variations.

First, we will examine how the different kinds of academic motivation in mathematics fluctuate during junior high school. Second, we explore whether perceived competence trajectories might be influential for the motivation trajectories. In other words, the objective consist of (a) identifying trajectories of motivational profiles using a group-based approach (b) studying the relationship between the probability membership to each profile and students' perceived competence (c) combining the patterns of change in motivation and in perceived competence within a dual model.

The analysis will address several questions:

- Might students be autonomously motivated even if they report low level of perceived competence? and with which probability ?
- Might students display low level of autonomous motivation even if they report high level of perceived competence ?
- Might students simultaneously report high level of autonomous motivation while having low level of perceived

competence?

Session C 11

30 August 2017 08:30 - 10:00

Pinni B - B3109

Poster Presentation

Cognitive Science, Motivational, Social and Affective Processes

PO: Neuroscience and Motivation

Keywords: Cognitive skills, Collaborative Learning, Conceptual change, Educational Psychology, Educational Technology, Emotion and affect, Experimental studies, Higher education, Learning Technologies, Mathematics, Mixed-method research, Motivation and emotion, Neuroscience, Numeracy, Professions and applied sciences, Quantitative methods, Science education

Interest group: SIG 08 - Motivation and Emotion, SIG 22 - Neuroscience and Education

Chairperson: Rebecca Edwards, University of Victoria, Canada

Analysis of Motivational and Cognitive Processes in Collaborative Learning

Keywords: Collaborative Learning, Educational Psychology, Mixed-method research, Motivation and emotion

Presenting Author:Etsuko Tanaka, Nagoya University, Japan; **Co-Author:**Emmanuel Manalo, Kyoto University, Japan

Previous studies point to the influence of collaborative learning on motivation and cognition but the processes involved remain to be fully elucidated. The purpose of this study was to examine the changing process of interest and its relationship with cognition by analyzing participants' change in interest and self-efficacy every 5 minutes, and their speech and behavior during collaborative learning. Twelve pairs of 24 undergraduate and graduate school students participated in the experiment. They learned about JavaScript by reading a textbook individually for 25 minutes and then were asked to solve an applied problem collaboratively for another 25 minutes. During collaborative learning, students evaluated their interest and self-efficacy pertaining to the applied problem every five minutes, and their speech and behavior were recorded. Collected data were analyzed qualitatively. The results indicate that interest is enhanced by sharing thoughts and understanding with each other at the beginning of collaborative learning. When they are stuck and their self-efficacy decreases, conversation focusing not only on superficial procedures for generating an answer but understanding of each meaning of protocol leads to new awareness and maintenance of interest levels. By analyzing change of motivation during learning, and speech and behavior which reflect their cognition together, we can gain insight about motivational and cognitive processes involved in collaborative learning.

Examining Learners' Physiological Activation during an Interaction with a Mobile AR App for Learning

Keywords: Educational Technology, Emotion and affect, Learning Technologies, Motivation and emotion

Presenting Author:Susanne Lajoie, McGill University, Canada; **Co-Author:**Jason Harley, University of Alberta, Canada; **Co-Author:**Amanda Jarrell, McGill University, Canada; **Co-Author:**Tara Tressel, McGill University, Canada; **Co-Author:**Laura Pipe, McGill University, Canada; **Co-Author:**Chayse Haldane, The University of Alberta, Canada; **Co-Author:**Eric Poitras, University of Utah, United States

Understanding the physiological component of emotion and its relationship with learning is critical, but also challenging given the diversity of available approaches to measure it and the paucity of guidance from theories of emotion regarding physiological-specific assumptions. The authors contribute to addressing this gap by examining the relationship between learners' physiological activation and their random assignment to one of two different learning conditions during an interaction with a mobile augmented reality application for history learning. Physiological activation was captured using a bracelet that recorded learners' electrodermal activation (EDA). EDA data was processed and analyzed from a subsample of six out of 44 participants collected in an ongoing study. The two conditions varied based on the nature of the historical reasoning prompts provided by a human guide to users of the mobile AR application. The control condition provided shallow, comparison-based prompts while the extended prompt and feedback (EPF) condition drew on a broader and deeper set of historical reasoning prompts to foster more active learning, cognitive engagement, and deeper levels of historical reasoning. Preliminary results revealed that learners tended, across conditions, to experience moderately elevated mean levels of physiological activation during their interaction with the mobile AR app. Self-reported emotion data revealed that mean EDA levels likely reflected instances of positively-valenced activation (e.g., enjoyment) rather than negatively-valenced activation (e.g., frustration). These findings provide converging support that the mobile AR app and guide interaction fostered positive emotions as well learning about history.

The role of inhibitory control in learning counterintuitive science and math concepts in adolescence

Keywords: Cognitive skills, Conceptual change, Mathematics, Science education

Presenting Author:Annie Brookman-Byrne, Birkbeck, University of London, United Kingdom; **Co-Author:**Andy Tolmie, UCL Institute of Education, United Kingdom; **Co-Author:**Denis Mareschal, Birkbeck, University of London, United Kingdom; **Co-Author:**Iroise Dumontheil, Birkbeck, University of London, United Kingdom

Science and math learning requires the integration of new evidence about the world into one's existing theories. According

to the traditional view of learning, naïve theories are replaced in the face of new evidence. However, recent behavioural and neuroimaging research suggests that old theories remain even when new ones are learnt. When correctly solving counterintuitive science problems, expert scientists recruit the lateral prefrontal cortex and anterior cingulate cortex. These areas of the brain are associated with conflict monitoring, error detection and inhibitory control, the ability to stop prepotent response. Inhibitory control therefore may enable the suppression of theories in the processing of counterintuitive material. Individual differences studies suggest that inhibitory control is associated with reasoning about counterintuitive concepts in adolescence, but the relation between inhibitory control and *learning* new counterintuitive concepts is largely unknown. Four classes, comprising 96 adolescents (12-14 years old) were given measures of response and semantic inhibition. Counterintuitive concept understanding was measured one week before, one week after, and one month after a lesson on a mathematical or scientific counterintuitive concept. Analyses focused on the extent to which individuals' inhibitory control performance predicted their improvement on the counterintuitive concept test following the lesson. A better understanding of how inhibitory control affects learning of counterintuitive concepts may be informative for teaching practices.

Associations between digits are fundamental for mathematical ability

Keywords: Cognitive skills, Experimental studies, Mathematics, Numeracy

Presenting Author:Bert Reynvoet, KU Leuven, Belgium; **Co-Author:**Helene Vos, KU LEUVEN, Belgium; **Co-Author:**Delphine Sasanguie, KU LEUVEN, Belgium; **Co-Author:**Tom Heyman, KU LEUVEN, Belgium; **Co-Author:**Wim Gevers, ULB Brussels, Belgium

Over the past few years there has been a growing interest in the relation between mathematical ability and the ability to process order information. Several studies have shown that digit order processing is strongly related to individual differences in mathematical ability. Currently, different mechanisms underlying the processing of ordered sequences are proposed. One explanation is that ordered sequences are processed by a serial scanning mechanism, suggesting that participants scan the counting sequence item by item. An alternative explanation assumes that ordered sequences are processed through associations between the items. The aim of this study was to disentangle these explanations by looking at the processing of ascending sequences (e.g. 1-2-3) and descending sequences (e.g. 3-2-1) separately. Participants had to indicate whether a sequence of three digits was presented in the correct order or not. Ascending, descending and non-ordered trials were presented. Additionally, half of the trials for each direction were small distance sequences, the other half were large distance sequences. Results revealed reversed distance effects (i.e. better performance on small distance trials than large distance trials) for ordered sequences. Ascending sequences elicited faster performance and stronger reversed distance effects than descending sequences, suggesting that associative mechanisms underlie order processing. To further verify whether associations underlie order processing, it was investigated whether performance on the different trials of the order judgement task was predicted by word association norms. These word associations norms predicted the performance on the order judgement task confirming that associations underlie digit order processing.

An EEG study of cognitive load during arithmetic calculation aided by brackets or visual spacing

Keywords: Educational Psychology, Experimental studies, Mathematics, Neuroscience

Presenting Author:David Maximiliano Gomez Rojas, Universidad de Chile, Chile; **Co-Author:**Arturo Perez, Universidad de Chile, Chile; **Co-Author:**Alvaro Rivera-Rei, Universidad Diego Portales, Chile; **Co-Author:**Pablo Dartnell, Universidad de Chile, Chile

Research has shown that the visual display used to present mathematical expressions affects how these expressions are cognitively processed. In particular, arithmetic precedence rules are slower to be applied, or more likely to be misapplied, to mixed addition/multiplication arithmetic expressions (e.g. $2+3 \times 5$) whose symbol spacing imposes tighter visual packing of addition (e.g. $2+3 \times 5$) rather than multiplication (e.g. $2 + 3 \times 5$). Symbol spacing has also proved to play a role in children's responses to a mixed-operation arithmetic test, particularly in children who do not apply precedence rules correctly. From an educational stand, symbol spacing might thus provide a way to scaffold the learning of arithmetic precedence in elementary school. Still, it remains to be proved whether this is a more desirable or effective way to achieve this goal than others that have been proposed, such as the use of mathematically-unnecessary brackets (e.g. $2+[3 \times 5]$). We thus conducted an electroencephalography (EEG) study to investigate the cognitive load induced by these different presentation formats in arithmetic calculation by Engineering undergrads. In this poster, we will present preliminary data on event-related potentials and neural oscillations contrasting these presentation formats.

The neuroscience of motor-expertise in real-world tasks

Keywords: Higher education, Neuroscience, Professions and applied sciences, Quantitative methods

Presenting Author:Ellen Kok, Utrecht University, Netherlands; **Co-Author:**Anique de Bruin, Maastricht University, Netherlands

Expertise research has led to increased insights into the mechanisms causing expert performance. Recently, neuroscience methods such as fMRI have enabled us to investigate the brain correlates of expert performance. Expertise research has a tradition of using ecologically valid domain-specific tasks. This poses a challenge for neuroscience research, in particular when it comes to studying motor expertise. How can motor expertise be investigated when a participant must lie still in an fMRI scanner? In this presentation, we provide an overview of three broad experimental paradigms for investigating the neuroscience of motor expertise in real-world tasks in an fMRI scanner: action observation, motor imagery and task execution. Action observation paradigms require participants to watch video-clips of domain-specific movements. In some

of these tasks, participants are also required to anticipate the direction of motion. These studies typically find increased activity in the action-observation network with increased expertise. Motor imagery paradigms depart from the finding that motor imagery and motor execution recruit (partly) the same networks. Studies on motor imagery find increased activity with increased expertise in motor regions such as the premotor cortex. Finally, several studies managed to have their participants actually execute a domain-specific task. These studies typically look at neural efficiency, and find decreased activity in areas such as the primary motor cortex, as well as control regions such as the basal ganglia. Together, these studies provide insight into the brain correlates of expert performance in real-world motor tasks.

Session C 12

30 August 2017 08:30 - 10:00

Main Building E - E350

Poster Presentation

Assessment and Evaluation, Culture, Morality, Religion and Education, Educational Policy and Systems, Learning and Instructional Technology, Motivational, Social and Affective Processes

PO: Moral and Democratic Education

Keywords: Attitudes and beliefs, Citizenship education, Cognitive development, Conceptual change, Content analysis, Developmental processes, Educational policy, Educational Technology, Morality, Primary education, Qualitative methods, Quantitative methods, Reflection, Secondary education, Social development, Social interaction, Teacher Professional Development, Teaching / instruction, Teaching approaches, Technology, Values education, Writing / Literacy

Interest group: SIG 13 - Moral and Democratic Education

Chairperson: Hanna Jarvenoja, University of Oulu, Finland

Integrating Impulses and Dilemma Stories for Values Education in STEM Context

Keywords: Qualitative methods, Reflection, Teaching approaches, Values education

Presenting Author:Heinz Mandl, Ludwig-Maximilians-Universität (LMU), Germany; **Co-Author:**Katrin Wallner, Ludwig-Maximilians-University Munich, Germany; **Co-Author:**Birgitta Kopp, Ludwig-Maximilians-University, Germany

Sensitizing children for values is a main aim of education. Specifically, in school education values have a long tradition in order to guarantee a justified and peaceful living together. In STEM context, values receive a more specified focus as decisions in natural scientific subjects have not only effects on individuals, but also on society and on earth. To foster the sensitization of values in STEM context, we didactically enriched experimental material for students in the 4th grade of elementary school with impulses and dilemma stories. We evaluated the realization of two experiments in STEM with impulses and dilemmas in a field study using qualitative observation and interview data. Overall, results indicated an effective integration of impulses and dilemma stories in order to foster values education. In more detail, results showed that a combination of impulses and dilemma stories was effective for students to take the perspective of the protagonists in the dilemma story and discuss diverse opinions showing environmental consciousness or self-activity. Furthermore group discussion in contrast to class discussion showed better results in reflecting on problem solutions integrating value issues of e.g. environmental consciousness. And the students' activity is of importance to stimulate reflection on values. Thus, the study gives first indications that impulses and dilemma stories are adequate didactical methods in order to foster values education in STEM context.

The importance of a transitional phase from limited to full installation of ICT in classrooms

Keywords: Educational Technology, Primary education, Teacher Professional Development, Teaching / instruction

Presenting Author:Taku Sugimoto, Aoyama Gakuin University, Japan

This study is an in-depth analysis of the process of implementing interactive white boards and tablet PCs at a Japanese primary school, focusing on the nature of institutional efforts and teachers' learning. Analyses are made on three-year data from classroom observations, teacher interviews, teacher and student surveys, and participatory observations of teachers' workshops. It is found that a gradual process from limited installation to full adoption, during which teachers made various attempts and shared ideas and practices, played an important part in teachers' shift in conceptualization of learning, teaching and technology, which leads to extensive and effective use of ICT in classrooms. Institutional supports during this process are shown to be important in fostering teachers' sustaining efforts toward better practices.

Social development in school: A comparison of civic competences between 8th and 12th grade students.

Keywords: Citizenship education, Quantitative methods, Secondary education, Social development

Presenting Author:Dorien Sampermans, KU Leuven, Belgium; **Co-Author:**Ellen Claes, KU LEUVEN, Belgium

The civic engagement of future generations is a crucial element in democratic societies. Therefore democratic countries attach much importance to the civic education of young adolescents in school. This paper aims to measure school influences on the social development of young adolescents. To create civic consciousness and engage secondary school students, teachers not only transfer civic knowledge. We increasingly assume schools to be a mini-polity, in which students can learn to interact with the society and where they learn to value their participation. It is by reaching these civic competences that students can become engaged citizens.

To measure social school influences, this paper compares the results of the Flemish ICCS 2016 data with the Flemish

educational effectiveness and evaluation survey. Both surveys measure civic knowledge and attitudes and are administered parallel in Flemish schools. The first study is administered among eight grade students, the latter among twelfth graders. Comparing the results of these studies reveals a growth of civic competences (civic knowledge, reported participation levels and students' self-efficacy) over age. And parallel to this higher critical consciousness, older students seem to perceive good citizenship more often as engaged citizenship. The relationship between students' engagement and their civic competences can be confirmed by a regression analysis and visualized in two structural equation models. Both path models then illustrate the dependency between students' perceptions of good citizenship and students' civic competences.

Categorizing student, Categorizing texts. Will Plagiarism Detection leave Blood on the Tracks?

Keywords: Morality, Social interaction, Technology, Writing / Literacy

Presenting Author:Lars-Erik Nilsson, Kristianstad University, Sweden; **Co-Author:**Anders Eklöf, Kristianstad University, Sweden; **Co-Author:**Tina Kullenberg, Kristianstad University, Sweden

Within research on examination cheating, a common assumption is that plagiarism in the context of examination is increasing epidemically. A uniform definition of plagiarism does not exist, but plagiarism is the category most frequently used when students at Swedish universities are notified and sanctioned for deception. Text Comparison is frequently presented as an effective technology for addressing plagiarism. Plagiarism Detection Services (PDS) are used for detecting text overlaps, particularly in higher education. While Higher Education Institutions in some countries appear to have uncritically accepted the use of text comparison technology, the reception in other countries have been ambivalent or even critical. The present project studies consequences of the use of text comparison through teachers meaning making regarding the pedagogical task to grade students and the moral task, to report students that try to deceive. We hypothesise that teachers' epistemological views are contingent on technology and discourses on technology. Text comparison technology, therefore, runs the danger of introducing consequential biases to the assessment of student performance. The material has been gathered in five focus group conversations. Focus has been introduced through the presentation of reports from a Plagiarism Detection System. A topical analysis has been performed on the transcribed conversations. From our results, we conclude that teachers' epistemological views are contingent on technology and discourses on technology. Text comparison, therefore, runs the danger of introducing a consequential bias to the assessment of student performance leaving students open to the accusation about deception.

Policy formation in times of transition: What education policy research can tell us.

Keywords: Attitudes and beliefs, Conceptual change, Content analysis, Educational policy

Presenting Author:Catherine Simon, Bath Spa University, United Kingdom

Policy research offers useful insights into the formation of a policy narrative. This conceptual analysis explores the intellectual antecedents which have informed Conservative Party education policy in England since 2010 It draws on an eclectic mix of liberal, conservative, radical and socialist discourse relating to notions such as citizenship, community, civil society and the role of the state in relation to these. Lévi Strauss's (1962) theoretical model of bricolage, Hall's (1998) agency of political ideas help uncover the inherent contradictions and limitations in current education policy and therefore may be used to inform policy implementation and development. This paper explores the formation of education policy at times of transition. Education has not been immune to the neoliberal project contained within globalisation. This is particularly so in England since the late 1980s. At a time when party politics in the West appears to be converging on the centre -right, a key question is how might education policy be constructed by newly elected governments in ways that appear original and distinctive to the electorate, whilst espousing the values and ideologies of the political party or parties in power.

The Economics of Ethics: The Logic of Moral Action and the Consequences for Education

Keywords: Citizenship education, Cognitive development, Developmental processes, Morality

Presenting Author:Karin Heinrichs, Otto-Friedrich-University Bamberg, Germany; **Co-Author:**Gerhard Minnameier, Goethe-Universität Frankfurt, Germany

In the context of economic experiments, giving in a "dictator game" is generally conceived as moral, while keeping the entire endowment is conceived as immoral. Similarly, in the "prisoners' dilemma", cooperation is understood as the moral course of action, defection as the immoral or selfish one. However, this interpretation misses the point for two major reasons. One concerns the rationality of moral action. The second concerns the notion of morality as such. Whereas moral philosophers and psychologists have come to see morality as a specific set of personal values, moral principles may also be understood as "institutions" in the economic sense.

Session C 13

30 August 2017 08:30 - 10:00

Virta - 113

Poster Presentation

Assessment and Evaluation, Learning and Instructional Technology

PO: Assessment

Keywords: Achievement, Assessment methods and tools, Cognitive skills, Comprehension of text and graphics, Educational Technology, Higher education, Intelligence, Learning approaches, Mixed-method research, Problem solving, Quantitative methods, Second language acquisition, Secondary data analysis, Self-regulation, Social aspects of learning and teaching, Student learning

Interest group: SIG 01 - Assessment and Evaluation

Chairperson: Martínez Ortiz Ma Guadalupe, Mexico

Tracing the student journey through the feedback landscape

Keywords: Higher education, Learning approaches, Social aspects of learning and teaching, Student learning

Presenting Author:Rola Ajjawi, Deakin University, Australia; **Co-Author:**Margaret Bearman, Deakin University, Australia;

Co-Author:Elizabeth Molloy, Monash University, Australia; **Co-Author:**Charlotte Rees, Monash University, Australia

There has been a palpable shift in the feedback literature emphasising the role of students in feedback. Indeed, the shift suggests that information not resulting in student action is not actually feedback. Yet students tell us still that feedback is something done *to* them rather than *with* them. They are typically positioned (by self and teachers) in a passive role within feedback interactions. Synthesising recent research into students' judgements, expectations and actions in feedback interactions, we reposition the student within the feedback discourse and highlight some of the tensions that students face in navigating the feedback landscape. We do this by tracing a fictitious medical student journey through a number of networked systems described in Bronfenbrenner's ecological systems theory. Ecological systems theory posits that individuals are influenced by five interdependent (networked) environmental systems: micro-, meso-, exo-, macro- and chrono-systems (Neal & Neal, 2013). This analysis identifies the need to support students in improving their feedback literacy and helping them make sense of their experiences so that future curricula and workplace encounters build on realistic expectations and healthy feedback practices. Further, this analysis highlights the need to reframe understandings of feedback from rules about content and delivery to more nuanced appreciations of the role of relationships and context in feedback encounters.

Left to their own devices: using tablets to enhance student engagement in a flipped EFL classroom

Keywords: Educational Technology, Mixed-method research, Second language acquisition, Social aspects of learning and teaching

Presenting Author:Nicholas Bovee, Kyushu Sangyo University, Japan

AimsThis ongoing study examines how iPads might be leveraged to support student engagement and autonomy in a "flipped" English language oral communication course. Findings will be used to formulate a preliminary set of best practices in regards to tablet use in this and similar contexts.

MethodologyThe subjects were students in a compulsory course at a Japanese university in three conditions: flipped/textbook, flipped/iPad, and traditional (control condition). Engagement and autonomy support questionnaire data and objective outcomes were modeled (ANOVAs/SEM). Qualitative evidence regarding engagement was obtained from class observations and interviews.

Preliminary resultsEngagement increased greatest over the semester in the iPad condition. Engagement in the flipped and iPad conditions was higher than in the traditional condition at the end of the semester. Contrary to expectations, perceptions of autonomy support were the lowest in the iPad condition. Proficiency test scores did not differ between conditions. Completion rates for the textbook review e-learning homework was highest in the traditional condition, suggesting that higher engagement did not extend beyond the classroom. Class observations revealed that although the patterns of interactions were similar in both flipped conditions, the iPads did not seem to foster higher quality interactions.

ImplicationsThe overall similarity in engagement patterns between the iPad/flipped and textbook/flipped conditions suggests that the flipped approach itself plays a greater role in affecting engagement than the introduction of iPads. Future development of iPad-based activities should focus on minimizing their "footprint" in terms of mediating interactions so that students are communicating more directly.

Computer-based assessment of thinking skills in China: a pilot study

Keywords: Assessment methods and tools, Cognitive skills, Problem solving, Quantitative methods

Presenting Author:Hao Wu, University of Szeged, Hungary; **Co-Author:**Gyongyver Molnar, University of Szeged, Hungary

The objectives of the study is to explore the applicability of online reasoning tests for detecting the component skills of problem solving and defining background factors which impact the developmental level of student's problem solving skills in China. The sample of the pilot study was drawn from six grade students (age 11-13, N=50). The instruments of the study were conducted by four tests measuring problem solving (20 items), inductive reasoning (53 items), visual memory (12 items) and creativity (6 items), and a questionnaire, which focused on participants' demographic data, learning strategies (13 items), test-taking motivation (15 items) and ICT familiarity (9 items). The tests were carried out by means of the eDia platform. The internal consistencies of the online instruments were high, Cronbach-a varied between .74, and .90. Participants' score distribution confirmed the applicability of the test. The bivariate correlations between problem solving and both inductive reasoning ($r=.44$, p

The interplay of g and mathematical abilities in large-scale assessments across grades

Keywords: Achievement, Assessment methods and tools, Intelligence, Secondary data analysis

Presenting Author:Nele Nicole Kampa, Leibniz Institute for Science and Mathematics Education (IPN), Germany; **Co-Author:**Steffani Sass, Leibniz Institute for Science Education and Mathematic, Germany

The study investigates the interplay of general cognitive abilities and domain-specific mathematical ability applying three different models that represent g , math-ability and Gf as well as math-specific ability and g . Furthermore, we analyze the relation between the student characteristics like self-concept in mathematics, gender, SES, and grade in mathematics. Using data from six different German LSAs of the three cohorts Grade 5, 9 and 13 (sample sizes range from $N_{Grade5} = 730$ to $N_{Grade9} = 3,893$) and two different frameworks (i.e., literacy and curricular) the data confirmed that LSAs do test math ability beyond g . The two cognitive factors correlated differently with the considered student characteristics which calls for future longitudinal approaches to the issue.

Deeper learning and Assessment in 7th graders reading comprehension processes

Keywords: Assessment methods and tools, Cognitive skills, Comprehension of text and graphics, Self-regulation

Presenting Author:Wenke Mork Rogne, Volda University College, Norway; **Co-Author:**Siv M. Gamlem, Volda University College, Norway

The aim of this study is to investigate 7th graders' ($N=30$) text processing in reading multiple, partly contradictory texts. Further, we investigate to what extent pupils seek internal feedback and process information from such texts. In the current project we adopt a comprehensive definition of the concept "Deeper learning" as it is explained as heuristics by Wineburg (1991). Moreover, pupils with prior high scores on standardized reading tests elaborated and evaluated more, and paraphrased less, on contradicting information than pupils with low prior reading scores. These pupils seem to seek internal feedback on a task, process and self-regulation level, while the pupils with low prior reading scores were seeking feedback related to a task- and self-level. This illustrates how reading strategies may vary across individuals with respect to both reading skills and ability to detect contradictory information when pupils work with multiple conflicting documents. While the less-skilled readers ignored the contradictory information, the skilled readers showed a strong will to resolve the dissonance and struggled to clarify through using deeper strategies and questions during reading. Results demonstrate that less-skilled readers need more support during problem solving tasks.

Assessment for learning in Higher Education: Potential and constraints from the students' view

Keywords: Assessment methods and tools, Higher education, Learning approaches, Self-regulation

Presenting Author:Diana Pereira, University of Minho, Portugal; **Co-Author:**Patrícia Santos, Institute of Education - University of Minho, Portugal; **Co-Author:**Maria A. Flores, University of Minho, Portugal

Pedagogical innovation is a key issue in Higher Education (HE), in a context where the educational priorities point out to the need to strengthen the teaching quality levels. With the Bologna Process, the renewed framework in the curricula has brought about changes with implications for teaching, learning and assessment methodologies, considered key issues to achieve pedagogical excellence in HE. Since it emphasises assessment and continuous feedback mechanisms between teacher and student for adjustment of teaching strategies and learning activities, the Assessment for Learning (AfL) approach has been pointed out as a pedagogical innovation where the priority is to enhance students' learning. Literature highlights that AfL practices stimulate students' engagement in the learning process in a more active way, providing them with more positive formative experiences. This paper draws on data from an ongoing PhD project aimed at investigating AfL in Sciences, Engineering and Social Sciences in two public universities in Portugal. With three different research phases, the study combines the development of focus groups, a survey and the development of an intervention project with students. Data reported in this paper were collected through the development of the intervention project focused on AfL, namely with the development of a survey and the monitoring strategies of teaching, learning and assessment. In total, 70 students enrolled at an Engineering programme participated in this phase. Findings reflect about AfL potentialities and implications in the teaching, learning and assessment processes, as well as in the academic outcomes in HE.

Session C 14

30 August 2017 08:30 - 10:00

Main Building C - C7

Poster Presentation

Motivational, Social and Affective Processes

PO: Motivation, Attitudes and Beliefs

Keywords: Attitudes and beliefs, Collaborative Learning, Conceptual change, Educational policy, Emotion and affect, Experimental studies, Goal orientation, Misconceptions, Morality, Motivation, Motivation and emotion, Parental involvement in learning, Pre-service teacher education, Primary education, Secondary education, Social interaction, Synergies between learning - teaching and research, Teacher Professional Development, Teaching approaches

Interest group: SIG 08 - Motivation and Emotion

Chairperson: Yuri Uesaka, University of Tokyo, Japan

Epistemic beliefs as predictors of epistemic emotions: Extending a theoretical model

Keywords: Attitudes and beliefs, Emotion and affect, Experimental studies, Synergies between learning - teaching and research

Presenting Author:Tom Rosman, Leibniz Institute for Psychology Information, Germany; **Co-Author:**Anne-Kathrin Mayer, ZPID - Leibniz Institute for Psychology Information, Germany; **Co-Author:**Günter Krampen, ZPID - Leibniz Institute for Psychology Information, Germany

We analyze the effects of psychology students' epistemic beliefs on their emotions when confronted with controversial learning materials (e.g., multiple texts containing contradictory views on a topic). According to the cognitive incongruity model by Muis, Pekrun, Sinatra, Azevedo, Trevors, Meier, and Heddy (2015), cognitive incongruity arises if students' epistemic beliefs are incompatible with the epistemic nature of a learning task. This, in turn, has negative effects on their epistemic emotions. Since the epistemic nature of controversial learning materials might be perceived very differently depending on whether individuals integrate (i.e., resolve) the controversies (e.g., by identifying moderator variables) or not, we propose to extend the cognitive incongruity model by including students' individual approach towards the learning materials (i.e., integrative vs. not integrative) as an additional model component. In line with our theorizing, we expected students with more advanced epistemic beliefs to experience less negative and more positive epistemic emotions when confronted with scientific controversies – but only if they integrate the conflicting claims. To test these predictions, we instructed one third of our sample to integrate the information contained in 18 text snippets on gender stereotyping that were specifically designed to allow for such integrations (so-called resolvable controversies). Two control groups were given the same text snippets, but were not required to integrate the controversies. Results revealed that absolute beliefs positively and evaluativistic beliefs negatively predict negative emotions in the experimental group, but not in the control groups, thus supporting our hypothesis concerning the extension of the cognitive incongruity model.

Toward success or away from failure: Factors that predict regulatory focus and academic goal pursuit

Keywords: Goal orientation, Motivation, Parental involvement in learning, Teaching approaches

Presenting Author:Fiona Cooligan, University of Ottawa, Canada; **Co-Author:**Kaitlyn Werner, Carleton University, Canada; **Co-Author:**Rebecca Klimo, Carleton University, Canada; **Co-Author:**Marina Milyavskaya, Carleton University, Canada

The purpose of the present study was to examine the factors associated with the development of a promotion versus prevention regulatory focus, which in turn influence the motivation for academic goals. As part of a larger study, participants identified three personal goals and indicated their reasons for pursuing them. For the purposes of the present research, however, all goals were coded and the first academic goal indicated for each participant was used. We also measured participants' regulatory focus and their perception of autonomy support from their parents and favourite professor. We examined whether both parenting and teaching style (i.e., autonomy supportive versus psychologically controlling) is associated with a promotion or prevention orientation and, in turn, whether such orientations influence motivation for academic goals. Preliminary results indicate that autonomy support from parents was significantly associated with students exhibiting a promotion orientation, while autonomy support from favourite professor was only marginal. Neither autonomy support from parents or professor was associated with a prevention-orientation. Further analyses investigate whether promotion and prevention orientations differentially predict motivation for pursuing academic goals (i.e., autonomous, controlled, approach and avoidance motivation). Discussion will focus on potential limitations in terms of professor autonomy support and how both parents and teachers can influence the way students frame their experience during academic goal pursuit.

Shifting attitudes on GMF's: The influence of a conceptual change intervention

Keywords: Attitudes and beliefs, Conceptual change, Emotion and affect, Misconceptions

Presenting Author:Ian Thacker, University of Southern California, United States; **Co-Author:**Krista Muis, McGill University, Canada; **Co-Author:**Gale Sinatra, University of Southern California, United States; **Co-Author:**Robert Danielson, University of Southern California, United States; **Co-Author:**Reinhard Pekrun, Ludwig-Maximilians-Universität (LMU), Germany; **Co-Author:**Philip Winne, Simon Fraser University, Canada; **Co-Author:**Marianne Chevrier, McGill University, Canada

We assessed the effects of reading multiple refutation texts about genetically modified foods (GMFs) on participants' misconceptions and attitudes. University students (N=217) drawn from two North American universities first read a refutation text on GMFs and were then randomly assigned to receive additional information about advantages of GMFs, disadvantages of GMFs, or both. Results revealed that students reading about the advantages of GMFs had significantly better attitudes than students that read about the disadvantages. Results also suggest that emotions significantly predicted changes in attitudes. There were also significant knowledge gains overall. Theoretical and practical implications are discussed including the impact these findings may have on science education.

How Perceived Emotions of Classmates Affect Students' Emotions

Keywords: Attitudes and beliefs, Emotion and affect, Social interaction, Motivation and emotion

Presenting Author:Philipp Forster, Ludwig-Maximilians-Universität (LMU), Germany; **Co-Author:**Kaiqi Shao, University of Munich (LMU), Germany; **Co-Author:**Reinhard Pekrun, Ludwig-Maximilians-Universität (LMU), Germany

The emotional environment in the classroom setting has been identified as important to students' experience of emotions

(Pekrun, 2006). However, research on the role of student's perceptions of other students' emotions for their own experienced emotions is largely lacking. To redress this research deficit, we investigated $N = 104$ Chinese middle school students. Correlative analyses revealed that students' perceptions of their classmates' enjoyment, anxiety, and boredom are positively related to their own experience of these emotions. Mediation analyses showed that the link between students' perceived and experienced enjoyment is mediated by their appraisals of control and value. Overall, our findings support the importance of students' perception of others' emotions for their own emotional lives.

Viewpoints to tablet computers, learning and motivation –how are they related?

Keywords: Collaborative Learning, Primary education, Secondary education, Motivation and emotion

Presenting Author: Laura Hirsto, University of Eastern Finland, Finland; **Co-Author:** Timo Tossavainen, University of Eastern Finland, Finland

In this paper the experiences of using and utilising tablets for learning among students of two different types of combined elementary and secondary schools in Finland. Earlier research had shown contradictory results on the effects of the use of tablets and iPads in education for learning and motivational themes. Thus, it is evident that we need more research to find out and understand the potential of tablets for learning (e.g. Underwood & Farrington-Flint, 2015). The aim of this paper is to investigate primary and secondary education students' experiences of learning in two different kind of tablet school contexts. The first school has had few years of experience of using one-to-one tablets in all subject areas frequently, and the other has used school-based tablets more seldom. According to preliminary results, pupils experiences in there different contexts varied. Of course, the better availability of the tablet facilitated more varying pedagogical use of them. However, there seemed to be also different kinds of general pedagogical practices in these two contexts. Pupils in the one-to-one tablet school more often reported practices that facilitated self-regulated learning and collaborative knowledge building. The results will be discussed in the light of earlier studies and theoretical viewpoints to motivation.

Exploring teacher-student boundaries through ethical dilemmas in the secondary school context

Keywords: Educational policy, Morality, Pre-service teacher education, Teacher Professional Development

Presenting Author: Zoe Morris, Monash University, Australia

Teachers face frequent ethical dilemmas in their daily work (Shapira-Lishchinsky, 2011), and require adequate skills in ethical reasoning (Strike & Solitis, 2009). 227 early career secondary teachers in Australia who had up to five years' teaching experience responded to five vignettes presented within a survey as part of a larger study. Each vignette outlined a brief situational context in which ethical boundaries of a teacher may be compromised. The interaction domains depicted in the vignettes were: physical support, connectivity, emotional support, instrumental support. Three themes emerged in the responses across all vignettes: proposed action, contextual considerations, and protective behaviour. Higher order themes and their relationships are examined within the ethical policy context of teachers.

Session C 15

30 August 2017 08:30 - 10:00

Virta - 112

Poster Presentation

Assessment and Evaluation, Developmental Aspects of Instruction, Higher Education, Instructional Design, Learning and Special Education, Teaching and Teacher Education

PO: Educational Effectiveness

Keywords: Achievement, Assessment methods and tools, Cognitive skills, Early childhood education, Educational policy, Educational Psychology, Educational Technology, Higher education, Instructional design, Language (L1/Standard Language), Learning approaches, Literacy, Primary education, Problem-based learning, Quasi-experimental research, School effectiveness, Science education, Social interaction, Special education, Synergies between learning - teaching and research, Teacher Effectiveness, Teacher Professional Development, Teaching approaches

Interest group: SIG 18 - Educational Effectiveness

Chairperson: Andreas Obersteiner, University of Education Freiburg , Germany

The impact of project-based learning in a KAMISHIBAI class: developing students' 21st-century skills

Keywords: Cognitive skills, Higher education, Learning approaches, Problem-based learning

Presenting Author: Naomi Tomioka, Shikoku University, Junior College, Japan; **Co-Author:** Naohiro Minagawa, Naruto University of Education, Japan

This study aims to evaluate the impact of project-based learning (PBL) in a KAMISHIBAI (Japanese traditional paper theatre) class. The author hypothesized that participating in and performing KAMISHIBAI together with a teammate would improve students' 21st-century skills. Accordingly, PBL classes were planned. The participants included six undergraduates and six graduate students at two Japanese universities. After the classes, descriptive data about students' perceived improvements was collected and analysed via a content analysis using a text-mining method. The results show that students believed that they improved in five out of 10 skills: "Critical thinking, problem solving, decision making" in the "Ways of Thinking" category; "Communication" and "Collaboration (teamwork)" in the "Ways of Working" category; and "Citizenship" and "Personal and social responsibility" in the "Ways of Living in the World" category. The results also

indicate that the two broad categories of 21st-century skills were improved through PBL in the KAMISHIBAI class. There are, however, two limitations of this study: (1) the difficulty of evaluating metacognition in the present analysis and (2) the difficulty of improving participants' ways of thinking.

Gender differences on technology-enhanced feedback for pupils in general and special education

Keywords: Educational Technology, Primary education, Social interaction, Special education

Presenting Author:Sanna Oinas, University of Helsinki, Finland; **Co-Author:**Risto Hotulainen, University of Helsinki, Finland; **Co-Author:**Mari-Pauliina Vainikainen, University of Helsinki, Finland

Technology-based platforms enable new methods for parent-teacher collaboration. Parents can be informed for example via school web-pages and e-mails (Thompson, Mazer & Grady, 2015). Teachers can also provide technology-enhanced feedback direct to pupils and parents (Tanes, Arnold, King & Remnet, 2011). In the Core Curriculum (National Board of Education 2014), information technology is explicitly named as a tool for collaboration with parents, and over 90% percent of the Finnish municipalities use these platforms for sending feedback to parents about their child's performance and behaviour. The impact of feedback has been studied from different perspectives, for example focussing on performance (Hattie & Timperlay, 2007), learning orientations (Pekrun, Cusack, Myrayama, Elliot & Thomas, 2014), and school engagement (Tennant, Demaray, Malecki, Terry, Clary & Elzinga, 2015). The results have been controversial: they indicate that feedback can be either beneficial or harmful, depending on how it is given and how it focusses on (Dweck & Master, 2009). However, supportive feedback for pupils with special needs is essential (NBE, 2014; Tennant et al., 2015). The results of the two studies are presented in a poster. The data consisted on 211 003 separate feedback actions delivered through technology-enhanced platform for 7811 pupils, in a school-year 2014-2015. The results show that feedback is delivered unequally to pupils, and boys and girls receive feedback differently. There is also shown that pupils in special education, specially boys, got more negative feedback than others. Results are important for preventing negative feedback loops in education.

Implementation effects in the training of phonological awareness in kindergarten children

Keywords: Early childhood education, Language (L1/Standard Language), Quasi-experimental research, Teacher Effectiveness

Presenting Author:Catharina Tibken, University of Würzburg, Germany; **Co-Author:**Sebastian Kempert, University of Potsdam, Germany; **Co-Author:**Regina Götz, University of Wuerzburg, Germany; **Co-Author:**Kristine Blatter, Deutsches Jugendinstitut, Germany; **Co-Author:**Wolfgang Schneider, University of Würzburg, Germany

In previous studies, phonological awareness proved as an important precursor for the acquisition of written language. According to recent meta-analyses, phonological training programs foster the development of phonological awareness in kindergarteners. On average, moderate effect sizes of the training have been reported. Although current meta-analyses show the general benefit related to phonological training, they indicate that training implementation significantly influences the program's effectiveness. Up to now, there is a lack of studies, which investigate the role of moderating factors. In our study, we addressed this question with regard to a set of organizational and personal factors. We examined 390 kindergarten children in Germany. During the last year of kindergarten, we administered a set of phonological tests at two measurement points. In between, the kindergarten teachers conducted a well-established phonological training to foster the children's phonological awareness. Additionally, the kindergarten teachers recorded procedural details and took part in an interview about the general conditions of the training. Results show that the phonological training improved children's phonological awareness. Further, especially personal factors such as a greater experience of the kindergarten teachers with the training program substantially enhance its benefit. In contrast, organizational factors such as group size seemed to play a subordinated role. Consequently, paying attention to specific quality criteria in the training implementation improves the training's success and should be considered in future. To use limited resources in the most efficient way, it is crucial to know, which moderating factors play the most important role in educational processes.

Transfer of knowledge: A modality, knowledge, and conceptual analysis

Keywords: Educational Psychology, Instructional design, Learning approaches, Synergies between learning - teaching and research

Presenting Author:Bobby Hoffman, University of Central Florida, United States; **Co-Author:**Morgan McAfee, University of Central Florida, United States

A goal of successful scholarship is using evidence-based practices to inform teaching excellence. As such, this mixed-method study examined transfer of knowledge amassed during the completion of a three-year Masters-level program in Educational Psychology. Quantitative methods determined if superior knowledge transfer was related to course modality, domain of interest, and/or knowledge type. A qualitative scoring matrix and content analysis were used to provide examples of innovative knowledge transfer and application. Results revealed greater knowledge transfer for blended-learning students compared to those who predominantly completed distance education and significantly greater transfer for declarative and procedural knowledge related to learning and motivation in comparison to life-span development. We advanced strategies and design recommendations to promote authentic knowledge transfer in graduate-level educational psychology programs.

When the apprentice surpasses the master: teacher content knowledge relative to their students

Keywords: Educational policy, Literacy, Primary education, Teaching approaches

Presenting Author:Nives Nibali, University of Melbourne, Australia; **Co-Author:**Susan-Marie Harding, The University of Melbourne, Australia; **Co-Author:**Patrick Griffin, The University of Melbourne, Australia; **Co-Author:**Lorraine Graham, The University of Melbourne, Australia

Research into levels of teacher knowledge in literacy and more specifically reading is largely confined to ranking teachers and comparing student achievement between classes of teachers whose content knowledge differs. A review of the literature failed to find studies that compared teacher performance levels with those of their students. Comparing teacher performance levels to that of their students would reveal if there are students for which the teacher has a lower level of content knowledge and may consequently lack the content knowledge required to support growth in students of relatively higher ability. This study, compared teacher content knowledge with student content knowledge. A total of 23 Year 5/6 teachers and their students completed an online reading comprehension assessment to determine their reading ability. Of the 23 classes that participated, 61 percent of classes contained students who performed at a higher level than their teacher. Given that the study was conducted at the primary level, this finding is particularly poignant as it challenges the widely accepted assumption that Year 5/6 teachers are more proficient in reading than their students.

Assessing and improving quality science instruction using an innovative tablet portfolio app.

Keywords: Assessment methods and tools, Science education, Teacher Effectiveness, Teacher Professional Development

Presenting Author:Jose Felipe Martinez, University of California, Los Angeles, United States; **Co-Author:**Matthew Kloser, University of Notre Dame, France; **Co-Author:**Brian Stecher, The RAND Corporation, United States; **Co-Author:**Matt Wilsey, University of Notre Dame, United States; **Co-Author:**Jayashri Srinivasan, University of California, Los Angeles, United States; **Co-Author:**Amanda Edelman, Pardee RAND Graduate School, United States

Teaching portfolios have long been used in a dual role to monitor and assess instructional practices, and support teachers in professional reflection and learning. Quality of instruction and professional self-reflection among practicing science teachers is currently a topic of great interest in the United States as the country moves to adopt the Next Generation Science Standards (NGSS). We developed an innovative electronic portfolio tool implemented in tablet computers which enables science teachers to compile and review multimedia evidence of instructional practices aligned to the NGSS (documents, pictures, and video). We report the results of a pilot study with nearly 40 middle school science teachers who used the e-portfolio to collect evidence of instruction in their classrooms. Our study investigates two related questions: first the reliability and validity of ratings of quality science instruction based on the evidence compiled in the portfolios, and second the value of the portfolio tool for teacher professional development. Qualitative analysis of interviews with all participant teachers suggest the tool offers an effective platform for professional self-reflection and growth. The paper will additionally present psychometric analysis of the portfolio rating part of the study currently under way. We discuss the implications of these results for understanding how portfolio tools may support systems looking to monitor and improve the quality of classroom practices, and teachers seeking a platform for reflecting about and improving their own instructional practices.

Implementation of instructional change and its effect on students' achievement.

Keywords: Achievement, Quasi-experimental research, School effectiveness, Teacher Professional Development

Presenting Author:Sébastien Dellisse, Université catholique de Louvain (UCL), Belgium; **Co-Author:**Benoît Galand, Université catholique de Louvain (UCL), Belgium; **Co-Author:**Xavier Dumay, Université catholique de Louvain (UCL), Belgium; **Co-Author:**Liesje Coertjens, Université catholique de Louvain (UCL), Belgium; **Co-Author:**Vincent Dupriez, Université catholique de Louvain (UCL), Belgium

Large-scale instructional change is a substantial challenge. Due to a lack of implementation, many reforms fail in their effort to both change teaching practices and improve student achievement. Focusing on the implementation process, Rowan and Miller (2007) have shown that a procedural or a professional model have a significant effect on instructional change and learning improvement. Other researchers have highlighted that motivational aspects, more precisely self-efficacy and task-value, and organizational capacity, like collaboration and the support of the educative team, could also have a significant effect on the implementation of alternative teaching practices. Our research investigates three hypotheses: procedural and professional control, in comparison with the control group, promotes instructional change (1), professional control promotes a higher level of implementation than procedural control (2), and, the implementation of new practices fosters achievement gains in students' reading and writing (3). To answer these questions, we conducted an experimental study in 19 Belgian secondary schools. Schools were randomly assigned to either the control group or to experimental conditions which have received an educational program on reading and writing strategies, a training to its use and/or a coaching during the school year. Data were collected through validated questionnaires completed by teachers and their students. Preliminary analyses indicate that, compared to the control group, classes pertaining to the experimental conditions show a stronger increase in students' achievement. It also seems that the value given by teachers to some program components and collaboration around program activities are positively related to the implementation.

Session C 16

30 August 2017 08:30 - 10:00

Virta - 120

Poster Presentation

PO: Learning and Instruction with Computers

Keywords: Cognitive skills, Computer-assisted learning, Educational Technology, Learning Technologies, Metacognition, Motivation, Multimedia learning, Primary education, Problem solving, Qualitative methods, Quantitative methods, Reading comprehension, Science education, Self-regulation, Student learning, Technology

Interest group: SIG 07 - Learning and Instruction with Computers

Chairperson: Sara Scrimin, University of Padova, Italy

Effects of usability and organization on students' learning from instructional hypertext

Keywords: Educational Technology, Learning Technologies, Reading comprehension, Multimedia learning

Presenting Author:Álvaro Jáñez, University of Salamanca, Spain; **Co-Author:**Javier Rosales, University of Salamanca, Spain; **Co-Author:**Jean-François Rouet, University of Poitiers, France

Hypertext structure and usability have been identified as key variables associated to navigation and comprehension performance in hypertext. However, there is currently very little data on the potential interactions of both variables. In the present study, twenty-four undergraduate students were recorded while navigating two hypertexts (one structured hierarchically, the other one structured as a network). The participants were assessed for comprehension afterwards. Another twenty-four students were recorded navigating the same two hypertexts, but with a lower usability design. Results showed an interaction between hypertext structure and usability on comprehension scores. Also, navigation recordings showed how participants navigated differently across hypertext structures. Differences in comprehension are analysed through navigation differences, trying to explain how both variables interact.

Supportive hints in a digital environment foster students' motivation to read informational text

Keywords: Computer-assisted learning, Motivation, Reading comprehension, Self-regulation

Presenting Author:Marlies ter Beek, University of Groningen, Netherlands; **Co-Author:**Leonie Brummer, University of Groningen, Netherlands; **Co-Author:**Anouk Donker-Bergstra, Rijksuniversiteit Groningen, Dept of Education and GION, Netherlands; **Co-Author:**Marie-Christine Opendakker, University of Groningen, Netherlands

Students' motivation to learn increases when they can autonomously decide what to do or when they can regulate their own need for help (e.g., self-regulated learning; Zimmerman, 2008). Self-regulated learning nowadays can be digitally facilitated, but although technological applications are believed to increase student motivation, little empirical research exists regarding the possible influence of digital support on reading motivation (Moran et al., 2008). This research project investigated whether self-regulated use of supportive cognitive and metacognitive scaffolds in a digital learning environment increases students' motivation to read informational texts. Three different groups of 7th-graders work in our digital reading environment to read geographical and historical materials. By using three different conditions we can determine whether providing supportive hints influences student motivation to read regardless of the subject of the text. Preliminary results based on a usability questionnaire show that students enjoyed working in our digital environment, but statistical data analysis after semester 1 (December 2016) will reveal whether providing hints significantly influences student reading motivation.

Effects of Scaffolding Programs on Meta-Cognitive Skills Within Computerized Science Problem Solving

Keywords: Computer-assisted learning, Metacognition, Problem solving, Science education

Presenting Author:Zvia Fund, Bar-Ilan University, Israel

The current paper examines the effect of scaffolding programs on *meta-cognitive skills* in a computerized environment. This environment presents simulations of scientific laboratory experiments followed by qualitative problems that the students are required to solve. Four scaffolding components were identified - structure, reflection, subject-matter and enrichment, and used in different configurations to construct four support programs (based on human teaching), implemented by appropriate worksheets. The scaffolded groups were compared to one another and to a non-scaffolded control group as regards increasing effectiveness of three meta-cognitive skills: self-assessment problem solving process; assessing final answer; finding the error and its causes for incorrect solution. Participants were 187 junior high school students, in five experimental groups, each of three academic levels. All groups worked within the same computerized learning environment. The treatments were conducted once in every two weeks for a period of approximately 6 months. The students were interviewed at the end of the study, and their problem solving activities in the computerized learning environment were observed and transcribed. The resulted protocols were then analyzed, each student being assigned an effectiveness score for each meta-cognitive skill. These scores were subjected to a 5x3 (groups by academic levels) ANOVA analysis. Results showed highly significant differences between the groups in all three skills, and different patterns of effectiveness, depending on treatment and academic level. Further contrast analyses showed strong effect of "structure + reflection" combination, and weak or even negative effect of subject-matter, both are explained and elaborated upon in the paper.

Learning from scientific texts through constructing video-based explanations

Keywords: Learning Technologies, Science education, Student learning, Multimedia learning

Presenting Author:Stephanie Wassenburg, Erasmus University Rotterdam, Netherlands; **Co-Author:**Björn de Koning, Erasmus University Rotterdam, Netherlands; **Co-Author:**Fred Paas, Erasmus University Rotterdam/University of

Wollongong, Netherlands

Video-based explanations are an increasingly popular educational method. As many studies have already indicated the advantages of learning from these videos, the present study focuses on the effects of creating video explanations on learning and transfer. It has been shown that creating a video-based explanation of a text encourages the messenger to actively engage in learning strategies. The present study investigates what it is about explaining aloud during video creation that helps participants learn. For example, recording a video allows you to imagine a non-present audience (i.e., other students versus future self). Presumably, the imagined audience influences what strategies are used. Furthermore, the multimodal nature of a video enables the speaker to gesticulate while explaining, which may decrease cognitive load. In the present study, undergraduate students create a video explanation after reading a science text. Students are either instructed to explain the text to oneself or to non-present students, whereas a control group reads the text out loud while recording. To study the influence of gesture, half of the participants are restrained from using gestures, whereas gesticulating is encouraged for the others. All participants are tested on comprehension and knowledge transfer immediately after constructing the video. Besides a main effect of gestures, we expect students in both explaining groups to outperform the control group. Furthermore, the non-present audience may influence self-efficacy and reported mental effort. Results are expected before the spring of 2017 and will be of relevance for educational practice.

The effect of computer game usage on absenteeism mediated by students' cognitive lesson avoidance

Keywords: Cognitive skills, Educational Technology, Quantitative methods, Technology

Presenting Author:Arvid Nagel, University of Teacher Education St.Gallen, Switzerland; **Co-Author:**Horst Biedermann, University of Teacher Education St.Gallen, Switzerland

In the past the phenomenon of lesson avoidance and school absenteeism of students has aroused an increasing interest both in science and in media. Nevertheless, research has failed to keep up with these developments in offering theoretical and empirical evidence for understanding students' lesson avoidance yet. This study aims to predict cognitive and physical lesson avoidance of students by (problematic) computer game usage. In this regard we pose the question whether we can identify effects of computer game use on cognitive and physical lessons avoidance behavior of students? The study was conducted based on a German student sample from grades 7 to 10 (N=578). Whereas research on school absenteeism generally describes students failing to attend schools or their lessons, we take a broader perspective and – beyond physical lesson avoidance – also address cognitive lesson avoidance of students. So far, no appropriate quantitative instruments are available to assess students' cognitive lesson avoidance. Therefore, we developed a new four-item scale. The psychometric properties of the EFA and CFA support the theoretically postulated one-factorial structure of cognitive lesson avoidance. Further we are able to show a mediation of computer game usage on physical lesson avoidance via cognitive lesson avoidance utilizing structural equation modeling.

How Tablets Can Improve Learning in Schools - An Explorative Study

Keywords: Computer-assisted learning, Educational Technology, Primary education, Qualitative methods

Presenting Author:Steffi Zander, Bauhaus-Universität Weimar, Germany; **Co-Author:**Anne Behrens, Bauhaus-Universität Weimar, Germany

This contribution reports the results of a project that aimed in implementing tablets into a primary school and to examine perceived advantages and drawbacks of tablet use by teachers and students. The faculty was qualified to create own lessons of high media didactic quality in order to implement them afterwards in their own classes. In the project's empirical part, the possibilities were examined how tablet computers may support and increase the lessons' quality. The resulting insight was connected to existing theoretical and empirical evidence. Further, core categories for a sensible high-quality tablet-assisted curriculum were developed. The results show that the students and teachers seem to be very excited to learn and teach with the tablet computers, also they are reflecting the frequency of usage on high standard. These findings are intensified in a subsequent study in secondary schools and continue to be reviewed.

Session C 17

30 August 2017 08:30 - 10:00

Pinni B - B3118

Poster Presentation

Learning and Social Interaction, Learning and Special Education, Teaching and Teacher Education

PO: Special Educational Needs

Keywords: Assessment methods and tools, Attitudes and beliefs, Collaborative Learning, Early childhood education, Experimental studies, Instructional design, Learning disabilities, Mathematics, Misconceptions, Mixed-method research, Peer interaction, Primary education, Self-efficacy, Social interaction, Special education, Teacher Professional Development, Teaching / instruction

Interest group: SIG 15 - Special Educational Needs

Chairperson: Osnat Rubin, Israel

Does a differentiated instruction increase or decrease interactions between students?

Keywords: Peer interaction, Primary education, Special education, Teaching / instruction

Presenting Author:Stefanie Bosse, University of Potsdam, Germany; **Co-Author:**Thorsten Henke, University of Potsdam, Germany; **Co-Author:**Katja Bogda, University of Potsdam, Germany; **Co-Author:**Nadine Spörer, University of Potsdam, Germany

In inclusive classes the range of students' individual abilities is higher than in regular classes. Therefore, teachers are challenged to provide appropriate levels of instruction by, for example, using differentiated instruction. It is assumed that differentiated instruction influences the interactions in the classroom (Klieme & Warwas, 2011). However, empirical evidence of this assumption is still rare. The goal of our study was to analyse if there was a positive relation between differentiation in inclusive primary school lessons and the number of on-task student-student-interactions. Participants of the study were $N = 213$ students drawn from ten German primary schools. Data were collected at three measurement points within a time period of two school years. To answer the research question, students' math and German lessons were observed 10 times at each measurement point by trained external observers. The observations were conducted with the help of a software. The results of our initial analyses were in line with our assumption. For the first two measurement points we found positive correlations between the amount of differentiation and the amount of on-task student-student-interactions. The more a teacher used differentiation during a lesson, the more a student interacted with another student. In the next analysis steps, we will focus on differences between math and German lessons. Furthermore, the relation between the learning context and the student-student-interactions will be analysed.

Effect of disability cognitive bias modification task on attitudes towards people with a disability

Keywords: Attitudes and beliefs, Experimental studies, Misconceptions, Social interaction

Presenting Author:Vanja Van Aarsen, KU Leuven, Belgium; **Co-Author:**Katja Petry, K.U.Leuven, Belgium

In the past decades, there is a trend of including people with a disability into society. Despite this trend, people with a disability are viewed as differing from the norm and are discriminated against. It is often assumed that full inclusion of these people is hindered by negative attitudes about them held by the general population. According to the dual-attitude model, these attitudes can be explicit or implicit. Research has shown that implicit attitudes are a better predictor of behaviour when it concerns socially sensitive topics. Thus, improving the implicit attitudes of people towards people with a disability can enhance the chance of successful inclusion of people with a disability. For example, improving the attitudes of teachers towards students with a disability can enhance the chance of successful inclusion into the school community of these students. In this paper we developed an intervention aimed at changing attitudes towards people with a disability. We developed a cognitive bias modification task that targets the interpretation bias about people with a disability in everyday live situations. Our experiment was successful, as we found that our participants had more positive interpretations afterwards than they had at the start. However, we did not find an effect on our implicit or explicit attitude measures.

Development and validation of a social network analysis instrument to promote inclusive education

Keywords: Assessment methods and tools, Collaborative Learning, Social interaction, Special education

Presenting Author:Jasmien Sannen, KU Leuven, Belgium; **Co-Author:**Katja Petry, KU Leuven (BE), Belgium; **Co-Author:**Nick Ferbuyt, University of Antwerp, Belgium

A pivotal factor in realizing inclusive learning environments (ILO) is collaboration. One cannot expect that a single teacher, working alone, has all the knowledge and expertise to meet the diverse needs of all learners. The social network theory (SNT) and its corresponding methodology, social network analysis (SNA), provides an excellent framework to study collaboration and to gain insight into the exchange of knowledge and expertise through social relationships. To our knowledge, there is no research that has focused on the use of a social network approach on studying collaboration in order to create ILO. Therefore, this study focuses on the development and validation of a SNA-instrument that provides teachers, schoolteams and researchers insight in the social networks with regard to the creation of ILO. We will apply a whole network approach to create a picture of the network of the whole schoolteam and their external partners. Each of them will indicate who they ask for support and who they give support in the light of creating ILO. Accessible and inviting visualisations of social networks will be provided to support teachers and teams to better understand and strengthen their networks. To validate the SNA-instrument the *Standards for Educational and Psychological Testing* will be used. By developing and validating an innovative SNA-instrument in the context of inclusive education, which can be used both for research and for practical purposes, this study is of great theoretical, methodological and practical importance.

How to design educational material for inclusive classes

Keywords: Instructional design, Learning disabilities, Mathematics, Mixed-method research

Presenting Author:Anna Noll, University of Koblenz-Landau, Germany; **Co-Author:**Jürgen Roth, University of Koblenz-Landau, Germany; **Co-Author:**Markus Scholz, Pädagogische Hochschule Ludwigsburg, Germany

Although pupils with disabilities are broadly integrated into mainstream schools, only few empirically based findings about inclusive lessons can be found. For example, little research has been conducted on how educational material used in inclusive classes should be designed. Furthermore, the few available studies are contradictory. This project investigates which design elements of work assignments positively influence the performance of students in inclusive classes. Within the framework of an empirical study, we will analyze whether the use of the easy-to-read guidelines or enriching text with symbols facilitates pupils' comprehension. Students with and without learning disabilities participate in the study. With regard to content, the pre-study and the main study focus on introducing fractions. These are taught in activity-oriented

manner with hands-on material. A qualitative preliminary study focuses on the benefits of using easy-to-read language as well as on the advantages of linking text and symbols by use of eye tracking, interviews and thinking-aloud-protocols. An adequate register, an appropriate use of symbols and convenient exercises shall thus be identified. For the main study, a pre-post-test design comprises two experimental and one control group. Before and after the conduction of the exercises, the pupils' knowledge about fractions is determined by a test. Experimental group one works with a linguistically and pictorially simplified version of the tasks as the easy-to-read guidelines are applied and symbols are added to the text. The tasks of the second experimental group are linguistically simplified only. The control group receives a not simplified version of the tasks.

Italian preschool teacher's opinion about their inclusive practices

Keywords: Early childhood education, Mixed-method research, Special education, Teacher Professional Development
Presenting Author: Lucia Scipione, University of Modena and Reggio Emilia, Italy; **Co-Author:** Maja Antonietti, University of Modena and Reggio Emilia - Department of Education and Human Sciences, Italy; **Co-Author:** Chiara Bertolini, University of Modena and Reggio Emilia - Department of Education and Human Sciences, Italy; **Co-Author:** Alice Veneziani, University of Modena and Reggio Emilia - Department of Education and Human Sciences, Italy

Italian school regulation state full inclusion for all children with SEN in regular schools since 1982. The Italian discussion about the model of inclusion in the last years seems not to recognize the specificity of different school settings, like preschool, referring to a general theoretical framework. According to the literature and inclusion evaluation scale (ERVIS, INDEX, QUADIS), the research construct a questionnaire with closed and open questions focused on crucial issues about inclusion. This research investigates preschool context, analysing 68 preschool teachers opinion about their inclusive practices. The aim is to collect, describe, analyse inclusive practices in preschool, comparing them with general school inclusion model and previous research.

Teachers beliefs about inclusion: self-efficacy and attitudes

Keywords: Attitudes and beliefs, Self-efficacy, Special education, Teacher Professional Development
Presenting Author: Saskia Opalinski, University of Education Freiburg, Germany

For ensuring an inclusive school system, demanded by the UN Convention on the Rights of Persons with Disabilities, teachers' attitudes and knowledge, as two aspects of teacher professionalism, need to be considered as key factors. While national and international research findings are broadly inconclusive or even contradictory, a positive correlation between teacher self-efficacy and attitudes towards inclusion in schools was shown (Savolainen et al., 2012). For Germany recent research on these two aspects and comparative research with a leading country in matters of students' performance, equal opportunities and inclusion like Finland is missing. In this study research questions concerned (a) Thuringian teachers' self-efficacy, their attitudes towards inclusion and (b) the relation of these two concepts (c) compared to those of Finnish teachers. In 2010/2011 teachers from Finland (N=112) and Thuringia (N=362) were surveyed using online questionnaires. Previous analyses show, that while the Finnish teachers show definite positive attitudes towards inclusion, Thuringian teachers present quite negative and critical attitudes. Both groups ascribe a similarly neutral to positive professional self-efficacy to themselves. A significantly higher correlation between teacher self-efficacy and attitudes towards inclusion was found for the Thuringian teachers. Further analyses were done to examine potential explanations of these differences. Therefore, results of cluster analysis will be reported. At the end, based on the results, aspects of modified basic and advanced education of German teachers are addressed.

Session C 18

30 August 2017 08:30 - 10:00
 Main Building A - A3
 Poster Presentation
 Learning and Special Education

PO: Special Educational Needs and Primary Education

Keywords: Achievement, Assessment methods and tools, E-learning / Online learning, Early childhood education, Educational Psychology, Language (L1/Standard Language), Learning and developmental difficulties, Learning disabilities, Lifelong learning, Literacy, Mathematics, Neuroscience, Primary education, Qualitative methods, Quasi-experimental research, Special education

Interest group: SIG 15 - Special Educational Needs

Chairperson: Natacha Boissicat, Université Grenoble Alpes, France

Literacy Development Trajectories in Children at FR of Dyslexia: The Role of Early Oral Language

Keywords: Language (L1/Standard Language), Learning disabilities, Literacy, Primary education

Presenting Author: Marjolein Zee, University of Amsterdam, Netherlands; **Co-Author:** Sietske van Viersen, University of Amsterdam, Netherlands; **Co-Author:** Elise de Bree, University of Amsterdam, Netherlands; **Co-Author:** Aryan van der Leij, University of Amsterdam, Netherlands; **Co-Author:** Ben Maassen, University of Groningen, Netherlands; **Co-Author:** Peter de Jong, University of Amsterdam, Netherlands

The present study investigated the influence of early oral language on two pathways towards reading comprehension in

children with and without a family risk (FR) of dyslexia. The sample included 237 children (164 at FR) from the Dutch Dyslexia Program (DDP). Longitudinal data covered seven occasions during development between 4 and 12 years. The effect of early oral language on reading comprehension was mediated by preliteracy skills and word decoding ability for the first pathway and by later language abilities for the second pathway. FR was found to have an independent effect on general learning ability, preliteracy skills and word decoding abilities, but not on the language pathway. FR was also found to have a direct influence on reading comprehension. Findings indicated that early oral language has a small effect on early literacy development, but effects are hard to trace on the long run.

Specific and general orthographic knowledge predicts reading and spelling skills

Keywords: Educational Psychology, Learning and developmental difficulties, Literacy, Primary education

Presenting Author:Telse Nagler, German Institute for International Educational Research (DIPF); IDeA-Research Center, Germany; **Co-Author:**Jelena Zaric, German Institute for International Educational Research (DIPF); IDeA-Research Center, Germany

The role of orthographic processing for literacy development has become a focus of interest in recent years as empirical data suggest that orthographic knowledge can predict reading and spelling performance. Orthographic knowledge is considered to be a multi-dimensional construct with two subcomponents, the word-specific (sensitivity to the correct spelling of a specific word) and general (sensitivity to legitimate letter patterns) orthographic knowledge. The predictive value of orthographic knowledge, however, is not yet sufficiently verified and it remains unclear to which extent both subcomponents explain different amounts of unique variance. It is, hence, the aim of the present study to investigate the predictive value of word-specific and general orthographic knowledge more closely. Reading and spelling performance from 94 German elementary school children was assessed via standardized achievement tests. Furthermore, an orthographic choice task measuring word-specific orthographic knowledge and two nonword forced choice tasks measuring general orthographic knowledge, with regard to the sensitivity of frequency and legit position of letter patterns, were conducted. Results indicate that the orthographic choice task as well as one of the nonword forced choice tasks (with regard to the legitimacy of letter pattern position) significantly correlated with and significantly predicted reading and spelling performance. Squared semi-partial correlation analysis further indicated that word-specific orthographic knowledge and general orthographic knowledge of legit letter patterns explained more unique variance for spelling than for reading. Hence, information about word-specific and general orthographic knowledge could be used for early identification of children at risk for reading and especially spelling difficulties.

Improving executive functions in pupils with specific learning disabilities (dyslexia, dysgraphia)

Keywords: Learning disabilities, Neuroscience, Quasi-experimental research, Special education

Presenting Author:Mateja Hudoklin, University of Ljubljana, Slovenia; **Co-Author:**Cirila Peklaj, University of Ljubljana, Slovenia

Executive functions help us plan and organize activities, sustain attention and persist in completing tasks. Research showed that students with specific learning disabilities (SLD) also have difficulties with executive functions. It has been confirmed that executive functioning can compensate primary deficits of SDL. The aim of our study was to develop and evaluate an intervention program for improving executive functions in students with SDL (dyslexia and dysgraphia). Our research included 97 ten years old students who had diagnose of severe dyslexia and dysgraphia. Students were assigned to experimental (EG) and control group (CG). Students in ES received regular help program and additional 30-hours executive functions training. Students in CG received only regular help program. The results of measurement of executive functions before and after intervention have shown a short term effect related to attention, however, after five months the effect is not significant any more. Teacher and parents reported positive effects of different executive functions after five months, namely in inhibition, initiative, working memory, self-monitoring, behaviour regulation and metacognition. The results confirmed efficacy of intervention, although important changes in behaviour can be seen after a longer period. Key words: dyslexia, dysgraphia, executive functions, intervention, specific learning disabilities

Development of an orthographic knowledge test to differentiate reading and spelling skill levels

Keywords: Educational Psychology, Learning and developmental difficulties, Literacy, Primary education

Presenting Author:Jelena Zaric, German Institute for International Educational Research (DIPF); IDeA-Research Center, Germany

Word-specific and general orthographic knowledge (i. e. knowledge about the correct spelling of specific words and permitted letter patterns), play an important role in acquiring reading and spelling skills (Burt & Tate, 2002; Holmes, 1996). However, the most effective method assessing these two orthographic knowledge components is still unclear. The goal of this study was therefore to develop an adequate test to measure orthographic knowledge for German elementary school children on the word-specific and general level. The child-oriented childLex database (Schroeder, Wurzner, Heister, Geyken & Kliegl, 2015) was used for developing test items. An orthographic choice task was designed to measure word-specific orthographic knowledge. To assess general orthographic knowledge, two tasks involving pseudo-word pairs with different violation types (i. e. sensitivity to frequency and to legal positions of letter patterns) were developed. A sample of 67 German children, divided into two groups (with and without reading and spelling difficulties) participated in this study. Reading and spelling skills were measured via standardized achievement tests and compared with the performance on the orthographic knowledge tasks. Analyses revealed significantly better performance of children without reading and spelling

difficulties on the orthographic-choice task and on task comprising frequency of letter patterns compared to children with reading and spelling difficulties. Thus, these two tasks can be considered as an effective method to assess word-specific and general orthographic knowledge, and can be used to differentiate between children with and without reading and spelling difficulties. However, poor internal consistency indicates that the test items need further development.

Early Mathematical Skills of Children in South Africa and in Finland

Keywords: Achievement, Assessment methods and tools, Early childhood education, Mathematics

Presenting Author:Riikka Mononen, University of Oslo, Norway; **Co-Author:**Johan Korhonen, Åbo Akademi University, Finland; **Co-Author:**Lara Ragpot, University of Johannesburg, Unknown; **Co-Author:**Elizabeth Henning, University of Johannesburg, South Africa; **Co-Author:**Pirjo Aunio, University of Oslo / University of Helsinki, Finland

Abstract (246 words) This study compared the early mathematical skills of South African ($N = 443$, *Age* 6.80 y) and Finnish children ($N = 236$, *Age* = 6.23 y) in the beginning of their formal mathematics education. Children's mathematical skills were assessed using a test developed in Finland, and a translated version in English was used in South Africa. No statistically significant difference was found between the South African (SA) and the Finnish (FIN) children in mathematical relational and counting skills. However, the FIN children performed better in basic arithmetic skills (verbal word problems). Overall, girls and boys performed equally well, but boys outperformed girls in counting skills in the SA sample. Younger children performed somewhat weaker than older children. According to the results, when compared to each other, FIN and SA children seem to have little difference in their early mathematical skills in the beginning of the formal education. However, according to the international comparative assessments in mathematics, the students in these countries seem to perform in contrast to each other in the end of their compulsory school – Finland in the top and South Africa in the lowest performing countries. In future, it would be thus interesting to investigate how educational setting (e.g., teacher's pedagogical knowledge, group size, mathematics content taught and educational support), home language and socioeconomic status affect mathematics learning along the school years, and to find possible obstacles that could be improved in order to provide ingredients for better and equal learning of all children.

What do MOOC providers think about accessibility?

Keywords: E-learning / Online learning, Learning disabilities, Qualitative methods, Lifelong learning

Presenting Author:Francisco Iniesto, Open University, United Kingdom; **Co-Author:**Patrick McAndrew, Open University, United Kingdom; **Co-Author:**Shailey Minocha, Open University, United Kingdom; **Co-Author:**Tim Coughlan, Open University, United Kingdom

Massive Online Open Courses (MOOCs) have become an accepted way to make learning opportunities available at large scale and low cost to the learner. However, only if these are made accessible will they be able to offer flexibility of learning and benefits to all, irrespective of disability. Experience in providing accessible online learning at distance universities suggests that this can be best achieved through understanding different roles and the options in planning for adjustments to be made. To effectively apply similar approaches to MOOCs, it is necessary to understand the various viewpoints and roles of stakeholders and how these impact on accessibility. This includes educators who create materials and facilitate learning, and technologists who develop and maintain platforms. We report the results from a study involving semi-structured interviews to investigate the perceptions and accessibility-related processes of MOOC platform accessibility managers, platform software developers/designers and MOOC accessibility researchers. Our results show awareness that MOOCs can be valuable for disabled learners, and indicate that legislation acts as a driver for accessibility. However, our investigations suggest limited progress to date in either producing universally accessible MOOCs, or tailoring MOOCs to meet the needs of individual learners with disabilities

Session C 19

30 August 2017 08:30 - 10:00

Main Building D - D12

Poster Presentation

Cognitive Science, Developmental Aspects of Instruction, Learning and Social Interaction

PO: Early Childhood Education

Keywords: Achievement, At-risk students, Citizenship education, Cognitive development, Early childhood education, Educational attainment, Educational Psychology, Environmental education, Learning approaches, Literacy, Mathematics, Numeracy, Primary education, Quantitative methods, Social development, Student learning

Interest group: SIG 05 - Learning and Development in Early Childhood

Chairperson: Elisabeth Fischer, University of Kassel, Germany

Learning patterns, personal factors and academic performance in students at Primary School

Keywords: Educational Psychology, Learning approaches, Primary education, Student learning

Presenting Author:Jordi García-Orriols, Autonomous University of Barcelona, Spain; **Co-Author:**Jose Reinaldo Martinez-Fernandez, Autonomous University of Barcelona, Spain

The aim of this study was to analyze the relationship between learning patterns and some personal factors and academic

performance in students at primary education. Methodology: 229 students of Primary Education from Spain completed an adapted version of ILS (Inventory of Learning Styles) (Vermunt, 1998). Findings: We found four patterns: *meaning-directed* (MD); *reproduction-directed* (RD); *application directed* (AD) and *undirected* (UD) pattern; according to Vermunt. Regards personal factors differences according gender, effort and academic self-concept were found. Taking into account these findings, from a theoretical and Education significance of the research we support the accurate of Vermunt model (1998) based on four pattern. In addition, each one is influenced by and has a relationship between some personal factors and the GPA. Finally, a new challenger about education could be introduced, which must consider teaching and learning processes as a way of maximizing MD/AD patterns in students and caring for students with RD/UD patterns.

Oral Language and Early Literacy skills in Brazilian preschool children

Keywords: Achievement, At-risk students, Early childhood education, Literacy

Presenting Author:Rute Tomás, University of Luxembourg, Luxembourg; **Co-Author:**Carolina Nikaedo, University of Luxembourg, Faculty of Language and Literature, Humanities, Arts and Educational Sciences (FLSHASE), Luxembourg; **Co-Author:**Elizeu Macedo, Universidade Presbiteriana Mackenzie, Brazil; **Co-Author:**Pascale Engel de Abreu, University of Luxembourg, Luxembourg

In Brazil, many students perform below the expected levels on literacy. Children that fail to learn to read and write are at high risk of school failure and this risk is positively associated with low socio-economic status. Reading is a complex task that depends on a range of cognitive skills. Letter sound knowledge, phonological awareness, oral language and rapid automatized naming are important predictors for literacy acquisition. Preschool children with difficulties in any of these abilities are at risk of low literacy levels in primary school. Recent studies suggest that individual differences in literacy acquisition are detectable before formal school enrolment and targeted early interventions can improve the reading outcomes of these children. These studies have, however, almost exclusively been conducted in developed countries and less is known about individual differences in the cognitive processes of reading in children from countries with high levels of inequality. This study sought to fill this gap. One hundred preschool Brazilian children, from public and private preschools (4-5 years of age) took part in the study. Children completed a battery of tests tapping into oral language, phonological awareness, letter knowledge, rapid automatized naming and non-verbal reasoning. Results will be analysed using an individual differences approach to explore the cognitive skills related to reading in a sample of preschool Brazilian children from a wide range of socioeconomic status backgrounds. This study has important implications in relation to the detection of children at risk of developing reading difficulties in a developing country.

Relationship between language and early numerical development in children at the age of kindergarten

Keywords: Early childhood education, Mathematics, Numeracy, Quantitative methods

Presenting Author:Silvia Pixner, Institute of Psychology, UMIT, Health & Life Sciences University, Austria

There is still a lack of clarity how close language development and numerical development in early childhood are connected. Since both are very complex constructs, the aim of our present study was two-folded. First we focused on the relationship between the development of number words (i. e., 1, 2, 3) and the quantifier (i. e., more, many, a few), especially depending on vocabulary. Does the acquisition of quantifier possibly support the acquisition of certain number words or are these probably two completely detached systems? The second aim of our study was to analyze in this context the role of zero and the negation-quantifiers, i. e., "nothing" or "none". Do the children acquire an understanding of zero with the help of the negation-quantifiers, or are they as well independent of each other? In this longitudinal study a total of 73 monolingual German-speaking children between 3.6 and 4.6 years of age (33 boys and 40 girls) were examined in a first measurement. In addition to vocabulary and spatial orientation (measured by standardized methods), the focus was on the numerical development. The cardinality of certain magnitudes (0-5), as well as the understanding of quantifiers were operationalized with a give-N task.

Children's ideas about participation and their effect on sociocognitive development

Keywords: Citizenship education, Cognitive development, Early childhood education, Social development

Presenting Author:Nadine Correia, University Institute of Lisbon (ISCTE - IUL), Portugal; **Co-Author:**Margarida Fialho, ISCTE-IU, Portugal; **Co-Author:**Cecília Aguiar, University Institute of Lisbon (ISCTE - IUL), Portugal

Children's participation right has gained scale in the research field. The positive relationship between children's participation and the quality of preschool contexts is documented and indicates that children who attend high-quality preschool settings report more opportunities to participate or exert influence (Sheridan, 2007). Because children's participation is a criterion to be taken into account when evaluating preschool quality and there still exist few studies on this topic, we aimed to investigate the associations between children's ideas about participation, self-concept, assertiveness, and self-control, classroom quality, and teacher's perceptions about children's participation. Specifically, classroom quality and teachers' perceptions will be tested as moderators of the relationship between children's ideas and children's sociocognitive outcomes. Participants were (a) 60 preschool teachers, which filled in the questionnaire on "Teacher's perceptions about the implementation of children's participation right in preschool settings"; (b) 60 preschool classrooms of the Lisbon area, observed with the Classroom Assessment Scoring System (CLASS; Pianta, La Paro, & Hamre, 2008), and (c) 360 children attending those classes, assessed with the Portuguese version of the Social Skills Rating System (Gresham & Elliott, 1990), the Portuguese adaptation of The Pictorial Scale of Perceived Competence and Social Acceptance for Young Children (Harter & Pike, 1984; Mata, Monteiro, & Peixoto, 2008), and interviewed with "Choosing

classrooms: A structured interview on children's participation right". Associations between variables will be analysed and preliminary results will be presented.

Exploring the relationship between learning patterns, academic talent and GPA in primary school

Keywords: Early childhood education, Educational Psychology, Learning approaches, Primary education

Presenting Author: Laura Garcia Ravidá, Autonomous University of Barcelona, Spain; **Co-Author:** Jose Reinaldo Martinez-Fernandez, Autonomous University of Barcelona, Spain; **Co-Author:** Juan Marin, Escola La Salut, Spain

The aim of this study was to analyse the relationship between learning patterns, academic talent and the grade point average (GPA) on students of primary school. Methodology: the participants were 54 students from 4th grade of primary education in a school of Barcelona (Spain). They complete the Inventory of Learning Styles (ILS) and the School and College Ability Test III (SCAT III). Data were analysed from a correlation tests, factor analysis and cluster analysis. There were two relevant findings: First, the results showed a relationship between learning patterns (*Application-directed* and *Reproduction-directed*) with the academic performance. Second, the academic talent is confirmed as an adequate predictor of academic performance; but it is not related with learning pattern. We consider that it is necessary to inquiry more in depth the role of assessment (GPA) as to what it measures.

The early home learning environment as a protective factor for early adolescent coping with life

Keywords: Early childhood education, Educational attainment, Environmental education, Quantitative methods

Presenting Author: Sabine Blaurock, University of Bamberg, Germany; **Co-Author:** Simone Lehl, University of Bamberg, Germany

The quality of the home learning environment (HLE) is widely recognized as a contributor to children's competence development, social functioning and to their subsequent educational success (e.g. Bradley, 2015). The present study examined the relations between child and family risk factors (e.g. low maternal education etc.), the quality of the HLE in early childhood and adolescent's educational attainment and problem behavior. All the data are based on the German longitudinal study BiKS and the follow-up study BiKS^{plus}[3-13], which final follows 229 children from preschool age till age of 13. A mediation model was hypothesized and tested using pathway analysis. The findings show that exposure to social risk in early childhood predicted educational attainment negatively and risk-taking behavior and conduct problems positively. Furthermore, the negative association between risk and educational attainment were substantially weakened when children have experienced high stimulation at home in early childhood and additionally in early adolescence. Results are discussed regarding the longer-term protective potential of high stimulation at home for later coping with life.

Session C 20

30 August 2017 08:30 - 10:00

Pinni A - A2089

Poster Presentation

Cognitive Science, Higher Education, Instructional Design, Learning and Instructional Technology, Learning and Special Education

PO: Writing

Keywords: Attitudes and beliefs, Cognitive development, Cognitive skills, Educational Psychology, Higher education, Instructional design, Language (L1/Standard Language), Literacy, Peer interaction, Primary education, Quasi-experimental research, Secondary education, Teaching / instruction, Teaching approaches, Writing / Literacy

Interest group: SIG 12 - Writing

Chairperson: Saara Repo, University of Helsinki, Finland

The recursive nature of the writing process: editing strategies of professional literary authors

Keywords: Language (L1/Standard Language), Literacy, Teaching approaches, Writing / Literacy

Presenting Author: Susan Jones, University of Exeter, United Kingdom; **Co-Author:** Floor Buschenhenke, Huygens ING, Netherlands

Cognitive research into the writing process indicates that revision is a 'cognitively complex and costly process' (Chanquoy 2001) but that expert writers spend more time on revision, make changes to the text which are more substantive, and have a stronger sense of how they want the text to be (Sharples 1999). In contrast, novice writers tend to make few changes or focus on surface features such as spelling. Theoretical understanding of revision distinguishes between pre-text revision, which includes evaluation and refinement of ideas at the planning stage; online revision which occurs during writing, and deferred revision which happens when a draft is complete (Allal et al 2004). A further distinction is made between revision which focuses on error-correction and revision which transforms the text, including alterations to meaning. At the heart of revision is the capacity for the writer perceive a sense of dissonance between the text and the writer's intention, but this is difficult for developing writers (Hollaway and McCutchen 2004). We know that that professional writers revise more than developing writers; however, many empirical studies rely on self-report. This study was set up to explore the possibilities of keystroke logging for tracking the writing processes of literary authors. For the current presentation, the focus is on investigating the editing strategies observed in the four participants in our study, supplemented with interview data, and considering how this might inform the teaching of revision skills to less proficient writers.

Analysis of the strategy-focused instruction for improving writing competence

Keywords: Instructional design, Primary education, Teaching / instruction, Writing / Literacy

Presenting Author:Rut Sanchez, University of León, Spain; **Co-Author:**Paula Lopez, University of León, Spain; **Co-Author:**Alba Gonzalez, University of León, Spain; **Co-Author:**Raquel Fidalgo, University of León, Spain, Spain

Strategy-focused instruction has been considered the most effective approach for improving students' writing skills. Nevertheless, this kind of instruction has been implemented specially in upper grades of Primary Education versus the instruction on transcription processes in the first grades of this scholar stage. Therefore, the current study explores the effectiveness of the strategy-focused instruction in students of 3rd grade of primary education and the specific contribution of the type of practice implemented in the strategy-focused instruction, individual or collaborative. Also, the students' writing style will be taken into account to explore its influence in the intervention effectiveness. The sample comprised 72 students of 3rd grade of primary education divided in 3 classrooms within the same school. Two classrooms, randomly chosen, formed the experimental condition where it was implemented a strategy-focused program for the improvement of the writing competence focused on planning and drafting processes. Complementary, in one of the experimental groups students worked individually whereas in the another experimental group, students worked in a collaborative way, with the roles of writer and helper. Finally, the third group, in the control condition, received an instruction based on the promotion of motivation and creativity for the improvement of the writing competence. The study followed a quasi-experimental design with three evaluation times: pretest-posttest-follow up (2 months after the intervention). Textual productivity, organization and quality measures were taken, as well as measures related to students' writing style. Currently, analyses are being carried out, therefore the results and conclusions will be showed in the congress.

The SRSD + ICT model improves the writing skills of 4th grade students

Keywords: Instructional design, Primary education, Quasi-experimental research, Writing / Literacy

Presenting Author:Catarina Araújo, Institute of Education - University of Minho, Portugal; **Co-Author:**Ana Paula Loução Martins, Institute of Education, University of Minho, Portugal; **Co-Author:**António José Osório, Institute of Education, University of Minho, Portugal

Writing is an important, complex and demanding process, where students and teachers show difficulties (Graham & Hall, 2016). The Self-Regulated Strategy Development (SRSD) model and some technological tools provide scientific efficiency in writing (MacArthur, 2009). The aim of this study was to analyze the impact of using the SRSD model with and without the use of ICT in the performance of writing opinion essays by 4th grade students, with and without writing problems; The sample was composed by 178 4th grade students, organized equally in two groups (n = 78). Group 1 received SRSD model intervention (Karen, 1982) using ICT, and through regulated processes, while group 2 did not use ICT. Performance in writing opinion essays was assessed before and after the interventions according to: writing elements, composing quality, length and number of linking words. Each intervention lasted for 12 weeks (90 minutes per week); The results indicated a positive impact of SRSD and SRSD + ICT intervention in writing performance (writing elements, composing quality and number of linking words), presenting highly and very large magnitude of effect. Successively, we found a highly significant effect, with very large magnitude, of SRSD + ICT intervention compared to SRSD intervention on writing quality and the number of linking words; The results reinforce the relevance of using the SRSD model and the effectiveness of the integration of ICT, through self-regulation processes, on opinion essay writing performance. The theoretical, educational and political implications will be discussed. In the future it is suggested the implementation of these interventions, in other contexts and with different samples.

Text quality, writing processes and students' beliefs about writing at Secondary education in Chile

Keywords: Attitudes and beliefs, Language (L1/Standard Language), Secondary education, Writing / Literacy

Presenting Author:Magdalena Flores, University of Amsterdam, Netherlands; **Co-Author:**Gert Rijlaarsdam, University of Amsterdam, Netherlands; **Co-Author:**Daphne van Weijen, University of Amsterdam, Netherlands

At the end of school age many Chilean students demonstrate deficiencies in their academic writing skills. With the aim of providing information for improving this situation, this study aims to establish relationships between text quality, writing processes and students' beliefs. Participants will be sixty 7th students and sixty 11th grade students, from three different public schools. The method of the study will include two writing tasks and replying to a questionnaire. First, students will write an argumentative text (Task 1). Data of their writing processes will be recorded through Inputlog, a keystroke logging program. Second, students will respond a questionnaire about their motivation and conceptualizations concerning the first task. Third, students will write a letter to a fictitious new classmate, explaining him what should be done to achieve a better text in Task 1. Data will be collected in August 2017. After the analysis, statistical operations will be applied to determine correlations between the three sources of the data.

Learning to be a good Reviewer: the effects of reviewing on one's own writing

Keywords: Educational Psychology, Higher education, Peer interaction, Writing / Literacy

Presenting Author:Marta Pardo Estruch, Ramon Llull University, Spain; **Co-Author:**Montserrat Castelló, Ramon Llull University, Spain

In this research we have developed and evaluated an intervention based on the use of collaborative review as a means of enhancing and overcoming difficulties during the writing process from the reviewers' perspective. Our main goal was to

explore what kind of comments promoted deep revision and how offering comments on peer' drafts could help to improve reviewers' own writing. We adopted a longitudinal interpretive mixed method design that combined quantitative and qualitative data where 49 undergraduate students played two different roles: writers and reviewers (20.4% men - 79.6% women). We developed orientations and a writing guideline in order to help students during the revision process. Indeed, some specific instruments were developed to assess: a) final text quality (text assessment grid); b) reviewer's comments regarding their type and function (comments assessment grid); and c) changes that student- writers made in their texts - after receiving comments from their peers- according to acceptance or rejection, quality of the introduced and eluded changes and impact of changes in text (revision strategies grid). Results confirmed that deep revisions enhanced writing performance and highlighted collaborative reviewing as a useful way to learn to write and as a means for learning disciplinary knowledge. Moreover, results also showed that deep revision was related to develop a position as an author in one's own text, meaning dialoguing with others authors and establishing alignment with a particular position. Keywords: reviewer; collaborative peer revision; deep revision; writing performance; academic writing

Delving into the subjective frequency estimates in Spanish. On what are the estimations based on?

Keywords: Cognitive development, Cognitive skills, Literacy, Writing / Literacy

Presenting Author:M^a Emma García Pérez, Pontifical University of Salamanca, Spain

We collected subjective frequency estimates for 1,080 Spanish words of varied objective frequency. Specifically, 248 children (11-12 years) provided estimates of a sample of 615 words and 120 adults (20-26 years) estimated 465 words. Both groups rated the words on a 5-point scale from never encountered to encountered very often in four perceptual domains, that is, writing (FSE), reading (FSL), hearing (FSO) and speaking (FSD). ANOVA and regression analyses confirmed the results obtained in the English language for the adult population (Balota, Pilotti and Cortese, 2001). We found that subjective frequency estimates depend more on our knowledge of how many times we have spoken or heard a word rather than how many times we have written or read it. FSD (frequency of encounters in speaking) accounted for most of the variance in general subjective frequency (FSG). Added to this, the relevance of this work also depends on the kind of population employed for this study.

Session C 21

30 August 2017 08:30 - 10:00

Main Building A - A31

Poster Presentation

Motivational, Social and Affective Processes

PO: Motivation and Educational Psychology

Keywords: Assessment methods and tools, Attitudes and beliefs, Collaborative Learning, Educational Psychology, Educational Technology, Emotion and affect, Higher education, Mathematics, Motivation, Out-of-school learning, Parental involvement in learning, Quasi-experimental research, Science education, Self-regulation, Teacher Effectiveness, Teaching / instruction, Video analysis, Vocational education

Interest group: SIG 08 - Motivation and Emotion

Chairperson: Joerg-Tobias Kuhn, University of Münster, Germany

Does training to reflect on action foster reflection in action and finally on-the-job performance?

Keywords: Educational Technology, Quasi-experimental research, Video analysis, Vocational education

Presenting Author:Elisa Motta, Swiss Federal Institute for Vocational Education and Training, Switzerland; **Co-**

Author:Alberto Cattaneo, Swiss Federal Institute for Vocational Education and Training (SFIVET), Switzerland

According to the experiential learning approach, reflection leads the transformation of experiences in learning and can be classified as reflection *on* and *in* action depending if happening after or during the professional's performance. After a previous phase where we demonstrated the effectiveness of promoting reflection *on* action through instructional activities based on metacognitive prompts, we now present a study aimed at investigating 1. to what extent getting apprentices used to metacognitive prompts to reflect *on* action was also a way to promote their reflection *in* action; 2. to what extent reflection resulted in quality improvement within their professional performance; 3. if the exposition to reflective prompts during instructional activities at school promoted apprentices' long-term attitude to reflect *on* action. Apprentice chefs (9 belonged to the experimental group in the previous phase and 7 to the control group) were invited to perform a recipe and, when finished, to fill in a personal report to self-evaluate their performance. All the utterances were video-taped and the thinking aloud protocol analyzed. The experimental group outperformed the control group in the level of both reflection *in* and *on* action. The quality of the performance was also higher in the former group, according to experts' evaluation; qualitative data confirmed the approach had concrete consequences on apprentices' professional daily life. Despite its limitations in sample size, the study represents an interesting premise to deepen the feasibility of our pedagogical approach in vocational education and training across professions.

Predicting teachers' flow experience and job satisfaction from need satisfaction and frustration

Keywords: Educational Psychology, Motivation, Teacher Effectiveness, Teaching / instruction

Presenting Author:YoonJung Cho, Sungshin Women's University, Korea, Republic of; **Co-Author:**Sungok Serena Shim,

Ample evidence on the utility of students' need satisfaction has been documented, however, very few studies have addressed the importance of teachers' need satisfaction for their optimal functioning and psychological well-being. The present study focused on examining in what ways teachers' psychological needs for competence, autonomy, and relatedness are satisfied and/or frustrated and how teachers' need satisfaction and/or need frustration is related to teachers' optimal functioning as indicated by teachers' flow experience and job satisfaction. Person-centered analysis was conducted using six standardized variables (three need satisfaction scales and three need frustration sub-scales). K-means cluster analysis revealed three distinct groups: An average group with all six dimensions around the means, need-satisfied group with high need satisfaction scores but low need frustration scores, and a need-frustrated group with low need satisfaction scores and high need frustration scores. Results indicated that the need-satisfied teachers are less likely to leave the profession and furthermore, they tend to report more frequent flow experiences during teaching. Need-satisfied teachers showed most optimal functioning among the three groups that vary in terms of need satisfaction and need frustration. High need satisfaction accompanied by low need frustration will lay a foundation for teachers to flourish at work with high job satisfaction and less intention to leave.

The Effects of Private Tutoring on the Learning Context at Home

Keywords: Mathematics, Out-of-school learning, Parental involvement in learning, Quasi-experimental research

Presenting Author:Barbara Otto, Ludwigsburg University of Education, Germany; **Co-Author:**Christian Müller, Goethe-University Frankfurt, Germany

The prevalence of private tutoring in Germany is rather high compared to other European countries. Particularly low-achieving students get enrolled in this kind of shadow education in order to enhance their academic achievement. Despite of the high prevalence of private tutoring in Germany the investigation of its effectiveness has been neglected so far. Only a handful of studies have been examined this research field in a methodologically adequate way. Moreover, most of these refer to academic achievement or students' motivation as dependent variables. As empirical studies also revealed low academic achievement is also associated with conflicts at home suggesting that attending private tutoring should also enhance students' learning climate at home. Therefore, the current study aimed at the investigation of the effects of private tutoring on students' perceptions of their parents' involvement and the parent-child relationship.

38 students who were newly enrolled in a tutoring institute and a matched control group voluntarily participated in the longitudinal study. Data were assessed by a questionnaire that was applied two times (first: right after enrollment; second three months later). In order to answer the research question, analyses of variance with repeated measures were conducted separately for both dependent measures. The results of the analysis for parental involvement did not show a significant interaction effect. In contrast, tutored students reported on an enhancement of the parent-child relationship whereas students of the control group indicated a drop. These results are discussed with regard to their theoretical and practical implications.

Group Processes in College Classrooms: A Control-Value Theory Framework

Keywords: Attitudes and beliefs, Collaborative Learning, Emotion and affect, Higher education

Presenting Author:Jeannine Turner, Florida State University, United States; **Co-Author:**Jessica Summers, University of Arizona, United States

Framed by Control-Value Theory and Social Interdependence Theory, we conducted longitudinal analysis of two undergraduate courses that used group-work. In one course, students' group work contributed to over 50% percent of the final course grade (high stakes) while in the other course, students' group work contributed to only 1/3 of the final course grade (low stakes). At the beginning of the semester we assessed students' perceptions regarding their control of group-work processes, their valuing of group-work processes, and their prospective emotions about participating within group-work, and subsequently assessed their group-work emotions and perceptions of group knowledge-building at the end of the semester. Structural equation modeling demonstrated five major findings: (1) initial expectancies of group-work processes are closely related to immediate prospective emotions; (2) initial valuing of group-work processes are more related to distal experienced group-work emotions than prospective emotions, (3) the best predictor of experienced emotions is the anticipation of experiencing the emotion, (4) if students expect positive outcomes of group-work, they tend to also value group-work processes, experience enjoyment during group-work interactions, and perceive support for group-related learning, and (5) when students experience group-work anxiety or anger they do not experience the benefits of group-learning. The implications of these findings are discussed with respect to future research.

Measuring Science Attitudes: Two Studies Using a Motivation Framework

Keywords: Assessment methods and tools, Attitudes and beliefs, Motivation, Science education

Presenting Author:David Bergin, University of Missouri/Columbia, United States; **Co-Author:**Christi Bergin, University of Missouri/Columbia, United States; **Co-Author:**Chia-Lin Tsai, University of Missouri/Columbia, United States; **Co-Author:**Christopher Murakami, University of Missouri/Columbia, United States

Many interventions seek to improve students' attitude toward science and need a tool to measure this important outcome. This article addresses the development of a self-report measure of student motivation regarding science. The Science

Attitude Measure (SAM) was developed to address key motivational variables. Psychometric properties of the Science Attitude Measure (SAM) were assessed in two studies: (1) 1,351 high school freshmen in physics classes, (2) 3,085 high school seniors who reported regarding their science class. In Study 1, exploratory factor analysis suggested 4 factors (expectancy, value, cost, and identity/career interest), which confirmatory factor analysis supported. Invariance was demonstrated for gender and ethnicity (White and non-White). SAM scales correlated significantly with classroom engagement and other variables, which was further demonstration of validity. Study 2 confirmed results from Study 1. In conclusion, the 18-item SAM is aligned with major motivation theories, shows psychometric validity, and is a viable assessment of science attitudes across high school.

Second grade students' parents' ability beliefs and the quality of their homework involvement

Keywords: Attitudes and beliefs, Parental involvement in learning, Self-regulation, Teaching / instruction

Presenting Author:Grete Arro, Tallinn University, Estonia; **Co-Author:**Kati Aus, Institute of Psychology, Estonia

Supporting the development of self-regulatory processes is one of the many tasks of teachers, but the context of homework assigned by teachers to be completed at home is also a valuable resource for developing learning skills and self-regulation. According to research, one of the indicators of positive parental homework involvement is the ability of the parents to be autonomy supportive. There is ample evidence suggesting that people's implicit theories about the malleability of different personality attributes (incl. cognitive abilities) are associated with their behaviour in achievement contexts or otherwise demanding situations and possibly also their helping or directing of others in demanding situations. Current study aims to see whether parents' ability beliefs are associated with their autonomy supportive and structure offering versus controlling behaviour when it comes to parents' everyday involvement in their children's homework. Data on 162 parents of second grade students indicated that whereas entity beliefs about learning skills bore positive associations with parents' controlling as well as structuring behaviour during assisting with homework, beliefs about the malleability of general intelligence were not associated with parental homework behaviour. The results bear important implications for targeting specific belief-sets when addressing parents' possibilities for better supporting the development of their children's self-regulatory processes.

Session C 22

30 August 2017 08:30 - 10:00

Pinni B - B0039

Poster Presentation

Higher Education

PO: Higher Education and Teaching Approaches

Keywords: Action research, Collaborative Learning, Competencies, Conceptual change, Design based research, Educational policy, Educational Psychology, Higher education, In-service teacher education, Learning approaches, Quantitative methods, Self-regulation, Survey Research, Teaching approaches

Interest group: SIG 04 - Higher Education

Chairperson: Frans Prins, Utrecht University, Netherlands

Defining Consistency in Higher Education

Keywords: Conceptual change, Educational policy, Higher education, Survey Research

Presenting Author:Julian Dehne, University of Potsdam, Germany; **Co-Author:**Thi Nguyen, University of Potsdam, Germany; **Co-Author:**Ulrike Lucke, University of Potsdam, Germany

Consistency in higher education research has been a largely ignored subject. We define consistency in this context and present arguments as to whether it can be regarded as scientifically relevant. Furthermore, we tested our model in a quantitative study at our university. The statistics show that 57,9% of students perceive contradictions within their course work while 23,3% perceive unnecessary repetitions, while the concept of sequentiality correlates with certain aspects of study organization as well as with student's satisfaction. The results are discussed and linked to the larger paradigm of learning outcome oriented pedagogies and the current trend of modularization following the Bologna process.

I like to make people laugh: Adult playfulness among educators

Keywords: Competencies, Higher education, In-service teacher education, Quantitative methods

Presenting Author:Pirkko Siklander, University of Lapland, Finland; **Co-Author:**Marjaana Kangas, University of Lapland, Finland; **Co-Author:**Justus Randolph, Mercer University, United States; **Co-Author:**Heli Ruokamo, University of Lapland, Finland

All educators need to be creative and playful when designing teaching and learning activities, and acknowledging their potential for playfulness competence is important. Playfulness as a personality trait and as a quality of activities is studied widely in children but less often in adults. To explore adult playfulness, we use a Finnish language version of Staempfi's (2005; 2007) adult playfulness scale (APS). The participants (N=123) are educators or students in educational fields. The results reveal that playfulness is mostly consistent between different age groups and that men are slightly less playful than women. These results confirm those of our earlier studies and indicate that playfulness includes insight, creativity, imagination, embodiment and emotionality. The results of this study will be used to design our subsequent qualitative study and to design teaching and learning in teacher education programmes.

Does motivation explain different achievement of preservice teachers and psychology students?

Keywords: Action research, Design based research, Higher education, Teaching approaches

Presenting Author: Eva Seifried, Heidelberg University, Germany; **Co-Author:** Birgit Spinath, Heidelberg University, Germany

It is often assumed that preservice teachers are not motivated for courses other than their future teaching subjects (e.g., courses in psychology), and that their low motivation is relevant for their (low) learning outcomes. To test this assumption, we collected data on both preservice teachers' and psychology students' achievement aspirations as well as further motivational and cognitive learning prerequisites in parallel lectures "Introduction to Educational Psychology" at a German university in two semesters ($N = 294/275$ preservice teachers and $N = 129/122$ psychology students). We found that preservice teachers did not differ from psychology students in their achievement aspirations and most of the other learning prerequisites in a negative way. For the preservice teachers, achievement aspirations were only weakly correlated with examination performance but students' school grade point average (GPA) was the best predictor of performance for both student groups. The significance of the aforementioned variables and further learning prerequisites (e.g., (objective) prior knowledge and subjective knowledge) will be discussed.

Using a person-centered approach in identifying regulation profiles among Finnish medical students

Keywords: Higher education, Quantitative methods, Self-regulation, Survey Research

Presenting Author: Henna Vilppu, University of Turku, Finland; **Co-Author:** Eero Laakkonen, University of Turku, Finland; **Co-Author:** Mirjamaija Mikkilä-Erdmann, University of Turku, Finland; **Co-Author:** Pekka Kääpä, University of Turku, Finland

In this study we were interested in how medical students regulate their learning during the first 3 years in medical school and to what extent this regulation is connected with study success. Additionally, the functionality of a shortened version of regulation scales of the Inventory of Learning Styles (Vermunt, 1994) was analyzed in medical education context. The participants of the study were 162 medical and dental students, who answered the regulation scale at three measurement points. The analyses yielded a three-factor solution, which was reliable across time. Four profiles of regulation strategies were identified. Our results showed that these profiles were connected to study success: Students with lowest self-regulation and increasing lack of regulation performed worse than the other groups. Our longitudinal, within-subjects study is a valuable contribution to the field of research into academic learning. Using a person-centered approach along with more traditional variable-centered approach increases understanding of the complex nature of learning in higher education. Further, since the approach enables us to individualize students with different regulation strategy patterns, it could be used as a tool for supporting student learning and to help early diagnosing of learning difficulties.

Students' experience of interactive teaching by means of a digital response system

Keywords: Action research, Design based research, Higher education, Teaching approaches

Presenting Author: Åge Diseth, University of Bergen, Norway

Digital response systems, often labelled as SRS (Student Response Systems), enable interaction in the lecture situation by assigning subject relevant quizzes to the students and by providing immediate feedback to them. It also provides feedback to lecturers regarding the level of knowledge among their students. Hence, use of SRS has potential within the framework of Scholarship of Teaching and Learning (SoTL). This presentation shows how the students experienced utilization of SRS. Students were assigned subject relevant quizzes during the lecture by means of a web-based SRS (Socrative) which they utilized by means of their own devices (e.g., smartphones, laptops, tablets). The participants were subsequently asked to report their satisfaction with use of SRS in terms of items reflecting motivation, learning, interaction, and engagement during lectures. They reported a high degree of satisfaction, in particular regarding the possibility to disclose limitations in their own knowledge of the subject matter. Students who expected relatively weaker exam performance reported a somewhat higher degree of usefulness of SRS compared to students who expected better performance. These results were discussed with reference to the test-effect and to possible experience of flow in the learning situation. In conclusion, this presentation highlights the importance of constructing quizzes beyond testing of students' remembrance of particular topics. In particular, it seems important to also test students understanding in terms of analysis, evaluation, application, and creation of new knowledge.

Relationship between conceptions of learning, teamwork conceptions and GPA among undergraduates

Keywords: Collaborative Learning, Educational Psychology, Higher education, Learning approaches

Presenting Author: Laia Encinar Prat, Autonomous University of Barcelona, Spain; **Co-Author:** Marc Martínez-Pons, UAB Universitat Autònoma de Barcelona, Spain; **Co-Author:** Jose Reinaldo Martinez-Fernandez, Autonomous University of Barcelona, Spain

The aim of this study was to analyse the relationship between conceptions of learning, teamwork conceptions and academic performance (GPA) during the first year of tertiary education in the specific domain of Educational Sciences. Methodology: Participants were 84 undergraduates in Educational Sciences from Spain. They completed the learning conceptions questionnaire (CONAPRE) and the Conceptions about Teamwork Questionnaire (CTQ). At the same time, their GPA average was obtained. Findings: The results show a significant relationship between different conceptions of learning and teamwork conceptions, while only one of teamwork conception has a significant connection with GPA. Beyond these findings, it is worth it to continue towards a theoretical discussion about the relationships between learning and

teamwork conceptions in tertiary conceptions and how their can influence in the academic performance.

Session C 23

30 August 2017 08:30 - 10:00

Main Building A - A05

Poster Presentation

Assessment and Evaluation, Instructional Design, Learning and Instructional Technology

PO: Computer-assisted Learning

Keywords: Assessment methods and tools, Attitudes and beliefs, Comprehension of text and graphics, Computer-assisted learning, E-learning / Online learning, Early childhood education, Experimental studies, Game-based learning, Higher education, Instructional design, Learning disabilities, Learning Technologies, Misconceptions, Neuroscience, Numeracy, Quantitative methods, Science education, Self-efficacy, Student learning, Survey Research, Teaching / instruction, Technology

Interest group: SIG 07 - Learning and Instruction with Computers

Chairperson: Rupert Higham, University of Cambridge, United Kingdom

Different visual patterns for game-based learners with high and low self-efficacy of game playing

Keywords: Game-based learning, Learning Technologies, Neuroscience, Self-efficacy

Presenting Author: Meng-Jung Tsai, National Taiwan University of Science & Technology, Taiwan; **Co-Author:** Chung-Yuan Hsu, National Pingtung University of Science and Technology, Taiwan; **Co-Author:** Guo-Li Chiou, National Taiwan University of Science and Technology, Taiwan; **Co-Author:** Ching-Yeh Wang, National Taiwan University of Science and Technology, Taiwan; **Co-Author:** An-Hsuan Wu, National Taiwan University of Science and Technology, Taiwan

This study aimed to explore the visual patterns for learners during a game-based physics learning environment, especially for the learners with different self-efficacy toward the game playing. A Shadow Game with a meta-cognitive scaffolding design for learning the concept of light and shadow was used in this study. A total of 47 college students participated in the game-based learning eye-tracking experiment during which their eye-movements were tracked and recorded by an ASL MobileEye eye-tracker. At most ten minutes were allowed for each participant to play in this experiment. Participants' self-efficacies about game playing were assessed by a self-reported questionnaire right after the game playing. All eye-tracking measures on areas of interests were compared between the high and the low self-efficacy groups. Sequential analyses were further analyzed for the two groups. The preliminary results showed that there were different visual patterns between the high and the low self-efficacy learners, in terms of visual attention distributions and visual attention transfers. The high self-efficacy players seemed to be able to focus on utilizing the meta-cognitive tools. The low self-efficacy players might need to make more efforts on recalling the correlation between the sunlight schedule and the shadow length. This study provided some suggestions for future research and designs of physics game-based learning. All of the implications will be discussed in the conference.

Effects of a Training Intervention on Knowledge Integration in Physics

Keywords: Experimental studies, Instructional design, Misconceptions, Science education

Presenting Author: Markus H. Hefter, Bielefeld University, Germany; **Co-Author:** Kirsten Berthold, University of Bielefeld, Germany

In scientific domains such as physics, the naïve concepts learners bring to the classroom can be in conflict with the correct scientific concepts that are meant to be learned. Following the knowledge integration approach, learners should dispute, evaluate, and connect the naïve and scientific concepts and thereby establish a deep scientific understanding. It seems feasible to develop and test appropriate instructional approaches to foster such knowledge integration of naïve and scientific concepts. Thus, our aim is developing a short-term training intervention on knowledge integration in the domain of physics. We plan to conduct an experimental study with 80 German high school students in a between-subjects design comprised of two conditions: (a) training intervention on knowledge integration, (b) no such training intervention. We will assess learning outcomes, such as domain-general knowledge (i.e., knowledge about principles of the knowledge integration approach) and domain-specific knowledge (i.e., knowledge about the physical principles). Furthermore, we will assess self-explanation quality to gain insights into learning processes during the training interventions and to analyze the possible mediating effect of self-explanation quality on learning outcomes. Expecting positive effects of our training intervention on learning outcomes, we might show the potential of a short-term training intervention on knowledge integration. This could be a first promising step in developing more long-term and blended-learning interventions.

A comparative study on learning and teaching online inquiry skills in Finland and Chile

Keywords: Attitudes and beliefs, Comprehension of text and graphics, Self-efficacy, Survey Research

Presenting Author: Eero Sormunen, University of Tampere, Finland; **Presenting Author:** Mirjamaija Mikkilä-Erdmann, University of Turku, Finland; **Co-Author:** Teemu Mikkonen, University of Tampere, Finland; **Co-Author:** Norbert Erdmann, University of Turku, Finland; **Co-Author:** Carita Kiili, University of Oslo, Norway; **Co-Author:** Elina Hämäläinen, University of Jyväskylä, Finland; **Co-Author:** Mario Quintanilla, Universidad Católica de Chile, Chile; **Co-Author:** Roberto González-Ibáñez, Universidad de Santiago, Chile; **Co-Author:** Paavo Leppänen, University of Jyväskylä, Finland; **Co-Author:** Marja

Vauras, University of Turku, Finland

The poster presentation will report the findings of a survey study on teachers and students in Chile and Finland. The survey is a part of a cross-cultural project aiming to develop novel pedagogical practices in teaching online inquiry competences in primary schools. The survey explores students' epistemic and learning beliefs, attitudes to online inquiry, and their perceived self-efficacy on online inquiry skills. The teachers' survey covers the same constructs and, in addition, their teaching beliefs, and perceived self-efficacy on teaching online inquiry skills. The study is expected to shed light on the primary school students' and teachers' aptitudes to adopt pedagogical practices needed in the Internet-dominated information and media environment. Further, the study will demonstrate the differences in the actors' fundamental conceptions of knowledge, learning and teaching in two school systems and cultures. The poster will also discuss the methodological challenges in cross-cultural research in education.

Learning science - does e-text design matter?

Keywords: E-learning / Online learning, Higher education, Learning Technologies, Teaching / instruction

Presenting Author:Norbert Erdmann, University of Turku, Finland; **Presenting Author:**Mirjamaija Mikkilä-Erdmann, University of Turku, Finland; **Co-Author:**Eero Laakkonen, University of Turku, Finland

The purpose of this study is to investigate, how e-text influences science learning of preservice teacher students and what students expect from new e-text design. Two different e-text designs (index and concept map) for iPad were tested with 189 university students. Pre- and post-test design was used. Both groups increased statistically significantly their performance. However, there were no statistically significant interaction effects found between treatment groups. Students' expectations for e-text design seem to be very traditional. Students preferred traditional characteristics in e-text design such as underlining and making notes more than interactive characteristics such as links leading to additional materials, videos and games.

Students' task solving times and task solving efficiency on an online language skills test

Keywords: Assessment methods and tools, Computer-assisted learning, Quantitative methods, Student learning

Presenting Author:Tibor Vidákovich, University of Szeged, Hungary; **Co-Author:**Olga S. Hrebik, University of Szeged, Hungary; **Co-Author:**Tibor Vigh, University of Szeged, Hungary

This research investigated online task solving of primary school students. The aim was to analyse student achievements and task solving times on a universal (not language-specific) language skills test, and to explore the effect of task's cognitive level and task's position on task solving time and on task solving efficiency. The test consisted of four subtests with different cognitive levels. Data were collected in two primary schools, the sample comprised 6–7th grade students. The online assessment platform stored item responses and task solving times. An indicator of students' 'task solving efficiency' was computed for each task, expressing the relation of these factors. The test proved to be of acceptable reliability. Significant differences were found between the subtests in achievements and in test taking times as well, but the differences were independent from the cognitive level. Significant correlations were found between test taking time and test score for the whole test, and for two subtests. Our results verified the effect of the cognitive level of the subtest on students' task solving efficiency. Students proved to be more efficient on subtests of low cognitive level, and less efficient on subtests of high cognitive level. On three subtests, students' task solving efficiency was significantly lower on the first task than on the following ones. Finally, the higher was the cognitive level of the subtest, the stronger was the correlation between test taking time and test score. Successful task solvers tend to spend more time on tasks of high cognitive level.

Development of early mathematical cognition using app. An empirical study

Keywords: Early childhood education, Learning disabilities, Numeracy, Technology

Presenting Author:Jose I. Navarro-Guzman, University of Cadiz, Spain; **Co-Author:**Gonzalo Ruiz Cagigas, Universidad de Cádiz, Spain; **Co-Author:**Manuel Aguilar-Villagrán, University of Cadiz, Spain; **Co-Author:**Estívaliz Aragón-Mendizabal, University of Cadiz, Spain; **Co-Author:**M. Carmen Canto, University of Cadiz, Spain; **Co-Author:**Candida Delgado-Casas, University of Cadiz, Spain; **Co-Author:**Esperanza Marchena-Consejero, University of Cadiz, Spain; **Co-Author:**Inmaculada Menacho, University of Cadiz, Spain; **Co-Author:**Manuel García-Sedeño, University of Cadiz, Spain; **Co-Author:**Pedro Ramiro, University of Cadiz, Spain

There is unanimity that early identification of poor performance in learning, and relevant intervention could reduce subsequent failure in math. There are also evidence that intervention must address both aspects of "general domain" (working memory, processing speed), and those of "specific domain" (Subitizing, Composing and Decomposing Numbers, Number Line). In this regard, our project aims to implement these knowledge advances about early mathematics learning via widely used technologies by children. The project's overall objective is reducing rates of learning difficulties in mathematics at early age. This is identified in other more specific goals: (1) Design and construction of mobile devices applications (APP) tasks based on "general domain" and "specific domain" for early mathematical learning. (2) Check APP validity as educational tools with 5-7 y.o. students in order transferring contrasted knowledge to public and private educational settings. (3) Expand an innovative line of research examining the effectiveness of APP, through a continuous tutoring of students in several schools. The educative intervention is based on innovation strategies in the context of e-learning. Previous R & D projects developed by us have consolidated the cognitive features involved in learning mathematics. The project involves a collaboration between researchers and teachers to the design, implementation, supervision and monitoring. This proposal will be carried out a 3-years longitudinal study, with 2 groups (control and

experimental). Participants are evaluated before, during and after educational intervention, using e-assessment procedures. The expected results are e-learning should improve math skills.

Session C 24

30 August 2017 08:30 - 10:00

Main Building C - C5

Poster Presentation

Higher Education, Learning and Instructional Technology

PO: Higher Education and Student Learning

Keywords: Assessment methods and tools, Cooperative / collaborative learning, E-learning / Online learning, Educational attainment, Educational Technology, Experimental studies, Higher education, Learning analytics, Learning approaches, Qualitative methods, Science education, Student learning, Teacher Professional Development, Technology

Interest group: SIG 04 - Higher Education

Chairperson: Daniela Martinek, University of Salzburg, Austria

Merging academic and LMS data for first year engineering and education students at two universities

Keywords: E-learning / Online learning, Higher education, Learning analytics, Student learning

Presenting Author: Carlos González-Ugalde, Pontificia Universidad Católica de Chile, Chile; **Co-Author:** Sergio Celis, Escuela de Ingeniería y Ciencias. FCFM. Universidad de Chile, Chile; **Co-Author:** Dany López, Facultad de Educación. Pontificia Universidad Católica de Chile, Chile; **Co-Author:** Sergio Barrera, Escuela de Ingeniería y Ciencias. FCFM. Universidad de Chile, Chile; **Co-Author:** Augusto Sandoval, Facultad de Ingeniería. Pontificia Universidad Católica de Chile, Chile; **Co-Author:** Maximiliano Montenegro, Facultad de Educación. Pontificia Universidad Católica de Chile, Chile; **Co-Author:** Carolina Guzmán-Valenzuela, University of Chile, Chile

In this poster we characterize, compare, and contrast academic and learning management system (LMS) data from first year students enrolled in a School of Engineering and in a School of Education. Both schools, each of which belongs to a different research university in Chile, have constructed statistical models for understanding and predicting academic achievement. In this study, we expand those models with new sources of data and merge both school records. Thus, this study contributes several dimensions to our knowledge about learning analytics and academic performance. First, the study combines detailed academic records and different types of LMS operations in relation to first year courses. Second, since these data are collected at two types of institutions and from two professional disciplines, we are able to test how conceptual and statistical models behave across different but comparable learning environments. Finally, the poster will include key lessons obtained from merging sensitive data from multiple sources. In total, the data for this poster consists of 1,978 students from the 2013 and 2014 entry cohorts at both schools.

Students' expectations to and experiences of research based teaching

Keywords: Higher education, Learning approaches, Science education, Student learning

Presenting Author: Camilla Østerberg Rump, University of Copenhagen, Denmark; **Co-Author:** Dorte Christiansen Elmeskov, Department of Science Education, University of Copenhagen, Denmark

Teaching and learning are often competing activities, and this leads to frustrations and may compromise the quality of teaching. As part of a university wide initiative, three modules were redesigned to engage students in research or research-like activities. In order to evaluate this, we developed an instrument asking students about their *expectations* to research-based teaching. This instrument can be administered pre and post instruction. The idea is, that is that we would expect an increase in students' expectations to research-based teaching if they have a good experience. The instrument is based on Healey's model (2005) of four types of research-based teaching. It was administered pre and post instruction to three classes in landscape architecture and biochemistry. Results show that for biochemistry the students' expectations do indeed rise. For landscape architecture they do, however, decline. This can be explained by the students experiencing too little outcome in relation to time spent. A redesign has been made, and results from this will be reported. In our judgement, the instrument provided valuable input to the evaluation of the modules involved. A factor analysis identified four factors. We would have expected them to be close to the four types of factors in Healey's model. The factors were far from. Rather it seems that the students distinguish "ordinary teaching" from other types of teaching. We find that this is a quite striking result.

Where is the future? Identifying trends in educational technology using big data methodology

Keywords: E-learning / Online learning, Educational Technology, Higher education, Technology

Presenting Author: Maren Luebcke, Zurich University of Applied Sciences, Switzerland; **Co-Author:** Wilfried Seifert, Softwareentwicklung Seifert, Switzerland

Digital technologies are one of the key drivers of change identified by Ernst & Young (2012) in their study on the university of the future. In the field of educational technology new forms, trends, and hypes arise. Universities have to decide which short and medium and long-term developments must be addressed and adapted and which can be ignored.

We present a new methodology to identify educational technologies that become relevant for universities in 3 to 5 years.

The method is based on a meta-analysis of different discourse spaces, each discourse space representing a different part in the Gartner Hype Cycle. For 2016 the results of eight different trend reports, 1'416 scientific articles from the field of educational technology and 1,000 tweets were systematically analyzed. On a medium time perspective (5 years) the following technologies become relevant:

Bots / Robots/Affective Computing / AIAlgorithmVirtual Reality / Augmented RealityWearables

On a short time perspective (2 years) we can find the following trends:Mobile devicesGamesMOOCAAt EARLI 2017 these results from 2016 will be compared with results of the 2017 analysis .

How can Question Generation be implemented in the University Curriculum?

Keywords: Cooperative / collaborative learning, Experimental studies, Higher education, Student learning

Presenting Author:Roman Abel, University of Kassel, Germany; **Co-Author:**Matthias Mai, University of Goettingen, Germany

Generating questions is known as a solid learning strategy in order to enhance learning outcomes (Foos, Mora, & Tkacz, 1994; Rosenshine, Meister, & Chapman, 1996; Bugg & McDaniel, 2012). This method was already applied in early and recent field experiments on university courses' topics (Foos et al., 1994; Levin & Arnold, 2008) but never as an assignment for a course credit. In our study 87 students participated over four equal courses about Educational Psychology. They have been randomly distributed between ten timeslots with different topics and between three types of assignment for a course credit. Two control groups were conducted: 1. writing a report as an alternative elaborative strategy and 2. preparing and holding a presentation about a related, but not a relevant topic in the current timeslot. The final retrieval test contained a pool of items from each timeslot in order to differentiate topic related and topic non-related items. The main question of this study is whether the learning strategy generating questions leads to gains in learning performance regarding the targeted items. The study did not only reveal main differences between groups concerning the targeted items but also of topic irrelevant items. The type of assignment seemed to influence the degree of elaboration in the own as well as in other timeslots. In fact we could not confirm our hypothesis – not generating questions but writing a report revealed to be the favorable learning strategy.

Encountering Students in Disabling Conditions in Higher Education

Keywords: Higher education, Qualitative methods, Student learning, Teacher Professional Development

Presenting Author:Lotta Anderson, Malmö University, Sweden; **Presenting Author:**Lisbeth Ohlsson, Malmö University, Sweden; **Co-Author:**Camilla Nordgren, Malmö University, Sweden

The aim of this paper is to discuss challenges for staff in Higher Education encountering students in disabling conditions. The study takes a point of departure in a series of workshops to strengthen the competence among staff at Malmö University to develop inclusive learning environments in their field of responsibility. The research questions concern the participants' understanding of what constitutes an inclusive learning environment and their preparedness for acting in line with rights for people with disabilities to an education free from discrimination. Content analysis from field notes taken in dialogues with the participants showed that barriers exist e.g. due to procedures in order to get a statement qualifying to support as well as not having a statement meaning that the student becomes carrier of her/his own problems, responsible for telling each staff member about the disabling conditions and needs. Tension appeared in the analysis between giving support to the individual student and a proactive problem solving in a flexible learning environment to the benefit of all students. Principles of equal access and widened participation are not easily applied leading to the conclusions that further efforts need to be made to disseminate existing knowledge in the field and moreover to identify knowledge gaps by involving students, coordinators of support and other staff in different survey studies. The framework for coming studies is anchored in theory and practice developed in Universal Design for Learning focusing staff development and students' sense of belonging when facing disabling conditions in higher education.

Assessment Preferences and Approaches to Learning of MBA and MPA students: A Comparative Study

Keywords: Assessment methods and tools, Educational attainment, Higher education, Student learning

Presenting Author:James Kwan, Lancaster University, Singapore

This pilot study seeks to examine the educational goals, learning approach, and assessment preferences among the part-time MBA and MPA students in Singapore. The quantitative study uses a questionnaire that employed the revised two-factor study process questionnaire (R-SPQ-2F) to identify students approach to learning, and the adapted Assessment Preference Inventory (API) to examine students' preferences to different assessment types/tasks.

The results of this study showed that educational goals relating to career advancement/enhancement and improved knowledge and skills were the key motivational factors that lead students pursuing postgraduate studies. When comes to approaches to learning, students generally adopting a deep learning approach, especially among the MPA students and the older students. This approach to learning was also evident in the assessment preference among the respondents, where they preferred assessments that required higher order level of thinking. When comes to the assessment types,

respondents have strong preference for individual assignment and showed least preference for exam. However, there was no significant difference in the preference for any of the assessment items/format among gender and age groups. The findings in this study will be beneficial for the university to consider to redesign the curriculum for both programs to suit the needs of existing students as well as to increase its appeal to prospective students. The respondents' views on their learning approach and assessment preferences will allow instructors and module leaders to relook into the teaching pedagogy and current assessment structure in order to improve students' learning experience.

Session D 1

30 August 2017 10:15 - 11:45

Pinni B - B3109

Roundtable

Higher Education, Learning and Instructional Technology

RT: Online Learning and Writing

Keywords: Argumentation, E-learning / Online learning, Educational Technology, Higher education, Informal learning, Teaching / instruction, Writing / Literacy

Interest group: SIG 07 - Learning and Instruction with Computers, SIG 12 - Writing

Chairperson: Jannet Doppenberg, Eindhoven University of Technology, Netherlands

To tweet or not to tweet?! Can using Twitter improve learning and instruction in higher education?

Keywords: Educational Technology, Higher education, Informal learning, Teaching / instruction

Presenting Author: Britt Adams, Ghent University, Belgium; **Co-Author:** Annelies Raes, Ghent University, Belgium; **Co-Author:** Hannelore Montrieux, Ghent University, Belgium; **Co-Author:** Elise Ameloot, Ghent University, Belgium; **Co-Author:** Tammy Schellens, Ghent University, Belgium

Of the range of recent technological developments, social media have become the most widely adopted by the current generation of students. However, despite the widespread use and the potential of social media to enhance learning and instruction in higher education, research on students' actual user experiences is still lacking. This paper describes two consecutive interventions in which two comparable student populations were assigned (to start) using Twitter in the context of a Third Academic Bachelor Course Instructional Strategies. The first intervention was conducted from September '15 till January '16, the second intervention has just started in September '16. Based on the results of the first intervention, we could conclude that our students were rather skeptical about using Twitter in higher education, although they had moderate to high initial expectations. One of the critical obstacles students put forth was competence frustration, overload, and external motivation. These results led to concrete suggestions for future practice which are taken into account in the second intervention. We are looking forward to present the results of both interventions at a round table session, and discuss with the participants the opportunities and conditions for using Twitter - and social media in general - in higher education.

Improving integration skills for argumentative writing: a pilot intervention in an online university

Keywords: Argumentation, E-learning / Online learning, Higher education, Writing / Literacy

Presenting Author: Maria Luna, Universidad a Distancia de Madrid (UDIMA), Spain; **Co-Author:** Ruth Villalon, University of Cantabria, Spain; **Co-Author:** Mar Mateos, Universidad Autónoma de Madrid, Spain; **Co-Author:** Elena Martin, Universidad Autónoma de Madrid, Spain

Effective argumentation in written tasks is a demanding task for secondary and university students. It involves understanding, evaluating, weighing, combining and generating arguments and counterarguments from different sources and perspectives to support a final position. Despite its difficulty and complexity, argumentative writing is scarcely taught at the Spanish university, so students need, in particular, more instruction to improve their argumentative skills. This pilot study is aimed to design and test instructional assistance supported by Moodle platform in an online university. Volunteer undergraduates participated in this pre-post design. They were asked to write a previous synthesis from two source texts and to attend to two types of instructional virtual environment ("traditional" / "metacognitive") in order to write a second synthesis from two new texts. In this paper we present data of thirty-four students who receive the "metacognitive" instruction, which focus on the reading and writing processes of written argumentation. This intervention includes explicit instruction, a modelling video and a script to guide the reading and writing processes. It employs several resources such as videos, graphic organizers and exercises. Results show that, after the training, the written products which reached at least a minimum integration were more frequent. However, the products that presented medium and maximum integration were still limited. This results suggest that students still need more training and support in order to expand their skills for generating new integrative arguments.

Session D 2

30 August 2017 10:15 - 11:45

Pinni A - Paavo Koli

Single Paper

Doctoral Education

Keywords: Doctoral education, Educational policy, Higher education, Mixed-method research, Qualitative methods, Researcher education, Self-regulation, Writing / Literacy

Interest group: SIG 24 - Researcher Education and Careers

Chairperson: Thomas Moser, University College of Southeast Norway, Norway

Addressing the quality of doctoral supervisors

Keywords: Doctoral education, Educational policy, Qualitative methods, Researcher education

Presenting Author: Margaret Kiley, Australian National University, Australia

Research suggests that a supportive advising [supervising] relationship is central to successful and timely completion and particularly as an agent for socialization into the discipline the institution and a scholarly approach to research (Gardner, 2010; Golde, 2000). Furthermore, as Lovitts and Nelson (2000 p. 49) report: "The data suggest that the single most important factor in student decisions to continue or withdraw is the relationship with a faculty adviser". However, anecdotally it is not uncommon to hear Heads of Department, Deans of Faculty and those in similar positions say that they know who the poorly performing doctoral supervisors are, but often they are not sure what they can do to remedy the situation. This study interviewed 36 senior staff in order to understand how they identified supervisors who were generally considered less than ideal in the way they supervised doctoral candidates and then how they addressed this issue. The results provide helpful insights for staff in leadership positions as well as those whose role it is to support doctoral education, and particularly supervision.

What is the value of a doctoral degree? Perceptions of doctoral value in the UK knowledge economy

Keywords: Doctoral education, Higher education, Mixed-method research, Researcher education

Presenting Author: Billy Bryan, University of Sheffield, United Kingdom; **Co-Author:** Kay Guccione, University of Sheffield, United Kingdom

Those who have a doctorate are said to hold significant knowledge and social capital. The recruitment of doctoral graduates yields collective knowledge, skills, networking, and prestige benefits to organisations, and to UK industries. As individuals though, do graduates experience net gain from the doctoral process, and how do they perceive the value that engaging with doctoral study confers? This study used a mixed methods approach to collect survey data from current doctoral students (n=195) and interview data from recent doctorate holders (n=24). The main finding was that the doctorate was perceived not to be as valuable as both groups had expected, but gained other 'added-value' from the process. Doctoral students and graduates across disciplines and careers find most value in the personal resilience and resourcefulness they develop through study, as well as deriving useful and translatable learning from inter-personal, cultural awareness, and relational processes. Student's value judgements were affected by factors such as supervision and their level of progress in the doctoral process. Graduate's perceptions were chiefly affected by their progress on the career ladder and their financial position. These findings have the potential to inform doctoral education programme leaders and HE policy makers in not only how to squeeze value from doctoral graduates, but to create a positive doctoral experience with lifelong benefits to the individual.

Doctoral Students' Writing Regulation Processes

Keywords: Doctoral education, Researcher education, Self-regulation, Writing / Literacy

Presenting Author: Anna Sala-Bubaré, Ramon Llull University, Spain; **Co-Author:** Montserrat Castelló, Ramon Llull University, Spain; **Co-Author:** Gert Rijlaarsdam, University of Amsterdam, Netherlands

Academic writing is a complex cognitive and sociocultural activity that requires writers to regulate their actions at different levels and phases. Doctoral education research shows students face many challenges along the writing process. However, little is known about how PhD students regulate their on-line writing process. To address this gap, the present study analysed two doctoral students' regulation processes when starting to write their first scientific article. Participants wrote an extended abstract of their research under naturalistic conditions. A screen-recorder and a keystroke logging software were used to collect data, along with a short writing log and responded to an open-ended questionnaire. After a week, writers received feedback on their texts and revised their abstracts under the same conditions. The analysis involved three levels: 'operations' (each keystroke or mouse movement), 'actions' (consecutive operations sharing a specific goal), and 'episodes' (actions aimed at the same objective). Based on the unit of analysis 'Regulation Episodes', 'episodes' were classified as 'regulation' and 'production', and "regulation episodes" were further characterised in relation to their type, focus and location. Results showed writing a scientific article is a 'writing-from-sources' activity right from the beginning of the process. Great variations not only between the two writers, but also between sessions regarding the type and distribution of the problems addressed, the regulation episodes and the attempted solutions. This study provides an innovative method to explore regulation processes of authentic tasks.

Session D 3

30 August 2017 10:15 - 11:45

Pinni B - B4113

Higher Education - B

Keywords: Achievement, Action research, Attitudes and beliefs, Design based research, Developmental processes, Emotion and affect, Higher education, Learning approaches, Science education, Self-efficacy, Survey Research, Teacher Professional Development, Teaching approaches

Interest group: SIG 04 - Higher Education

Chairperson: Steve Nebel, Chemnitz University of Technology, Germany

Students' identity formation processes and academic achievement at their university

Keywords: Achievement, Developmental processes, Emotion and affect, Higher education

Presenting Author: Hanke Korpershoek, University of Groningen, Netherlands

The objective of this paper was to demonstrate the construct validity and predictive validity of the measurement framework presented by Crocetti, Rubini, and Meeus (2008), which was originally developed to measure the identity formation processes (such as achieving commitments) of individuals in various domains. An adapted version of the Utrecht-Management of Identity Commitments Scale (U-MICS) was used to measure university students' identity formation processes, which are a part of students' personal identities, at their university. The U-MICS seeks to measure three dimensions of identity formation: commitment, in-depth exploration, and reconsideration of commitment. A Rasch measurement approach was applied. The results showed that the multidimensional model validly represented students' identity formation processes at university (construct validity), although some items need further improvement. Suggestions for improvement are discussed. The commitment and in-depth exploration scales were positively related to students' academic achievement, while the reconsideration of commitment scale was negatively related to the same (predictive validity).

Mapping pedagogic frailty in science education: a comparison of academics' espoused values

Keywords: Attitudes and beliefs, Higher education, Science education, Teacher Professional Development

Presenting Author: Paulo Correia, University of Sao Paulo, Brazil; **Co-Author:** Joana Aguiar, University of Sao Paulo, Brazil; **Co-Author:** Ian Kinchin, University of Surrey, United Kingdom

Pedagogic frailty is explored as a unifying concept to integrate institutional efforts to enhance university teaching. One of the underlying causes of pedagogic frailty may be the way in which the curriculum discourses surrounding the instructional mechanisms of teaching seem to take precedence over the discourse of the underpinning values. This key dimension of frailty (regulative vs. instructional discourse) and the links that connect its parts are interrogated here through the analysis of contrasting concept maps produced by two academics experienced in the teaching and research of science education. The findings from this study reveal the subjective nature of teaching and provide a glimpse of the idiosyncratic nature of the values that underpin academic identity. The methodology described suggests a way forward to the development of bespoke, person-centred and discipline-sensitive faculty development by providing deep self-reflect as the process of teaching. Moreover, the data collected can be used to promote dialogue about quality enhancement in science teaching and the development of the idea of institutional values literacy.

Study profiles in different disciplines and their relation to study success and self-efficacy

Keywords: Higher education, Learning approaches, Self-efficacy, Survey Research

Presenting Author: Anna Parpala, University of Helsinki, Finland; **Co-Author:** Telle Hailikari, University of Helsinki, Finland

There is still little evidence on the disciplinary differences in students' approaches to learning as only a few studies have included students from various disciplines. The present study aims to examine what kind of combinations of approaches to learning emerge in different disciplines and how profiles, based on those combinations, are related to study success and self-efficacy beliefs. All together 4377 university students from six different disciplines participated in the study. The results showed that the most successful profile is the combination of deep and organised approach to studying whereas the combinations of deep and unorganised studying and incoherent study profile seem to be the most problematic in the light of self-efficacy and study success. The study highlights the need to take disciplinary differences and study profiles into account to enhance teaching and learning.

Improving University Courses by Fostering Students' Learning Strategies

Keywords: Action research, Design based research, Higher education, Teaching approaches

Presenting Author: Alexander Renkl, University of Freiburg, Germany; **Co-Author:** Tino Endres, University of Freiburg, Germany; **Co-Author:** Jasmin Leber, University of Freiburg, Germany

The Scholarship of Teaching and Learning can be thought of in two different ways. The traditional way is teaching orientated. This way is to optimize university seminars by improving the teacher's instruction. A complementary way is to foster students' learning strategies to learn more from teacher's instruction. For the latter purpose, we have developed a computer-based learning environment for freshmen students in a developmental psychology course. This environment consists of two modules: 1) teaching declarative knowledge about learning strategies and 2) supporting students to apply these learning strategies when working for the university course. We conducted several experimental studies to optimize this learning environment with respect to how motivating it is, how the declarative knowledge about learning strategies can

be effectively consolidated, and how the formation of prompts for applying the learning strategies can be sensibly supported. We found that motivation while working with the learning environment can be fostered by using sketched explanation videos used as advance organizers. For consolidating students' knowledge about learning strategies, a retrieval practice-based arrangement is best that uses different types of test questions for learners with different prior knowledge levels. This prior knowledge is automatically assessed in the learning environment. Finally, we found that it is important to guide the students to form very specific prompts for applying learning strategies.

Session D 4

30 August 2017 10:15 - 11:45

Main Building A - A32

Single Paper

Lifelong Learning, Motivational, Social and Affective Processes

Self-regulation and Motivation

Keywords: Achievement, At-risk students, Developmental processes, Educational attainment, Mathematics, Metacognition, Motivation, Motivation and emotion, Quasi-experimental research, Self-efficacy, Self-regulation, Student learning

Interest group: SIG 08 - Motivation and Emotion

Chairperson: Norbert Erdmann, University of Turku, Finland

Perception of Mindfulness Practice and its Contribution to Students Wellbeing

Keywords: Developmental processes, Educational attainment, Self-efficacy, Motivation and emotion

Presenting Author: Ariela Teichman-Weinberg, Achva Academic College, Israel; **Co-Author:** Ilana Rachmilewitz, Achva Academic College, Israel; **Co-Author:** Esther Grobgeld, Achva Academic College, Israel

Mindfulness meditation is intended to develop attention to an experience that is taking place in the present, with non-judgmental acceptance. The present study examined the experience of fifth and sixth graders who practice mindfulness and how this experience contributed to their wellbeing. Most of the interviewed students reported practicing mindfulness also in their free time, in order to cope with anger, pressure and stress. They experience of the practice as calming, improving the concentration ability. In the education system, mindfulness practice can comprise an effective, available and applicable solution which contributes to the students' positive feelings, by finding a quiet place in their minds.

Enhancing adolescents' self-determined motivation and self-concept in math. An intervention study.

Keywords: At-risk students, Mathematics, Motivation, Quasi-experimental research

Presenting Author: Claudia Cristina Brandenberger, University of Bern, Switzerland; **Co-Author:** Gerda Hagenauer, University of Bern, Switzerland; **Co-Author:** Tina Hascher, University of Bern, Switzerland

A negative trend, especially for students in lower achievement levels, is for academic self-determined motivation to significantly decline across childhood through adolescence, and more so in math than in any other school subject. To counteract this negative development, an intervention study based on the Self-Determination Theory was developed and implemented in seventh-grade math classes with basic demands in Switzerland. The study applied a quasi-experimental design using two treatment groups (combined student/teacher group: teachers and students participate in intervention; students-only treatment group: only students participate in intervention) and a control group. The sample for this study included 348 7th grade students (student/teacher group: 134 students; students-only group: 122 students; control group: 92 students). The aim of this study was to examine the impact of both treatment forms on students' motivation and self-concept. The intervention was evaluated longitudinally (pre- and post-test) through a student questionnaire. Paired sample t-tests and Cohen's d showed that the most positive effects were found for students in the combined group with a significant increase in intrinsic motivation and self-concept. Multivariate analysis of covariance with repeated measures revealed a significant intervention interaction effect for intrinsic and identified motivation as well as self-concept, indicating significant differences between the groups in favour of students in the combined group. The results of the present study highlight that the decline of autonomous motivation across adolescence is strongly influenced by teachers who shape the learning environment *and* by the students who develop learning competencies and reflect on their attitudes towards learning.

Parents' autonomous motivation favours students' motivation toward homework

Keywords: Achievement, Self-efficacy, Self-regulation, Motivation and emotion

Presenting Author: Angelica Moè, University of Padova, Italy; **Co-Author:** Idit Katz, Ben-Gurion University of the Negev, Israel; **Co-Author:** Marianna Alesi, Università di Palermo, Italy

Although homework is a frequent source of stress for both parents and students, parents' autonomous motivation and display of positive affect can make the difference. In this research, we tested the hypothesis that parents' autonomous motivation favours students' motivation and display of positive affect during homework. Study 1 used a correlational approach and showed, with 205 dyads of parents and their children from the fourth to eighth grades, that parents' autonomous motivation favours parents' positive affect, which in turn is associated with students' positive and negative affect, both directly and through the mediation of students' self-efficacy. Study 2 assessed the effectiveness of an intervention, with parents focused on practising autonomous supportive modalities on students' homework motivations and

affect. The results showed that the training reduced parents' controlled motivation and negative affect, and prevented a decrease in students' autonomous motivation and engagement. The discussion focuses on theoretical and educational implications.

Predictors of self-regulated learning in upper secondary and higher education

Keywords: Metacognition, Motivation, Self-regulation, Student learning

Presenting Author: Christian Brandmo, University of Oslo, Norway; **Co-Author:** Olav Schewe, University of Oslo, Norway

The current study examines how different individual and social components of motivation predict various aspects of self-regulated learning and whether these potential predictions are valid across levels of education. The participants comprised 1,588 upper secondary school students and 981 higher education students from Norway, totaling 2,569 students. The data were collected through an informative web-solution that gave the participants immediate feedback on their component scores compared to a norm. The data were analyzed by means of factor analyses and structural equation modelling. Using a tree-factor model of self-regulated learning – planning and monitoring, volition and resistance for distraction, and adaptive regulation for learning – the results revealed that the different types of motivation variously predicted the components of self-regulated learning. Though there were similarities in the prediction pattern across educational levels, significant differences were also found. Implications for further research as well as practical implications are discussed.

Session D 5

30 August 2017 10:15 - 11:45

Linna - K108

Roundtable

Educational Policy and Systems, Instructional Design

RT: Assessment and Conceptual Change

Keywords: Arts, Assessment methods and tools, Attitudes and beliefs, Computer-supported collaborative learning, Conceptual change, Educational policy, Educational Psychology, Reflective society

Interest group: SIG 03 - Conceptual Change

Chairperson: Laurent Filliettaz, University of Geneva, Switzerland

Reflective Assessment in Computer-Supported Collaborative Learning for Pre-Service Teachers

Keywords: Assessment methods and tools, Attitudes and beliefs, Computer-supported collaborative learning, Educational Psychology

Presenting Author: Carol Chan, The University of Hong Kong, Hong Kong; **Co-Author:** Wincy Lee, Education University of Hong Kong, Hong Kong; **Co-Author:** Rhoda Wang, The University of Hong Kong, Hong Kong

This study examined the design of a computer-supported environment using online discussion for alignment of learning, collaboration and assessment. Participants were 155 student teachers attending a course in psychology of classroom learning in a teacher education program in Hong Kong. The design included students contributing to online forum; engaging in regular discussion; and reflecting on their discourse. For reflective assessment, student teachers identified three best examples (clusters of notes) from the class community's discourse and explained why they were important for their inquiry. Data consisted of questionnaires on epistemic beliefs and collaboration; students' postings on online forum; reflective assessment notes (3 best clusters of notes); and end-of-term theory-practice summary paper. Correlation analysis show that students' beliefs about collaboration was related to their beliefs about knowledge (development); as well, regression analysis indicate that reflective assessment scores significantly predict summary paper (domain understanding). Implications of examining both individual and community learning through reflective assessment in computer-supported environments are discussed. _

Influencing policy makers and institutional leaders in Finnish Arts Education via systems thinking

Keywords: Arts, Conceptual change, Educational policy, Reflective society

Presenting Author: Tuulikki Laes, Sibelius Academy of the University of the Arts Helsinki, Finland; **Co-Author:** Lauri Väkevää, Sibelius Academy of the University of Arts Helsinki, Finland; **Co-Author:** Hanna Kamensky, Sibelius Academy of the University of Arts Helsinki, Finland; **Co-Author:** Sanna Kivijärvi, Sibelius Academy of the University of Arts Helsinki, Finland; **Co-Author:** Kati Nieminen, Sibelius Academy of the University of Arts Helsinki, Finland

In this round table discussion we examine how systems thinking can be used in policy work and communication with institutional leaders. We ask, can systems thinking in the context of Basic Education in the Arts be a tool for conceptualizing social change and strengthening democratization in contemporary Finnish society? The participants of the discussion are involved in the ArtsEqual initiative (2015-2020) that reinterprets the traditional position of the arts in Finland by regarding them as a basic service that should be equally available for all. From the perspectives of equality and well-being, the project generates new knowledge on how already existing arts services could be developed in order to enhance the democratic and inclusive thinking and action in diverse society. The project will propose policy recommendations to support decision-making and to consolidate new arts and arts education based services. Through examples of three innovative case studies of the ArtsEqual, we will raise the question: how can systems thinking in the context of Basic

Education in the Arts (BEA) be a tool for strengthening the process of democratization in contemporary Finnish society?

Session D 6

30 August 2017 10:15 - 11:45

Linna - Väinö Linna (K104)

Single Paper

Assessment and Evaluation

Assesment and Evaluation

Keywords: Achievement, Assessment methods and tools, Cognitive development, Motivation, Primary education, Qualitative methods, Quantitative methods, Reasoning, Science education, Secondary data analysis, Teacher Effectiveness

Interest group: SIG 01 - Assessment and Evaluation

Chairperson: Tsafirir Goldberg, University of Haifa, Israel

The modelling of teachers' judgment in summative assessment practices

Keywords: Assessment methods and tools, Primary education, Qualitative methods, Teacher Effectiveness

Presenting Author: Lucie Mottier Lopez, University of Geneva, Switzerland; **Presenting Author:** Lionel Dechamboux, University of Geneva, Switzerland

Our research examines the construction of meaning during summative assessment practices with respect to predefined assessment criteria and other emerging referents. The purpose is to model the dynamic and logic of the teachers' judgment in practice, in particular in case of hesitations and when the teachers authorize them to make adjustments during grading-process. First, we use a conceptual framework developed in the French-speaking community of researchers in assessment in education, that takes into account the relation between assessment criteria (called "referents", components of assessment frame of reference) and observables or signs in the student's answer selected by the assessor (called "referes", Hadji, 1989). Processing of assessment reference is called "referentialization" (Figari & Remaud, 2014), for instance when new meaning of pre-defined assessment criteria emerged during grading process. Secondly, we interpret the phenomena of referentialization we observed with respect to a professional judgment perspective (Lafortune & Allal, 2008). Our results will show how pre-existent and emergent referents are differently located during the teachers' activity of referentialization, between interpretation and decision-making processes. The kind of triangulation between these referents seems to characterize different profiles of teacher-assessor. We will discuss these profiles, in particular according to the validity of consequence of the assessment.

Development of achievement and test taking behavior – a class-centered analysis

Keywords: Achievement, Assessment methods and tools, Motivation, Secondary data analysis

Presenting Author: Risto Hotulainen, University of Helsinki, Finland; **Co-Author:** Sirkku Kupiainen, University of Helsinki, Finland; **Co-Author:** Mari-Pauliina Vainikainen, University of Helsinki, Finland; **Co-Author:** Pirjo Lindfors, University of Tampere, Finland

In Finland, differences between schools have been one of the lowest in the OECD according to several PISA studies, but there is much less research on within-school effects in Finland, with only a few exceptions. These studies have shown that there are considerable class level differences on both school achievement and scientific reasoning. Aim of this study was to detect if development of class-level academic achievement from 7th to 9th grade between classes differ and if yes, the second aim was study if there are between class-level differences in motivation and social capital. Two theories provided ground for the chosen approach: Achievement goal orientation theory and the Theory of social capital including both classroom and family social capital. The final study population filling out the questionnaires and achievement tests (math and reading) in 2011 (7th grade) and 2014 (9th grade) contained 5219 students (51.3% girls) from 462 classrooms and 117 schools. Latent profile analysis and ANOVAs were executed with aggregated class level data. The results showed that based on repeated achievement measures, it was possible to find three class achievement profiles: P1: increasing (69 %), P2: moderate (19 %) and P3: decreasing (13 %). Class profiles differentiated both in motivation and social capital (both classroom and family social capital). This study showed that the development of low-stake test achievement and behavior is associated with class level goal orientations and social capital.

Relationship between scientific and inductive reasoning in grades 5 and 7

Keywords: Cognitive development, Quantitative methods, Reasoning, Science education

Presenting Author: Erzsébet Korom, University of Szeged, MTA-SZTE Science Education Research Group, Hungary; **Co-Author:** Mária B. Németh, MTA-SZTE Research Group on the Development of Competencies, Hungary; **Co-Author:** Attila Pásztor, MTA-SZTE Research Group on the Development of Competencies, Hungary; **Co-Author:** Benő Csapó, University of Szeged, Hungary

This study reports the first results of a project, which investigates the relationship between general thinking skills, scientific reasoning and motivation to learn sciences. The purpose of this paper is (1) to examine the development of general thinking skills and scientific reasoning between grades 5 and 7, and (2) to explore the relationship between inductive and

scientific reasoning. The sample included 53-53 classes from 52 Hungarian schools (grade 5: N= 549, males 49.9%, grade 7 (N=551, males 47.7%). An online test was developed to assess scientific reasoning (Cronbach's alpha grade 5: .76; grade 7: .84). In order to complete the tasks students had to operate different thinking processes such as conservation; proportional, correlational, probabilistic reasoning and classification skills in science context. The domain-general online inductive reasoning test comprised 55 items with four subtests: 15 figural series, 15 figural analogies, 14 number series and 11 number analogies (Cronbach's alpha was .90 in both grades). Results indicate that students' scientific reasoning skill changed significantly between the two school years. The correlation between scientific reasoning and domain general inductive reasoning was stronger in grade 7 ($r_{\text{grade5}}=.40$, $r_{\text{grade7}}=.62$). Linear regression analyses showed that inductive reasoning explained 39.7% of variance in grade 7 and 16.3% of variance in grade 5. Our results highlight the importance of improving reasoning through the content of teaching in everyday school practice.

Online assessment of scientific reasoning and motivation to learn science: a pilot study in Namibia

Keywords: Motivation, Quantitative methods, Reasoning, Science education

Presenting Author:Linus Kambeyo, University of Szeged, Hungary; **Co-Author:**Attila Pásztor, MTA-SZTE Research Group on the Development of Competencies, Hungary; **Co-Author:**Erzsébet Korom, University of Szeged, MTA-SZTE Science Education Research Group, Hungary; **Co-Author:**Mária B. Németh, MTA-SZTE Research Group on the Development of Competencies, Hungary; **Co-Author:**Benő Csapó, University of Szeged, Hungary

Abstract The purposes of this study were to explore the possibilities of online assessment and to investigate the relationship between scientific reasoning and motivation to learn science in Namibia. The sample of the study was drawn from the fifth (N=275) and seventh graders (N=346). The online assessment tool for scientific reasoning skills consisted of 36 items with 16 tasks assessing conservation; proportional, correlational, probabilistic reasoning and classification skills in science context. The Science Motivation Questionnaire II. (SMQ, Glynn et al., 2011) was also applied. The eDia platform was used to collect the data. Learners were ferried from their schools to the University of Namibia's ICT rooms. Due to the low reliability in grade 5 (Cronbach alpha=.64) we excluded them from further analyses. For grade 7 Cronbach alpha=.70. The tasks were moderately hard for the students: $M=40.56\%$; $SD=13.47\%$. One-parameter Rasch analyses showed that there were few items for differentiate students at low skill levels. The reliability of the SMQ was good, Cronbach alpha=.91. Average scores were relatively high, thus, students reported that they are motivated to learn science. Except self-efficacy significant (p

Session D 7

30 August 2017 10:15 - 11:45

Virta - 109

Single Paper

Teaching and Teacher Education

Teaching and Teacher Education - J

Keywords: Bilingual education, Educational Psychology, Language (Foreign and second), Motivation, Pre-service teacher education, Reading comprehension, Science education, Self-regulation, Teacher Professional Development, Teaching / instruction, Video analysis

Interest group: SIG 11 - Teaching and Teacher Education

Chairperson: Kristina Kögler, Germany

Linking Instruction and Student Achievement to Reading in English as a Second Language

Keywords: Language (Foreign and second), Reading comprehension, Teaching / instruction, Video analysis

Presenting Author:Lisbeth M Brevik, University of Oslo, Norway

This study follows teachers and students in seven classrooms at seven different schools across three school years, by identifying components of classroom practices that can be related to reading achievement. The study combines achievement data (national English reading tests), instructional data (video observations from English lessons), and student survey data (perceptions of their English instruction). The findings indicate low quality English instruction; evidence of implicit rather than explicit reading strategy use and instruction; and that while the majority of the students expressed satisfaction of the support they received in their English lessons, the observed support was primarily given in the first language aimed at the poor readers. This study contributes with systematic findings of what characterizes second language reading instruction.

Effects and Surprises of Teaching Biology in a Foreign Language

Keywords: Bilingual education, Language (Foreign and second), Motivation, Science education

Presenting Author:Pablo Pirnay-Dummer, Brandenburg Medical School Theodor-Fontane, Germany; **Co-Author:**Bonny Jänicke, Martin-Luther-Universität Halle-Wittenberg, Germany

Didactics often assume cognitive and motivational effects within properly conducted bilingual classroom settings for STEM-education, where a science is taught in a foreign language, which the students also learn at school. This quasi-experiment investigates commonly assumed effects on grades, grade change, motivation, interest and self-concept within a full-semester six point repeated measurement design with eight-graders (n=51). While none of the often-predicted effects on

motivation, interest and self-concept could be shown, this study presents promising cognitive effects on grades and performance within bilingual classrooms that are particularly beneficial for weaker learners: introducing the additional level of complexity of teaching to the class will not harm weaker students. They may instead benefit from such settings.

Motivational orientations, psychological needs and perceived autonomy support in teacher training

Keywords: Educational Psychology, Motivation, Pre-service teacher education, Teaching / instruction

Presenting Author: Daniela Martinek, University of Salzburg, Austria; **Co-Author:** Matteo Carmignola, University of Salzburg, Austria; **Co-Author:** Ulrike Kipman, Pädagogische Hochschule Salzburg, Austria; **Co-Author:** Julia Maria Keller, University of Salzburg, Austria

Being able to support their pupils' autonomy in class is an essential skill for teachers. Research results indicate that next to specific training programs individual orientations of students in teachers training need to be considered to enable future educators to reduce control and offer autonomy support in class. Our project focused on empirical evidence concerning the prerequisites of teacher trainees during their program at the university. Therefore 351 students participated in a questionnaire-based empirical study using the following scales: General Causality Orientations Scale (Deci & Ryan, 1985), Basic Psychological Need Satisfaction Scale (Van den Broeck et al. 2010) and Perceived Autonomy (based on Reeve et. al. 2003). In addition we manipulated the announcement of an existing educational course by offering one in controlling and one in non-controlling language. Data shows how students in teacher training differ in regard to the expressions of their causality orientations as they can be classified by distinct combinations of the three scales. Those profiles have an impact as high levels of autonomy orientation are linked to more valuable outcomes in the training program such as higher psychological need satisfaction and perceived autonomy. The experiment with two manipulated course descriptions brought the expected effect of verbal formulations on perceived autonomy as all students regardless their causality orientations showed higher levels of perceived autonomy for the formulation in autonomy supportive language. The results can contribute to design supportive didactical settings for teacher training offering students autonomy support and structure in a non-controlling way.

Prompting Preservice Teachers' Professional Vision for Self-Regulated Learning

Keywords: Pre-service teacher education, Self-regulation, Teacher Professional Development, Video analysis

Presenting Author: Tova Michalsky, Bar-Ilan University, Israel

The present study investigated the effects of three professional vision (PV) scaffolding level for analysing video-cases of complex self-regulated learning (SRL): (1) *Self-guided*, analysing video cases without any help, (2) *Hinted* approach, pre-service teachers got a time hint for the event they needed to analyse and (3) *Guided* approach, pre-service teachers got a popup notification of the relevant event and SRL teaching. Findings demonstrated that the *Hinted* approach led to better performance on pre-service teachers' use of SRL in their PV for SRL and actual SRL teaching as measured directly (implicit/explicit SRL-promoting strategy instruction), and indirectly (construction of SRL-promoting learning environments).

Session D 8

30 August 2017 10:15 - 11:45

Virta - 113

Single Paper

Instructional Design, Lifelong Learning, Teaching and Teacher Education

Phenomenography and Variation Theory

Keywords: E-learning / Online learning, Early childhood education, Instructional design, Lifelong learning, Mathematics, Peer interaction, Phenomenography, Pre-service teacher education, Qualitative methods, Student learning, Teaching / instruction, Teaching approaches, Video analysis

Interest group: SIG 09 - Phenomenography and Variation Theory

Chairperson: Tal Palevsky, University of Haifa, Israel

No Parents Left Behind! Enabling parental learning on a mobile phone app for working class families

Keywords: E-learning / Online learning, Peer interaction, Phenomenography, Lifelong learning

Presenting Author: Luis Go, The University of Hong Kong, Hong Kong; **Co-Author:** Ming Fai Pang, The University of Hong Kong, Hong Kong

It is found that text messaging were very effective in 'nudging' parents to participate in school activities and to get them more involved in their child's learning (EEF, 2014). However, as of today, mobile technology is still exceedingly under-utilized for the education of parents as parents. The paper presents the innovation of combining the case study methodology, publicly available video materials on parenting and WhatsApp mobile app to create a low cost, easy-to-use mobile app platform, thus making parent education more accessible to underprivileged working class families. With the help of administrators of schools located in relatively economically depressed areas of the city, 15 to 20 parents in each of the 3 participating schools were invited into a school WhatsApp mobile app peer-learning group. Five parenting situational videos were used as cases. Each case video was uploaded at the beginning of each lesson, and each case class discussion allotted five days. The group parent education moderator monitored the level of participation and ensured that the discussion stays on the case. Pre- and post- event interviews were conducted with the participants. Interview transcripts

were analysed to evaluate parental learning. Preliminary results indicate significant levels of transformational learning occurring amongst the participants.

Learning to see numbers as parts and wholes in preschool

Keywords: Early childhood education, Instructional design, Mathematics, Phenomenography

Presenting Author: Angelika Kullberg, University of Gothenburg, Sweden; **Co-Author:** Anna-Lena Ekdahl, Jönköping University, Sweden; **Co-Author:** Maria Reis, Göteborgs Universitet, Sweden

Children's understanding of early arithmetic plays a significant role in their potential for future learning of mathematics. It has been argued that one important part of children's understanding of the first ten numbers is a 'sensuous' experience of the numbers part-part-whole relationships. The aim of the research project, from which this study emanates, was to explore how the first ten numbers are experienced and early arithmetic is developed by 5-year old children. In the beginning of the project 103 participating children were interviewed individually. The intervention programme concentrated on games that focused e.g. on seeing part-part-whole relationships on fingers, and was implemented in close collaboration with the pre-school teachers. After the ten-month intervention period, the children were interviewed again. We report on findings from the analysis of one task in the video recorded interviews, 'the guessing game', using a variation theory framework. The aim of this paper is to illustrate identified differences found in children's experience of the part-part-whole relationship in the task before and after the intervention.

Learner contributions and sensitive teacher ears – Learning opportunities in mathematics instruction

Keywords: Qualitative methods, Teaching / instruction, Teaching approaches, Video analysis

Presenting Author: Tuula Maunula, University of Gothenburg, Sweden

Learner contributions and sensitive teacher ears – Learning opportunities in mathematics instruction The aim of this study is to identify teachers' responses to learner contributions in mathematics instruction and thereby to contribute to knowledge of what different responses mean to the emergence of learning opportunities. Variation theory is used to address learning opportunities in a content perspective (e.g. Marton, 2015). The empirical data encompasses 16 video recorded mathematics lessons. The lessons are either conducted in grade 9, 10 or 11 in Sweden. All lessons share the topic, *the introduction of linear equations*. Results show that learner contributions (LCs) are established in four different trajectories due to different teacher responses: Disregarded LCs, Selected LCs, Considered LCs, and Explored LCs. Also, the defining dimensions of the content are typically opened by teachers, with or without interaction. However, non-defining dimensions of the content are mainly opened due to co-constitution between teacher and students, most often as a result of considered or explored learner contributions. Learner silence and insufficient teacher responses to learner contributions, as well as the importance of responsible learners and sensitive teacher ears, are discussed in relation to pedagogical implications for teaching.

Reference:

Marton F. (2015) *Necessary Conditions of Learning*, London: Routledge

Critical competencies in teacher students' learning to teach

Keywords: Phenomenography, Pre-service teacher education, Student learning, Teaching / instruction

Presenting Author: Kyriaki Doumas, Linnaeus University, Sweden

This investigation explores critical aspects of competence in teaching and learning to teach as experienced by teacher students in practice parts of teacher education. The focus is on what teacher students experience as critical in critical events occurring during their teaching practice, and if and how they focus on the relation between teaching and pupil learning, critical from a theoretical educational perspective. Four groups of four teacher students in each, preschool, leisure, literature and physics teacher students, participated in the research. During a period of teaching practice they wrote narratives about critical events in their teaching sessions. Reflecting and focus interviews about the described critical events followed. The different forms of data collection give a possibility of triangulation and comparisons between methods. The general approach to the analysis of the material is contextual analysis. Three types of events were mainly identified through the analysis of critical events described by the teacher students: *Gaining authority*, *Facing the tension between the intended and the enacted object of learning* and *Creating relational didactics*. *Fronesis* as flexibility to act contextually and in situ as well as courage to act anew and to take the risk of failure are considered to be main teaching competencies.

Session D 9

30 August 2017 10:15 - 11:45

Pinni A - A1081

Single Paper

Higher Education, Lifelong Learning

Learning and Professional Development - B

Keywords: Cognitive skills, Content analysis, Educational policy, Higher education, Informal learning, Lifelong learning, Mixed-method research, Quantitative methods, Self-regulation, Survey Research, Teacher Professional Development, Technology, Workplace learning

Interest group: SIG 14 - Learning and Professional Development

Chairperson: Maaike Endedijk, University of Twente, Netherlands

Leadership for Innovative Teacher Teams in Higher Education

Keywords: Educational policy, Higher education, Teacher Professional Development, Lifelong learning

Presenting Author: Mieke Koeslag-Kreunen, Zuyd University of Applied Sciences / Maastricht University, Netherlands; **Co-Author:** Piet Van den Bossche, Maastricht University School of Business and Economics, University of Antwerp, Belgium; **Co-Author:** Marcel Van der Klink, Zuyd University of Applied Sciences, Netherlands; **Co-Author:** Wim Gijssels, Maastricht University, Netherlands

It has been argued that connecting teachers in teams may support innovation in higher education. A team approach enables members to co-construct innovative solutions through engaging in team learning behaviors. In practice, however, teachers are not used to share and discuss their practices together. Team leadership behavior is repeatedly marked as a crucial factor for stimulating team learning, but specific empirical insights are lacking; especially in the context of higher education. The present study examined which leadership behavior encourages learning behavior in university teacher teams who encounter innovative tasks in their job assignment. Results of hierarchical regression analyses on 52 teams show that shared leadership was the most important factor for supporting team learning, above and beyond vertical team leadership. Specifically, our findings show that teacher team members who encouraged challenging the status quo promoted team learning behavior, in contrast to focusing on structuring the task. Subsequently, their team learning behavior supported their effectiveness in dealing with their innovative tasks.

Understanding crowdworkers' learning practices

Keywords: Informal learning, Mixed-method research, Self-regulation, Workplace learning

Presenting Author: Anoush Margaryan, Goethe-Universität Frankfurt, Germany

This paper reports findings of a study exploring how crowdworkers develop their knowledge and skills in the course of their work on digital platforms. The focus is on learning initiated and self-regulated by crowdworkers: engaging in challenging tasks; studying professional literature/online resources; sharing knowledge and collaborating with others. The mixed-method study involves: (i) survey, (ii) interviews and observation of crowdworkers; (iii) interviews with crowdwork platforms providers, employers and policymakers; (iv) analysis of worker discussion fora and publically available materials about training provision within the platforms. The study draws on data from two platforms representing two types of crowdwork – microwork (CrowdFlower) and online freelancing (Upwork). Initial findings uncovered evidence for considerable individual and social learning activity within both types of crowdwork. Findings suggest that both microwork and online freelancing are learning-intensive and both groups of workers are learning-oriented and self-regulated. Crowdwork is a growing form of employment in developed and developing countries. Improved understanding of learning practices within crowdwork would inform the design and governance of crowdwork and empower crowdworkers to direct their own learning enhancing the developmental potential of crowdwork.

An Investigation Into Predictors and Mediators of Transfer of Training: A Time-Lagged Study Design

Keywords: Quantitative methods, Survey Research, Workplace learning, Lifelong learning

Presenting Author: Natalie Govaerts, KU Leuven - University of Leuven, Belgium; **Co-Author:** Eva Kyndt, KU Leuven, Belgium; **Co-Author:** Filip Dochy, KU Leuven - University of Leuven, Belgium

The aim of this study was to examine the effects of specific types of supervisor support on transfer of training, taking into account established trainee characteristics, such as trainees' motivation to learn and transfer and their training self-efficacy. More specifically, supervisors' pre-training information, role modelling & facilitation, request sharing, favourable attitude, coaching & feedback, openness, involvement & accountability, work coverage, and training participation were examined. In addition, the mediating effect of training retention is explored, as learning outcomes are a necessary, but not sufficient condition for transfer of training. A time-lagged design was used to investigate the relationships in the proposed model and it was evaluated using partial least squares path modelling (PLS-PM). Data was gathered through online questionnaires from 111 participants of work-related training. Results indicate that motivation to transfer and training retention positively predicted transfer of training three months after training. Motivation to learn and training self-efficacy did not have a significant direct relationship to transfer, nor did any of the specific types of supervisor support contribute directly to training transfer. However, it was found that trainees' motivation to learn and supervisors' involvement and accountability had an indirect effect on transfer of training through training retention.

Effects of online information provided by banks on learning and financial decision making

Keywords: Cognitive skills, Content analysis, Technology, Lifelong learning

Presenting Author: Baerbel Fuerstenau, TU Dresden, Germany; **Co-Author:** Mandy Hommel, TU Dresden, Germany; **Co-Author:** Claudia Leopold, Université de Fribourg, Switzerland; **Co-Author:** Hector Ponce, Universidad de Santiago de Chile, Chile; **Co-Author:** Mario Lopez, Universidad de Santiago de Chile, Chile

Financial competence has become increasingly important for citizens, especially in case they have to decide about complex financial products, such as mortgages. Mortgages have long-term consequences for individuals' financial situations, and potentially for the economy. In order to avoid wrong decisions, potential first-time homebuyers often consult the internet. Therefore, in a study we analysed whether information provided online by banks can support learning and decision making, and thus the development of financial competence. We included webpages of two banks differing in

quality and quantity of information. One hundred and one students took part in the study. They were randomly assigned to one of two experimental groups (bank 1 and bank 2), and a control group. All students answered behavioural questions, then surveyed the webpages of the respective bank, and took a retention and decision making test afterwards. Results did not show significant differences between the groups so that quality and quantity of information given did not seem to be crucial for learning. We can cautiously conclude that natural settings such as banks' webpages are only partly suitable for fostering financial competence about mortgages. Instead, systematic financial education using instructional research results (such as multimedia learning and text comprehensibility) seems to be needed.

Session D 10

30 August 2017 10:15 - 11:45

Main Building E - E350

Single Paper

Learning and Special Education, Motivational, Social and Affective Processes

Special Educational Needs - D

Keywords: Achievement, At-risk students, Attitudes and beliefs, Cognitive skills, Learning and developmental difficulties, Mathematics, Metacognition, Peer interaction, Primary education, Social development, Special education

Interest group: SIG 15 - Special Educational Needs

Chairperson: Doris Holzberger, Germany

The influence of cognitive strategies on solving concrete-operational concepts

Keywords: At-risk students, Cognitive skills, Metacognition, Special education

Presenting Author: Moritz Börnert-Ringleb, University of Potsdam, Germany; **Co-Author:** Jürgen Wilbert, Universität Potsdam, Germany

Mastery of concrete-operational concepts is an important aspect of cognitive development. It is associated with a range of learning outcomes and school achievement. At the same time, students with learning disabilities show lower levels of mastery of concrete-operational concepts. Interventions aiming at training concrete-operational concepts have proven to be possibly successful. A possible way of promoting concrete-operational concepts is the instruction of strategic operations. Nonetheless, construction of such instructional programs requires insights in involved strategic processes. In this context, several studies explore strategy use in different concrete-operational concepts, e.g. conservation. At the same time, these studies do not emphasize the differing effects of strategic operations on correct solution of the task. In the present paper we therefore focus on shedding a light on the influence of the individual strategic operations on the probability of correct solution of concrete-operational concepts. In this context, we address the question, to which extent the effect of isolated specific strategic operations varies. In addition, we focus on patterns of strategic operations, which might be in particular effective regarding correct solution of concrete-operational concepts. To address these questions, thinking-aloud protocols of 80 first and second graders were analyzed. Generalized linear mixed models, configuration frequency analysis and chi-square tests are performed to examine the contribution of isolated and combined strategic operations. The results are discussed and educational implications are highlighted.

The Authority to Choose Seclusion in Inclusion - An ASD Perspective on Educational Settings

Keywords: At-risk students, Cognitive skills, Learning and developmental difficulties, Special education

Presenting Author: Mona Holmqvist, Malmö University, Sweden; **Co-Author:** Lotta Andersson, Malmö University, Sweden

The aim of this study is to examine reasons for the increasing amount of pupils with autism (Wing, 1996) who refuses go to school. Three hypotheses were examined; (1) students are subjected to excessive demands in respect of social interaction and participation; (2) today's school policy in Sweden places high demands on pupils' executive ability, which means that it is expected they manage to organize and plan their work independently; and (3) students' problems may be reduced if they are exposed to a less amount of excessive stimuli. Data from 1.799 questionnaires and 15 interviews are analyzed. The results show that there is an unwittingly lack of deeper understanding about the pupils' specific deficits, which results in teachers forcing their pupils into situations which become impossible for them to cope. Offering the pupils opportunities for seclusion in the inclusive settings to help them sort their impressions and recover, as well as written or visual disposition to guide how to work with the tasks they have to solve would increase the quality for inclusive education and increase the possibility for the pupils to cope.

Social skills and social network dynamics: A longitudinal study in inclusive classrooms

Keywords: Peer interaction, Primary education, Social development, Special education

Presenting Author: Ariana Garrote, University of Zurich, Switzerland; **Co-Author:** Elisabeth Moser Opitz, University of Zurich, Switzerland

A considerable number of studies show that pupils with special educational needs (SEN) are at risk of experiencing difficulties in their social participation in mainstream classrooms. Low levels of social skills are suggested to be a reason why pupils with SEN have difficulties to build and maintain social relationships with peers. However, empirical contributions investigating potential reasons for the risk of pupils with SEN experiencing these difficulties are lacking. This paper addresses this research gap by studying the social network-behaviour dynamics in inclusive classrooms with longitudinal

data on social skills and social networks. The analysis of N = 692 pupils in 38 inclusive classrooms showed that pupils with an intellectual disability (ID; n = 43) had lower levels of social skills than their peers, but were similarly involved in social relationships. In addition, a longitudinal network analysis revealed that pupils did not select their social relationships based on the social skills of peers, but based on gender, popularity, and rejection within the classroom. Further, social influence effects were found, meaning that pupils influenced each other positively over time regarding the development of social skills. Summarizing, pupils with ID are capable of building and maintaining social relationships regardless of their low levels of social skills. Further, due to positive influence effects of social networks, they can improve their social skills in interactions with peers. Therefore, creating opportunities for social interactions seem to be a key strategy to foster social participation.

Reciprocal Relationships between Attitudes and Performance in Students with LD in Mathematics

Keywords: Achievement, Attitudes and beliefs, Learning and developmental difficulties, Mathematics

Presenting Author:Linda Salihu, University of Prishtina, Kosovo; **Co-Author:**Mikko Aro, University of Jyväskylä, Finland;

Co-Author:Pekka Räsänen, Niilo Mäki Institute, Finland

Students' attitudes and performance in school subject-matter tasks play an essential role in terms of how students intend to approach the certain task. The present study examined the relationships between attitudes and performance in students with learning difficulties in mathematics during their transition from primary to middle school. A total of 85 students, out of 233 tested, identified as having learning difficulties in mathematics were assessed for their math skills and reading comprehension. The findings of the study confirm that the relationships between attitudes and performance in students with learning difficulties in mathematics are reciprocal. On the one hand, students' attitude during transition from primary to middle school formed the basis for subsequent math performance. On the other hand, it is also found that math performance has triggered formation of subsequent attitudes toward math-related tasks.

Session D 11

30 August 2017 10:15 - 11:45

Pinni B - B4115

Single Paper

Assessment and Evaluation, Learning and Social Interaction

Metacognition - D

Keywords: Assessment methods and tools, At-risk students, Collaborative Learning, Early childhood education, Metacognition, Parental involvement in learning, Self-efficacy, Self-regulation, Video analysis, Writing / Literacy

Interest group: SIG 16 - Metacognition

Chairperson: Markus Talvio, University of Helsinki, Finland

Assessing children's cognitive and emotional self-regulation in two naturalistic play settings

Keywords: Assessment methods and tools, Early childhood education, Self-regulation, Video analysis

Presenting Author:Pauline Slot, Utrecht University, Netherlands; **Co-Author:**Hanna Mulder, Utrecht University, Netherlands; **Co-Author:**Paul Leseman, Utrecht University, Netherlands

The preschool period is marked by rapid growth of children's self-regulation and related executive functions. Self-regulation is considered an important aspect of school readiness and has been found to be related to academic and social-emotional outcomes in later childhood. Previous research has shown positive effects of play and play-based curricula on children's self-regulation. In the current study, three-year-olds' self-regulation was observed in two naturalistic play settings: one structured and more goal-oriented situation and a more open-ended play situation. The present study studied whether the display of self-regulation behavior was related to the type of play and how the children's observed self-regulation and test-based executive functions were related in the two play situations. Results showed that children showed higher levels of self-regulation during the more structured play setting compared to the open-ended setting. Furthermore EFs were significantly related to cognitive aspects of self-regulation children displayed in the more structured and goal-oriented play setting, but not to behavioral self-control. EFs were, however, significantly related to behavioral self-control in the more open-ended play setting with kitchen materials. Possible implications of the findings for early childhood programs are discussed.

Implicit theories and self-regulation in kindergarten: Development of a self-report instrument

Keywords: Assessment methods and tools, Early childhood education, Self-efficacy, Self-regulation

Presenting Author:Miriam Compagnoni, University of Zurich, Switzerland; **Co-Author:**Yves Karlen, University of Zurich, Switzerland

Children's implicit theories about the nature of their abilities, whether they are stable (fixed theory) or are susceptible to change (malleable theory), are related to both achievement and self-regulatory abilities (Burnette, O'Boyle, VanEpps, Pollack, & Finkel, 2013; Dweck, 2000). Moreover, researchers showed that interventions who target students' implicit theories influence how students interpret and respond to challenges and thus positively impact their self-regulatory abilities (Paunesku et al., 2015). Even though research suggests that five to six year old children may already formed beliefs about

the nature of their abilities as either fixed or malleable (Gunderson et al., 2013) and should be able to differentiate between various dimensions of their ability self-concept, empirical support is limited. To date, no instrument has been available that can reliably and validly assess implicit theories in children under the age of seven. We aim to develop and evaluate an instrument to assess implicit theories of ability in kindergarten. The objective is to investigate the mean level and structure of this self-concept for children as young as five to six years. Furthermore, the interaction of self-concepts, such as implicit theories of ability and ability self-concepts, is unclear. We aim to further the understanding of the development and structure of implicit theories in kindergarteners as well as generate new insight into the complex interplay between self-concepts and self-regulatory abilities in pre-schoolers.

Parent training to promote self-regulation in full- and preterm born toddlers

Keywords: At-risk students, Early childhood education, Parental involvement in learning, Self-regulation

Presenting Author: Kim Gärtner, Heidelberg University, Germany; **Co-Author:** Verena Clara Vetter, Heidelberg University Hospital, Centre for Child and Adolescent Medicine, Germany; **Co-Author:** Gitta Reuner, Heidelberg University Hospital, Centre for Child and Adolescent Medicine, Germany; **Co-Author:** Silke Hertel, Ruprecht-Karls-Universität Heidelberg, Germany

Self-regulation (SR) and executive functions (EF) are important prerequisites for academic achievement (McClelland & Cameron, 2012). Very preterm born children have an increased risk for an adverse development with regard to SR/EF (Mulder, Pitchford, Hagger & Marlow, 2009). Given the strong link between parenting behaviors and children's EF (Fay-Stammach et al., 2014), any effort to promote parental co-regulation and create environments in which children have opportunities to practice SR, seems like a promising way to counteract an adverse development. Up to now, there is no preventive parent training with special focus on SR development for parents of preterm toddlers. The present study aims to refine, adapt and evaluate existing parent training programs to promote the development of SR to the special needs of parents with preterm toddlers. Based on a quasi-experimental pre-post-test design with three months follow-up, parents of full-term (FT) and preterm (PT) toddlers (current sample: $N_{FT} = 55$, $N_{PT} = 23$) are randomly assigned to three treatment groups: 1) scaffolding, 2) combined scaffolding and sensitivity, 3) stress-management. Children are between 24 and 36 months of age. A multi-method approach is applied. Data collection is ongoing and will be finished by spring 2017. First results point towards high acceptance and benefit of the training programs. Parents are motivated to transfer the learned strategies to their everyday lives and report a high competence gain in promoting their child's SR, especially in the combined training group. Further results based on questionnaire and observational data will be reported to strengthen the findings.

Building stories together: How can a playful pedagogy support self-regulation in primary schools?

Keywords: Collaborative Learning, Metacognition, Self-regulation, Writing / Literacy

Presenting Author: David Whitebread, University of Cambridge, United Kingdom; **Co-Author:** Marisol Basilio, University of Cambridge, United Kingdom

Writing is the perfect example of a challenging cognitive task that requires self-regulation, and many children struggle with becoming effective writers. In the Play, Learning and Narrative Skills (PLaNS) project, we developed a playful approach to improve the writing skills of primary school children by providing collaborative building tasks preceding writing activities. Working in mixed ability groups, 5 to 10 year old children used LEGO sets to represent their stories and were encouraged to verbalise ideas that would inspire their writing. The building tasks had a great degree of freedom, so children could decide autonomously on their collaborative process: how to address the task, how to divide tasks in the group, how to merge their ideas into a single LEGO model. Teachers encouraged children to engage in metacognitive discussions about the process of working together, and about the process of writing. We measured the progress of 108 children in terms of their writing skills, metacognition, and collaborative skills (including socially-shared regulation) before and after the intervention –but not in a control group–, and found significant improvements. This playful pedagogy is a promising approach to improving self and socially-shared regulation that could be further tested in primary education.

Session D 12

30 August 2017 10:15 - 11:45

Pinni B - B3111

Single Paper

Cognitive Science, Teaching and Teacher Education

Educational Effectiveness - B

Keywords: Achievement, Comparative studies, History, Informal learning, Out-of-school learning, Parental involvement in learning, Primary education, Qualitative methods, School effectiveness, Student learning, Teacher Effectiveness, Teaching / instruction

Interest group: SIG 18 - Educational Effectiveness

Chairperson: Stefan Keller, School of Teacher Education Basel, Switzerland

Combining Generic and Content-Specific Practices in Exploring Teaching Quality in Physical Education

Keywords: Primary education, Student learning, Teacher Effectiveness, Teaching / instruction

Presenting Author:Charalambos Charalambous, University of Cyprus, Cyprus; **Presenting Author:**Leonidas Kyriakides, University of Cyprus, Cyprus; **Co-Author:**Ermis Kyriakides, University of Cyprus, Cyprus; **Co-Author:**Niki Tsangaridou, University of Cyprus, Cyprus

Trying to understand teaching quality and its effects on student learning, for years researchers have largely attended to either generic or content-specific teaching practices, without simultaneously attending to both. Aiming to address this research gap and attempting to complement recent works that attempted to do so but focused on cognitive outcomes, the present study considers both generic and content-specific practices when exploring teaching quality in Physical Education (PE) and its effects on student psychomotor learning. The main research question guiding this exploration concerns the added value of exploring the joint contribution of generic and content-specific teaching practices, as opposed to considering each type of practices in isolation. To answer this question we measured students' psychomotor growth, using a pre- and post- student performance test administered to the 3rd, 4th, and 5th grade students (N=944) that participated in the study, at the beginning and culmination of the school year. Three classroom observations were also conducted for each of the 49 participating teachers to measure teaching quality; finally, a student survey was used to tap instructional quality viewed through students' eyes. Data were analyzed by employing item response theory models, structural equation modeling, and multilevel modeling. The study findings suggest that the joint contribution of generic and content-specific teaching practices explains more teacher-level variance, compared to that explained when considering either type of practices in isolation. This finding has important theoretical and practical implications.

Characteristics of Parental Mediation of a History Museum's Curriculum

Keywords: History, Informal learning, Parental involvement in learning, Primary education

Presenting Author:Billie Eilam, University of Haifa, Israel; **Co-Author:**Merav Yosfan, University of Haifa, Faculty of Education, Israel

We examined parental mediation of a history museum's curriculum to their accompanying children during a museum visit. There is little research about this topic, in spite of the prevalence of this phenomenon as a form of informal education. Ten parent-child dyads (9-12 years old) were fitted with a small head-camera to record their entire visit, including their interactions with exhibits and related conversations. An external video camera captured their selected route and the duration spent in the museum and each of its galleries. The parents-children conversations were analyzed according to the grounded theory approach. Seven mediation categories were identified: mediating information, mediating the museum, activating the child, connection to the child's world, conduct in the museum, learning behaviors in the museum and general skills. Three of these categories dealt with the norm and accepted behavior in the museum, ways of learning in this museum environment, and the general learning that takes place during the museum's visit. These mediation categories were grouped together under the heading "Museum Conduct Mediation". The remaining four categories which related to mediation of the museum's curriculum, were grouped together under the heading "Museum Content Mediation." All these seven categories and the 40 mediation strategies that were identified, compose a model of the parental mediation in a history museum. Implications for museum design and informal education are discussed.

New Ways of Dealing with Lacking Measurement Invariance in Educational Research

Keywords: Out-of-school learning, Qualitative methods, School effectiveness, Teaching / instruction

Presenting Author:Markus Sauerwein, German Institute for International Educational Research (DIPF), Germany; **Co-Author:**Desiree Theis, German Institute for International Educational Research (DIPF), Germany

Educational research frequently aims to compare different groups or the development of certain (latent) constructs over time. For example researchers compare teaching quality between different countries, or the perception of teaching quality between groups (girls vs. boys). Furthermore in longitudinal studies researchers might also analyze the development of teaching quality across two or more measurement points. However, for such analyses measurement invariance (MI) between groups, subjects or measurement points is an essential precondition. In other words, we need to test if the same factor structure for a scale upholds between groups or across measurement points (MP). If the aim of a study is to compare scales between groups or MP a certain level of MI needs to be given. The following paper will discuss if lacking MI could also be an interesting result on its own, which should be interpreted and reported. Analyses are based on data of the Study on the development of all day schools (StEG) and PISA 2009.

Effects of Teaching and Learning Beliefs on Achievement – A Comparison of China and Germany

Keywords: Achievement, Comparative studies, Student learning, Teaching / instruction

Presenting Author:Anna-Katharina Praetorius, German Institute for International Educational Research (DIPF), Germany; **Co-Author:**Susanne Kuger, The German Institute for International Educational Research (DIPF), Germany; **Co-Author:**Yi Qi, Educational Testing Service, United States; **Co-Author:**Eckhard Klieme, German Institute for International Educational Research (DIPF), Germany

The effects of teaching quality and learning beliefs on student achievement are usually investigated independently from each other although interactive effects are likely to be expected. In the present study, we investigated whether aspects of teaching (i.e., teacher-directed instruction and cognitive activating instruction) and learning beliefs (i.e., persistence and internal control of success) have distinctive as well as interactive effects on student learning and whether these effects differ between China and Germany using data from PISA 2012. The findings indicate that relations differ for the two countries; this is the case not only for relations of teaching and achievement as well as learning beliefs and achievement,

but also for interactive effects of teaching and learning beliefs on achievement. Implications for theory and practice are discussed.

Session D 13

30 August 2017 10:15 - 11:45

Pinni B - B3107

Single Paper

Assessment and Evaluation, Teaching and Teacher Education

Teaching and Teacher Education - L

Keywords: Assessment methods and tools, Collaborative Learning, Competencies, Design based research, In-service teacher education, Mathematics, Motivation, Multimedia learning, Pre-service teacher education, Secondary education, Self-efficacy, Self-regulation, Teaching / instruction

Interest group: SIG 11 - Teaching and Teacher Education

Chairperson: Lisbeth Ohlsson, Malmö University, Sweden

Effects of inquiry learning on learning outcomes in adolescents' geography education

Keywords: Collaborative Learning, Motivation, Self-regulation, Teaching / instruction

Presenting Author: Merja Kuisma, University of Tampere, Finland

This study provides empirical evidence of effects of inquiry-based teaching and learning model called progressive inquiry on cognitive and affective learning results. The focus is on learning results among middle school and upper secondary students, and in all, 253 students were involved in the study. This way a comparison between different developmental stages can be made of the effects of the teaching and learning method in question. The results indicate that progressive inquiry improved cognitive learning results in both levels of the education system. In contrast to the cognitive learning results the results in the level of self-regulated learning and motivation are referred to as affective learning results. The previous level of self-regulated learning skills did not affect the cognitive outcomes in either of the student groups, and this study implies that the skills of self-regulated learning were enhanced in both student groups during the intervention period. In middle school it was the students with only sufficient skills in self-regulated learning that benefited the most from progressive inquiry, whereas in upper secondary school it was the students with the strongest self-regulation skills. Furthermore, in middle school the control and self-efficacy beliefs showed a statistically meaningful effect on cognitive results, but not in upper secondary school. Progressive inquiry showed a strong positive effect on learner's motivation level in middle school context. In upper secondary school the effect of the teaching and learning model on motivation level was not as clear.

Designing a training format supporting student teachers' parent-teacher communication competences

Keywords: Competencies, Design based research, Pre-service teacher education, Multimedia learning

Presenting Author: Karen De Coninck, Ghent University, Belgium; **Co-Author:** Ruben Vanderlinde, Ghent University, Belgium

Teachers worldwide are expected to possess the necessary competences to collaborate and communicate successfully with parents. However, teacher education institutes fail to help student teachers to develop these competences. To address these shortcomings, a design-based research (DBR) project was set up to design an innovative training program to foster student teachers' parent-teacher communication (PTC) competence development. This study reports about the first two processes of the DBR project: (1) analysis and exploration, and (2) design and construction. Regarding the first process, three data sources were consulted: literature, interviews with teacher educators (n=14) and student teachers (n=6), and an online questionnaire with student teachers (n=269). Regarding the second process, both literature and stakeholders (n=18) were consulted in order to define crucial design principles and to construct a prototype of a new training program. Findings show that more practical training and exercises are needed, particularly regarding the interpersonal and psychological dimension of the PTC competence. In this respect, the following design principles are put forward: authentic learning, specific pedagogical principles (learning by doing, learning through observation, receive immediate feedback and reflect on behavior), and blended learning. Discussion about these design principles with the stakeholders resulted in a prototype consisting of (1) an online theoretical introduction lesson on PTC, (2) two training sessions with online simulations, (3) one training session with face-to-face simulations, and (4) a reflection task. Next, it is important to start testing and refining this new training format in the following research phases.

Teachers' analysis of mathematics classrooms – How can different indicators complement each other?

Keywords: Assessment methods and tools, In-service teacher education, Mathematics, Pre-service teacher education

Presenting Author: Sebastian Kuntze, Ludwigsburg University of Education, Germany; **Co-Author:** Marita Friesen, Ludwigsburg University of Education, Germany

The teachers' analysis of processes in the mathematics classroom is a key professional requirement which is connected with mathematics teachers' criteria-related noticing and knowledge-based reasoning. For empirical research into teachers' perceptions of classrooms, methodological questions related to the choice of indicators correspond with specific foci on

particular theoretical constructs in the area of teacher expertise. This study consequently explores how different indicators for the teachers' criteria-related analysis of classroom situations empirically point to this aspect of teacher expertise in a complementary way: On the base of comments on classroom situations from more than 40 German in-service teachers collected through an instrument which combined open format and multiple-choice questions, two different sets of indicators for the teachers' analysis were focused on: On the one hand, a top-down coding of the open format answers afforded insight into how teachers connected their observations with corresponding professional knowledge. On the other hand, teachers' situation-related views about the quality of instruction could be tapped by the multiple-choice format answers. The results suggest that these different indicators – even though they might appear as relatively distant at first sight – correlated significantly. The results may hence be considered as a contribution to linking not only different expertise aspects of the teachers' analysis on the methodological level – knowledge-based reasoning and (potentially resulting) situation-related views in this case – but also as evidence which suggests a corresponding relationship of the theoretical constructs behind the different indicator sets.

Teacher self-efficacy: a study on validity and reliability of an Italian version of the “Ohio scale”

Keywords: Assessment methods and tools, In-service teacher education, Secondary education, Self-efficacy

Presenting Author: Lucia Scipione, University of Modena and Reggio Emilia, Italy; **Co-Author:** Maja Antonietti, University of Modena and Reggio Emilia - Department of Education and Human Sciences, Italy; **Co-Author:** roberta cardarello, Università Modena e Reggio Emilia, Italy; **Co-Author:** chiara bertolini, University of Modena and Reggio Emilia - Department of Education and Human Sciences, Italy; **Co-Author:** andrea pintus, University of Modena and Reggio Emilia - Department of Education and Human Sciences, Italy

This study investigate the construct validity and the reliability of an Italian version of the Teacher Self-Efficacy scale developed by Tschannen-Moran & Hoy (2001), also known as 'Ohio scale', a 24-item scale, administered to in-service second grade teacher. The TSES scale is found on three factors of Efficacy: Student Engagement, Instructional Strategies, and Classroom Management. In the Italian adaptation four professional dimensions of teacher efficacy are identified and assessed: student engagement, classroom management, instructional strategies and “traditional” strategies. The validity and reliability of the Italian version of the “Ohio scale” is confirmed. It is confirmed that the construct of self-efficacy is a multidimensional construct. Results suggest further investigation on teacher's professional contexts.

Session D 14

30 August 2017 10:15 - 11:45

Main Building A - A2A

Single Paper

Higher Education, Instructional Design, Learning and Instructional Technology

Comprehension of Text and Graphics - G

Keywords: Arts, Comprehension of text and graphics, Educational Technology, Experimental studies, Instructional design, Learning Technologies, Multimedia learning, Qualitative methods, Student learning, Vocational education

Interest group: SIG 02 - Comprehension of Text and Graphics

Chairperson: Valentin Riemer, University of Ulm, Germany

Cueing in Animations Leads to a Trade-Off between Knowledge of Terms and Transfer

Keywords: Comprehension of text and graphics, Educational Technology, Instructional design, Multimedia learning

Presenting Author: Christoph Mengelkamp, University of Würzburg, Germany; **Co-Author:** Kerstin E. J. Kasper, Pixelgenau Consulting GmbH, Germany

Cueing, also known as signaling, is a common instructional intervention when learning from animations. Based on the assumptions of cognitive theory of multimedia learning, cueing reduces extraneous cognitive load and, as a result, leads to better learning performance due to a better selection of the relevant content of an animation, a better organization and a better integration of that content into a coherent mental representation. Contrary to this assumption, we argue that cueing the elements of an animation when the respective term is mentioned in a synchronously spoken text, leads to a better knowledge about the naming of that element but a worse mental representation of the whole content. To test this assumption fifty-five participants learned from an animation showing how a cylinder deactivation in a gasoline engine works, either with or without cueing the components of the animation. Results showed that cueing was effective for terming the components of the animation, but had no effect on knowledge of facts about the engine and even a negative effect on transfer to new problems. The results are discussed with respect to the design of cues depending on the learning goal.

Twice is good! Test-Taking Fosters Repeated but not Initial Study of Multimedia Materials

Keywords: Comprehension of text and graphics, Experimental studies, Instructional design, Student learning

Presenting Author: Alexander Eitel, University of Freiburg, Germany; **Co-Author:** Katharina Scheiter, Leibniz-Institut für Wissensmedien (IWM), Germany

Are practice tests only helpful when having studied before taking them? This question was addressed in the present study contrasting two distinct hypotheses. First, test-taking fosters restudy because it provides information about the effectiveness of the initial study to which learners can adapt by optimizing their restudy behavior (i.e., indirect testing effect;

ITE hypothesis). Second, test-taking fosters initial studying because one simply knows about the test (i.e., test expectancy; TE hypothesis). Hence, learners can encode information that is specifically required for this type of test, optimizing performance. The two hypotheses were tested against each other in a multimedia learning scenario. Participants (N=85) did either not study or studied prior to taking a test, (re-)studied, and took the same test again. Tests required to recall and transfer knowledge. Supporting the ITE hypothesis, both recall and transfer performance increased with repeated study and test-taking, whereas only taking the test without having studied before did neither improve recall nor transfer performance. Results suggest that repeated study and test-taking is beneficial to multimedia learning because restudying can be used to counteract deficiencies from initial studying (i.e., indirect testing effect), and not because students just know the demands of the test (i.e., high test expectancy).

Information visualizations for a general audience: the designers' perspective

Keywords: Arts, Comprehension of text and graphics, Qualitative methods, Vocational education

Presenting Author:Annemarie Quispel, Avans University of Applied Sciences / Tilburg University, Netherlands; **Co-Author:**Alfons Maes, Faculty of Humanities Tilburg University, Netherlands; **Co-Author:**Joost Schilperoord, Tilburg University, Faculty of Humanities, Netherlands

Information visualizations are increasingly used in education and mass media. Such visualizations are created by an increasing number of designers. Little is known about the criteria they use in their work, since designers are used to work on the basis of intuition and experience, rather than explicit knowledge. Gaining more insight into the design practice would be beneficial for design education and, eventually, the general public. We investigated criteria for popular information visualizations from the designers' perspective. Results of interviews and literature reviews show that designers consider clarity the most important criterion, more important than attractiveness. However, in experimental studies, they have shown to prefer non-standard designs, which are considered unclear by non-designers. An explanation for this discrepancy may be that what they consider clear, may be less understandable for their visually less 'literate' audience. In that case, design education faces a challenge in overcoming this communication gap between designers and their audience.

When (no) more help is needed: Using eye movements to individually support multimedia learning

Keywords: Comprehension of text and graphics, Educational Technology, Learning Technologies, Multimedia learning

Presenting Author:Marie-Christin Krebs, Leibniz-Institut für Wissensmedien, Germany; **Co-Author:**Thérèse Felicitas Eder, Leibniz-Institut für Wissensmedien, Germany; **Co-Author:**Anne Schueler, Leibniz-Institut für Wissensmedien, Germany; **Co-Author:**Katharina Scheiter, Leibniz-Institut für Wissensmedien, Germany

Regardless of the effectiveness of multimedia instructions in general, some learners have difficulties to adequately process multimedia materials (i.e., text-picture combinations). One possibility to support these learners is to provide personalized, just-in-time instructional support using an adaptive multimedia system. The adaptive multimedia system used in the reported study monitors and analyses online the learners' processing behavior based on the learners' eye movements. Pursuant to these analysis learners with inadequate processing behavior receive instructional support. In our experiment (N = 58) we investigated whether the adaptive multimedia system supports learners in processing multimedia materials more adequately and whether it is beneficial for the learning outcome. During learning, one group received adaptive instructional support based on their individual gaze behavior. The other group received no instructional support. After learning all participants completed a posttest. Results indicated an interaction between prior knowledge and adaptivity: Only learners with higher prior knowledge profited from the adaptive multimedia system. Learners with lower prior knowledge, however, performed significantly worse with compared to without instructional support. Implications for the use of an adaptive multimedia system for individual support are discussed.

Session D 15

30 August 2017 10:15 - 11:45

Main Building D - D14

Single Paper

Learning and Social Interaction, Learning and Special Education, Teaching and Teacher Education

Eye-Tracking

Keywords: At-risk students, Cognitive skills, Comparative studies, Comprehension of text and graphics, Cooperative / collaborative learning, Culture, Educational Psychology, Experimental studies, Instructional design, Mathematics, Mixed-method research, Quantitative methods, Teacher Effectiveness

Interest group: SIG 15 - Special Educational Needs, SIG 27 - Online Measures of Learning Processes

Chairperson: Marie Evens, KU LEUVEN, Belgium

Role of sender/peer feedback characteristics for performance and cognitive processing (eye tracking)

Keywords: Cognitive skills, Comprehension of text and graphics, Cooperative / collaborative learning, Quantitative methods

Presenting Author:Markus Berndt, Universitätsklinikum der Ludwig-Maximilians-Universität München, Germany; **Co-Author:**Jan-Willem Stribos, University of Groningen, Netherlands; **Co-Author:**Frank Fischer, Ludwig-Maximilians-Universität (LMU), Germany

Feedback literature identifies mindful cognitive processing of (peer) feedback and (peer) feedback characteristics – as well as the presence of justifications – as important for its efficiency. However, mindful cognitive processing has yet to be operationalized and investigated. Moreover, different (peer) feedback characteristics may have an effect on the perception of the feedback by the receiver and also induce varying amounts of cognitive load. In a 2 × 3 factorial design, peer feedback on an essay (elaborated specific feedback with/without justifications) and sender's competence (low/average/high) were systematically varied. Eye tracking data of the peer feedback reading process (gaze durations and transitions) was correlated with performance measures (text revision and peer feedback recall) to infer mindful cognitive processing. Peer feedback perception was measured in terms of fairness, usefulness, acceptance, willingness to improve, and affect which in part aggregates to perceived adequacy of peer feedback. Cognitive load was measured for peer feedback reading and performance tasks. Results: Inclusion of justifications interacted with sender's competence on perceived affect and improved text-revision performance. Cognitive load moderated the impact of justifications on text-revision performance. Eye tracking data proved to provide valid measures to infer mindful cognitive processing. In sum, there seemed to be more intense mindful cognitive processing when more transitions between two text elements occurred. More intense mindful cognitive processing did not necessarily lead to better performance but seemed to serve a compensatory purpose to sustain performance, especially when justifications for peer feedback were not provided.

Attraction or distraction? Eye-tracking comparisons of TD versus ASD learner gaze at visual displays

Keywords: At-risk students, Comparative studies, Educational Psychology, Experimental studies

Presenting Author: Mary Hanley, Durham University, United Kingdom; **Co-Author:** Deborah Riby, Durham University, United Kingdom

The primary school classroom is crucial environment for children in terms of their learning. An important question is whether the physical classroom environment can impact upon children's ability to pay attention and to learn. In the classroom there can be many things to capture attention other than the focus of a lesson, such as visual displays on classroom walls. The aim of this study was to use eye-tracking to explore the impact of visual displays on attention and learning for typically developing children and also for children functioning on the autism spectrum. Children watched bespoke video stimuli of a teacher delivering 'story time' and mini-lessons. Half of the videos had no visual distraction (NVD) and half had high visual distraction (HVD). We recorded the children's eye movements while they watched the videos to explore the effect of displays on their attention, and we designed worksheets based on the lessons to measure the impact on their learning. Visual displays had a significant impact on attention for all children, but to a greater extent for children with autism. Visual displays also had an impact on learning, whereby children had poorer learning scores in the HVD compared to the NVD lessons. Individual differences in age, verbal, non-verbal and attention abilities were important predictors of learning, but time spent attending the visual displays was the most important predictor. This novel and timely investigation has implications for the use of classroom visual displays for all children, but particularly for children with autism.

Using mobile eye-tracking to analyse learning behaviour in class: Two case-study examples

Keywords: Comprehension of text and graphics, Instructional design, Mathematics, Mixed-method research

Presenting Author: Markku Hannula, University of Helsinki, Finland; **Co-Author:** Enrique Garcia Moreno-Esteva, University of Helsinki, Finland; **Co-Author:** Miika Toivanen, Finnish Institute of Occupational Health, Finland

We used mobile eye-tracking and a qualitative analysis of the gaze data to analyse two case studies on problem solving behaviour in class. The students worked in pairs using GeoGebra software. We analysed the gaze video and the two ordinary videos qualitatively to identify details of the target student learning behaviour. Instead of individual glances, we looked at the sequences of gazes and interpreted them in the overall context of student problem solving. Our first case study the student wearing the gaze tracker had relatively long sequences of silent gazing. With gaze tracker, we gained additional information about his problem solving behaviour. In our second case study we observed students to repeatedly fail to observe relevant information on the screen. When we analysed our target student gaze during the critical events, we observed, that his gaze followed teacher's hand movement in the display. Our interpretation is that moving elements attract student visual attention to the extent that other, important information, can be missed. Despite the labour intensiveness, the gaze tracking methodology seems to be a promising tool for a fine grained analysis of student learning behaviour in class. It requires a lot of manual work and developing automatic coding of data is a worthwhile investment. One important finding of the pilot phase is that it is essential to have an interview with the student after the recorded lesson, preferably with the gaze tracking video as a stimulus.

Using real-world gaze proportions to investigate expert teacher priorities: An eye-tracking study

Keywords: Culture, Educational Psychology, Quantitative methods, Teacher Effectiveness

Presenting Author: Nora McIntyre, University of Sheffield, United Kingdom; **Co-Author:** Halszka Maria Jarodzka, Open University of the Netherlands, Netherlands; **Co-Author:** Robert Klassen, University of York, United Kingdom

Classroom teaching is complex. In the classroom, teachers must readily attend to disruptions and successfully convey new tasks and information. Outside the classroom, teachers must organise their priorities that are important for successful student learning. In fact, differing gaze patterns can reveal the varying priorities that teachers have. Teacher priorities are likely to vary with classroom expertise and can conceivably change with culture too. Therefore, the present study investigated expertise related and cultural teacher priorities by analysing their gaze proportions. To obtain this data, 40 secondary school teachers wore eye-tracking glasses, with 20 teachers (10 expert; 10 novice) from the UK and 20 teachers

(10 expert; 10 novice) from Hong Kong. We analysed gaze proportions during teachers' attentional (i.e., information-seeking) and communicative (i.e., information-giving) gaze. Regardless of culture, expert teachers' gaze proportions revealed prioritisation of students, whereas novice teachers gave priority to teacher materials. For culture-specific expertise, UK novices prioritises teacher materials more than UK experts and Hong Kong novices' prioritises non-instructional, non-student ('other') regions of the classroom more than Hong Kong experts, during both attentional and communicative gaze. Student-centredness as a hallmark of effective teaching has received support from the present teacher gaze data, which corresponds with conclusions from existing teacher effectiveness research.

Session D 16

30 August 2017 10:15 - 11:45

Pinni B - B1097

Single Paper

Higher Education, Instructional Design, Lifelong Learning

Writing - C

Keywords: At-risk students, Cognitive development, Cognitive skills, Higher education, Instructional design, Language (L1/Standard Language), Lifelong learning, Literacy, Primary education, Self-regulation, Teaching approaches, Writing / Literacy

Interest group: SIG 12 - Writing

Chairperson: Johan Korhonen, Åbo Akademi University, Finland

Writing development in a linguistic and rhetoric perspective

Keywords: Cognitive development, Language (L1/Standard Language), Writing / Literacy, Lifelong learning

Presenting Author: Victoria Johansson, Lund University, Sweden; **Co-Author:** Pia Gustafsson, Lund University, Sweden;

Co-Author: Åsa Wengelin, University of Gothenburg, Sweden

This presentation addresses the issue of how to describe and evaluate writing development. We use a corpus of written texts from 10-year-olds up to adults to discuss how writing development can be described on the one hand linguistically, and on the other hand rhetorically. We are inspired by Myhill's (2008) discussion about teachers need to know more about different developmental trends in writing performances, in order to be able to intervene more strategically with their students. Research questions are: 1. How can syntactic features in the text be linked to rhetorical aspects of the texts? and 2. How does the development of syntactic and rhetorical abilities relate to age, and writing experience? Data consist of 190 written texts from 95 participants who each produced one narrative and one expository text on computer in an experimental setting. Syntactic features have been analysed both quantitatively and qualitatively. Results show that text length increase with age there, but that adults have shorter texts than adolescents. Investigating sentence types, declarative sentences are more common in narrative texts, and interrogative sentences are more common in expositives. Developmentally, adults use more interrogatives in expositives, and more fragments in narratives. Analysing sentence openings reveals that the youngest age groups use more time adverbials in their narratives, and more circumstantial adverbials in their expository texts, while the older age groups use a more varied repertoire of syntactic elements to highlight different aspects. This study stresses that teaching must relate rhetoric and syntactic aspects in their teaching of writing.

Effects of dyslexia on undergraduate students' writing processes and product

Keywords: At-risk students, Cognitive skills, Higher education, Writing / Literacy

Presenting Author: David Galbraith, University of Southampton, United Kingdom; **Co-Author:** Veerle Baaijen, Center for Language and Cognition Groningen, Netherlands

This quasi-experimental study was designed to assess the effects of dyslexia on the writing of 60 undergraduate students, half of whom had been assessed as dyslexic. All participants completed intelligence tests and a battery of spelling, decoding and working memory tests. These tests showed that students with dyslexia had significantly lower phonological/spelling ability but equivalent levels of verbal and non-verbal intelligence. Participants were then given 45 minutes to plan and write an article for the university newspaper discussing the legalisation of euthanasia. To identify the cognitive processes occurring during writing, half the participants were asked to complete the triple task (Kellogg, 1987) while producing the texts. Keystrokes were also recorded using Inputlog (Leijten & van Waes, 2013). The results showed that dyslexic students produced significantly shorter, poorer quality texts (even after spelling had been corrected), and that they paused for significantly longer between and within words. Analysis of the relationships between cognitive processes and text quality showed that whereas non-dyslexic writers produced better quality text the less they continued generating content during text production, dyslexic writers wrote better the more they continued generating content during text production. Mediation analyses indicated that the effect of dyslexia on quality was partially but not fully mediated by spelling ability and its effect on word-level pauses. We will argue that, over and above their spelling difficulties, adult writers with dyslexia have difficulties implementing their content plans during writing, and suggest that support should include strategies for the management of higher level writing processes.

Teachers as writers: the pedagogical impact of teachers' writing identities and personal practices

Keywords: Language (L1/Standard Language), Literacy, Teaching approaches, Writing / Literacy

Presenting Author: Lucy Oliver, University of Exeter, United Kingdom

The premise that teachers of writing should themselves write has been highly influential since the 1970s and forms a central tenet of professional development programmes such as the US National Writing Project. Predicated on a belief that 'teachers as writers' will bring the same kind of understanding of the writing process to the classroom as professional writers, the argument is that when teachers position themselves as writers in the classroom, instruction and learning are enriched. Yet relatively little appears to be known about the pedagogical consequences of teachers' writing or its impact on student outcomes.

This paper reports on a systematic review of the literature concerning classroom impact of teachers as writers. A keyword search of educational databases was conducted and over 400 potentially relevant papers located. These were screened over four iterations by two reviewers using agreed inclusion/exclusion criteria and graded for quality. 43 were found to address teachers' writing identities, personal writing and classroom practice. 22 papers satisfied all criteria and were subjected to in-depth analysis and synthesis. The findings reveal that the evidence base in relation to teachers as writers is not strong, particularly with regard to impact on student outcomes. Available data suggest that teachers often have narrow conceptions of what counts as writing and being a writer and that multiple tensions exist, relating to low self-confidence, negative writing histories, and the challenge of enacting teacher-writer positions in school. Some repercussions for student motivation and engagement are evident but impact on students' writing is unclear.

Effective writing interventions via revision instruction: The role of explicit process strategies

Keywords: Instructional design, Primary education, Self-regulation, Writing / Literacy

Presenting Author: Paula Lopez, University of León, Spain; **Co-Author:** Raquel Fidalgo, University of León, Spain, Spain; **Co-Author:** Gert Rijlaarsdam, University of Amsterdam, Netherlands; **Co-Author:** Mark Torrance, Staffordshire University, United Kingdom; **Co-Author:** Alba Gonzalez Moreira, University of León, Spain, Spain

This study aimed to determine whether 6th grade students need to know and apply explicit procedures for revising their text, or whether similar (or greater) benefit might be gained from developing their understanding of how readers respond to text combined with encouragement to revise but no teaching of explicit revision strategies. Our sample comprised 142 six grade Spanish students divided into 6 classes from two schools, with two classes per condition. In all conditions, students started by learning strategies for planning their text, at the same time that it was also stressed as the start point for revision in both experimental conditions. In the Observing Reader condition (OR) students observed the instructor reading and commenting on imperfect texts as input for revision. In the Observing Writer condition (OW), students were taught explicit revision-procedure strategies, principally by observing these being modelled by the instructor. In the control condition the instruction focused on set communicative goals for planning. The study followed a pretest-posttest-transfer test-follow up test design. Text quality was assessed by rating scales supported by anchor texts. We found evidence of immediate and sustained benefits for text quality of both interventions, relative to controls. However, we found no evidence of a benefit of learning revision strategy over observing a reader. Students wrote with digitising pens, providing real time measures of writing time-course. In our paper we will also present findings from these data.

Session D 17

30 August 2017 10:15 - 11:45

Main Building D - D11

Single Paper

Motivational, Social and Affective Processes

Motivation and Goal Orientation

Keywords: Educational Psychology, Emotion and affect, Goal orientation, Higher education, Motivation, Motivation and emotion, Quantitative methods, Secondary education, Teaching / instruction

Interest group: SIG 08 - Motivation and Emotion

Chairperson: Antti Laherto, University of Helsinki, Finland

Broadening classroom goal structures nomological network using doubly latent multilevel modeling

Keywords: Goal orientation, Motivation, Quantitative methods, Secondary education

Presenting Author: Lisa Bardach, University of Vienna, Austria; **Co-Author:** Marko Lüftenegger, University of Vienna, Austria; **Co-Author:** Gholam Hassan Khajavy, Department of Language Education, University of Bojnord, Iran; **Co-Author:** Seyyedeh Mina Hamed, English Department, Ferdowsi University of Mashhad, Iran

The present study aimed to expand the classroom goal structures nomological network by investigating relations with a broad array of motivational constructs: achievement goals, self-efficacy, interest, self-concept and personal best goals. To analyze the relations between mastery classroom goal structures and the motivational facets, we first applied recently developed doubly latent multilevel modeling that allows for a proper control for measurement and sampling error in classroom goal structures research. The sample consisted of 1200 secondary school students from 62 classes. Students filled out a paper-and-pencil-questionnaire including scales from the Goal Structure Questionnaire as well as measures for all motivational constructs during regular class. Results indicated positive relations between mastery classroom goal

structures and all motivational outcome variables. The theoretical and educational relevance of our findings are discussed.

The development of achievement goal orientations during the first school years

Keywords: Educational Psychology, Goal orientation, Motivation, Quantitative methods

Presenting Author:Katariina Nuutila, University of Helsinki, Finland; **Co-Author:**Heta Tuominen-Soini, University of Helsinki, Finland; **Co-Author:**Markku Niemivirta, University of Oslo, Norway

Achievement goal orientations (preferences for certain achievement-related goals and outcomes) play an important role both in terms of motivation and achievement. While these are known to be rather stable over the middle and high school years, the research on younger students' achievement goal orientations and their development is still sparse. In this study, we investigated i) how children's achievement goal orientations change from first to third grade, and ii) how these possible changes are related to each other. In addition, gender effects were examined. The data were collected from 18 classes in seven elementary schools in Southern Finland (N=244) during the three first school years, and consisted of teachers' evaluations of each child's achievement goals orientations (i.e., mastery, performance-approach, performance-avoidance and work-avoidance). The results from a series of latent growth curve models showed significant increase in both performance-approach and performance-avoidance over time, although the increase in performance-approach orientation was less steep for those with higher initial level. Significant individual differences in the rate of change were found only in performance-approach. Girls displayed higher mastery orientation than boys, and boys, in turn, were higher in performance-approach and work-avoidance orientations. No gender differences in the rate of change were found. In line with previous suggestions, our findings imply that children become more performance-oriented over the years.

Teaching Quality and Stress: Antecedents or Outcomes of University Instructors' Achievement Goals?

Keywords: Goal orientation, Higher education, Motivation, Teaching / instruction

Presenting Author:Martin Daumiller, University of Augsburg, Germany; **Co-Author:**Markus Dresel, University of Augsburg, Germany

Achievement goals of university instructors can be expected to be associated with instructors' teaching quality, and their perceived stress and strain at work. Cross sectional analyses have already confirmed relations of instructors' achievement goals with professional stress and teaching quality (Daumiller, Grassinger, Dickhäuser, & Dresel, 2016). However, goal theory research has mainly focused on unidirectional effects of goals on these outcomes, whilst reciprocal relationships have mostly been neglected but are highly plausible. The aim of this study was to examine the causal ordering of the effects of achievement goals with teaching quality and professional stress. At the interval of half a year, 347 university instructors (171 females; highest degree: 121 master, 226 PhD, thereof 87 full professors) were tested twice with regard to their achievement goals, teaching quality, and professional stress. The results revealed moderate to high stabilities of the individual goal classes (allowing preliminary statements about the extent to which goals can be influenced by other variables) and indicated that reciprocal effects with the outcome variables exist: Teaching quality predicted the adoption of task, learning avoidance, and work-avoidance goals but no effects were found for the reverse direction. Instead, relational goals positively and work-avoidance goals negatively predicted teaching quality. In regard to professional stress, appearance approach goals and normative avoidance goals emerged as positive predictors; whilst appearance avoidance goals and normative approach goals were negative predictors. Additionally, professional stress in T1 negatively predicted the adoption of task approach and task avoidance goals in T2, indicating a complex picture of motivational dynamics.

Boredom, wellness, and coping: An examination of relations among American teachers

Keywords: Educational Psychology, Emotion and affect, Motivation, Motivation and emotion

Presenting Author:Hadley Solomon, University of New Hampshire, United States; **Co-Author:**Beth Fornauf, University of New Hampshire, United States; **Co-Author:**Joy Dangora Erickson, University of New Hampshire, United States; **Co-Author:**Myles Lynch, University of New Hampshire, United States; **Co-Author:**Vasiliki Partinoudi, University of New Hampshire, United States; **Co-Author:**Minori Haga Stefan, University of New Hampshire, United States

Boredom in classroom settings has been associated with a host of maladaptive outcomes including dropping out of school and reduced overall wellness. Little work has been done to examine boredom in teachers and how it relates to teacher outcomes. The purpose of the current study was to examine teachers' self-reported boredom in classroom settings and its' relation to important motivational and affective constructs including appraisals of control and value and teacher burnout. A series of analyses were conducted to examine the relations of American teachers' (N 148) perceived boredom to outcomes including teacher self-efficacy, burnout, appraisals, and coping. Results indicate teachers reporting higher levels of boredom also report lower self-efficacy for teaching, lower appraisals of control and value, increased burnout, and increased reliance on substance use as a coping mechanism. Results, implications, and significance of these findings will be discussed.

Session D 18

30 August 2017 10:15 - 11:45

Pinni B - B1100

Roundtable

RT: Motivation and Emotion

Keywords: Arts, Attitudes and beliefs, Cognitive development, Developmental processes, Educational Psychology, Emotion and affect, Informal learning, Mixed-method research, Motivation, Motivation and emotion

Interest group: SIG 08 - Motivation and Emotion

Chairperson: Jan van Driel, The University of Melbourne, Australia

Examining Survey and Interview Measures of Individual Interest

Keywords: Arts, Attitudes and beliefs, Mixed-method research, Motivation

Presenting Author: Amanda Durik, Northern Illinois University, United States; **Co-Author:** Sarah Coley, Northern Illinois University, United States; **Co-Author:** Steven McGee, The Learning Partnership, United States

Many researchers use rating scale survey measures of individual interest because surveys have the benefit of efficiency with regard to collecting data for large groups of people. However, it is important to know whether survey approaches correspond with a lengthier interview approach. This research aimed to evaluate the correspondence between several self-report survey measures of individual interest and an interview measure. College student participants ($N = 138$, 66% women) rated their individual interest in the domain of visual arts on survey items that captured various aspects of individual interest, including feeling, meaning, and perceived knowledge. Participants also responded to a series of interview questions that were designed to assess individual interest. The interview responses were quantified in order to correlate them with the rating scales. Strong correlations between the rating scale survey measures and the interview were observed. In addition, both survey and interview measures positively predicted a behavioral measure of interest, exploration. These results suggest that data from survey measures of individual interest can be similar to those obtained with an interview. Remaining questions hinge on how individuals become aware of their interests in order to accurately report interest in either context.

A Conceptual Model of Internal and External Factors that Support Interest Development within Domains

Keywords: Cognitive development, Developmental processes, Educational Psychology, Motivation

Presenting Author: Tamara Jetton, Central Michigan University, United States; **Co-Author:** Jonna Kulikowich, Penn State, United States

Individuals have the capacity to both think and feel, and the power of these cognitive and affective factors within them support their progress toward expertise. Without the motivation or will to learn, many individuals cut short their progression toward expertise in a domain; it is their will and interest in examining and investigating information that drives and propels individuals toward expertise (Alexander, 2010; Renninger & Hidi, 2016). This research examines the extant research regarding interest development within an academic domain. Using the theoretical framework of the Model of Domain Learning (Alexander, 2003) and the Four-Phase Model of Interest Development (Renninger & Su, 2012), we explore the internal cognitive and motivational supports, and the external environmental supports for maintaining and increasing interest as individuals progress toward expertise within a domain. Using this framework and the extant literature, we constructed a conceptual model of internal and external variables that support and increase interest as learners progress from acclimated or novice domain learners to more competent learners and then to proficient learners who are experts in the field. This roundtable discussion will focus on the presentation of this model, along with a discussion of how each internal and external variable functions to support acclimated, competent, and proficient learning with an academic domain. Further discussion will focus on interest measurement, in light of this conceptual model.

Measuring teachers' and students' empathy

Keywords: Emotion and affect, Informal learning, Motivation, Motivation and emotion

Presenting Author: Csaba Gáspár, University of Szeged, Hungary

Empathy is a really complex concept, the meaning of which has gone through several alternations during the last century. Many disciplines (e.g. sociology, linguistics, psychology or ethics) show equal interest to empathy in different ways (Irishkanova et al., 2003), which can be a reason for it not being clearly defined so far. From one perspective, empathy is even a key factor for teachers' and students' success. Several studies (e.g. Swan & Riley, 2012; Vorkapić & Ružić, 2013) deal with examining teachers' empathy using both qualitative and quantitative methods. According to Davis (1980), empathy is a multidimensional construct with four dimensions (fantasy, empathic concerns, perspective taking and personal distress), which can be measured by his Interpersonal Reactivity Index. In our research this measurement tool was applied as well. Teachers and their students' level of empathy was examined in 2015-2016 (N Teachers: 69, N students: 525). We examined students' empathy in three different age (at the age of 12, 15 and 18) while we examined teachers' empathy based on the number of years of their teaching practice. Based on our first results there are significant difference between the examined age groups, empathic concern and perspective taking stronger at the age of 18. Considering teachers empathy no significant results were shown yet either based on gender or the number of theaching years.

Session D 19

30 August 2017 10:15 - 11:45

Main Building D - D10B

Teaching and Teacher Education - P

Keywords: In-service teacher education, Mathematics, Science education, Teacher Professional Development, Teaching / instruction, Video analysis

Interest group: SIG 11 - Teaching and Teacher Education

Chairperson: Marie-Christine Opdenakker, University of Groningen, Netherlands

Videotaped lessons as means to enhance reflection and knowledge of secondary mathematics teachers

Keywords: Mathematics, Teacher Professional Development, Teaching / instruction, Video analysis

Presenting Author: Ronnie Karsenty, Weizmann Institute of Science, Israel

The VIDEO-LM Project aims to enhance mathematics teachers' reflective skills, as well as their mathematical knowledge for teaching, through watching and discussing videotaped lessons of unknown teachers. Discussions are guided by the use of an analytic framework, consisting of six viewing lenses, which directs teachers to explore the videotaped lessons from various core aspects of the mathematics teaching practice. The lenses are (1) mathematical and meta-mathematical ideas around the lesson's topic; (2) explicit and implicit goals that may be ascribed to the teacher; (3) the tasks selected by the teacher and their enactment in class; (4) the nature of the teacher-student interactions; (5) teacher dilemmas and decision-making processes; and (6) beliefs about mathematics, its learning and its teaching as inferable from the teacher's actions. VIDEO-LM professional development courses have been offered to secondary mathematics teachers in Israel since 2012. In order to investigate the impact of these courses, data was gathered from 17 implementation sites during 2012-15, with a total of 212 participants. Several types of qualitative content analyses were conducted. Findings show that using the six-lens framework in video-based peer conversations supports the development of a reflective language, with which teachers relate not only to the teaching events watched, but also to their own practices. In addition, the analyses of several cases point to a considerable growth in teachers' mathematical knowledge for teaching, as measured by using the MKT categories defined by Ball and her colleagues.

Working with learner errors in classrooms: the Data Informed Practice Improvement Project

Keywords: Mathematics, Teacher Professional Development, Teaching / instruction, Video analysis

Presenting Author: Karin Brodie, Wits University, South Africa; **Co-Author:** Nicholas Molefe, Wits University, South Africa;

Co-Author: Abel Uverhaviwe, Wits University, South Africa

This presentation examines changes in practice among high school mathematics teachers who participated in the Data Informed Practice Improvement Project (DIPIP) over a period of three years. The project worked with teachers in professional learning communities, with a focus on understanding the reasoning behind learners' errors and working with learners' partially valid reasoning, in order to develop teachers' knowledge for teaching and improve their instructional practice. The focus on learner errors was intended to address teachers' pedagogical content knowledge, which then supported teachers to engage with their own content knowledge. All teachers notice errors, however very few think about errors as evidence of learners' valid reasoning or opportunities for learning. Teachers who participated in DIPIP worked with learners' errors in tests, in interviews with learners, in planning lessons and in teaching in order to think more deeply about their content and pedagogical content knowledge and their practice. This presentation will focus on an analysis of teachers' lessons, before, during and after the project, using the MQI tool and selected case studies. The analysis shows that most teachers made small but significant changes in their practice on most dimensions.

The PRACTISE professional development program: using classroom video to foster scientific discourse

Keywords: Science education, Teacher Professional Development, Teaching / instruction, Video analysis

Presenting Author: Hilda Borko, Stanford University, United States; **Co-Author:** Jonathan Osborne, Stanford University, United States; **Co-Author:** Florencia Gomez Zaccarelli, Stanford University, United States; **Co-Author:** Evan Fishman, Stanford University, United States; **Co-Author:** Emily Reigh, Stanford University, United States; **Co-Author:** Anita Tseng, Stanford University, United States

This presentation examines the efficacy of the Practicum Academy for Improving Science Education (PRACTISE) – a practice-based approach to science professional development (PD) for elementary (grades 3-5) classroom teachers. The PD focuses on instructional practices to support scientific discourse, specifically argumentation from evidence, among students. The decision to focus on scientific discourse is grounded in theory and empirical findings regarding the importance of classroom discussions of key scientific concepts and practices for fostering students' conceptual understanding and scientific reasoning. The PRACTISE model includes a summer institute followed by a teaching practicum in a local summer school program, and follow-up sessions during the year. Videos of participating teachers' science lessons situate the PD in the core activities of teaching, providing an opportunity for the teachers to study their classroom discourse practices collaboratively. The project used a two-cohort design to test the effectiveness of the PRACTISE model and added value of the practicum. Cohort 1 participated in the full PD program; Cohort 2 participated in the summer Institute and follow-up sessions only. Ratings of videos of classroom science lessons indicate that the PRACTISE PD was effective for helping teachers to incorporate science discourse into their classroom instruction. Findings regarding the added value of the practicum are mixed. This research contributes to our understanding of how to best

prepare teachers to engage their students in scientific discourse using evidence-based argument, which is of considerable interest to the fields of science education, professional development and teacher education.

Pushing teachers to rethink and change their practice on goal clarity in video-based discussions

Keywords: In-service teacher education, Teacher Professional Development, Teaching / instruction, Video analysis

Presenting Author:Alexander Groeschner, Friedrich Schiller University Jena, Germany; **Co-Author:**Martina Jerabek, Technische Universität München (TUM), Germany; **Co-Author:**Tina Seidel, Technische Universität München (TUM), Germany

Teacher professional development (PD) research points out core features that support teachers' learning. Our study contributes to this research strand by adopting Desimone's (2009) conceptual model for studying the effects of PD and examining how facilitated video-based discussions in an one-year practice-oriented PD program, the Dialogic-Video-Cycle (DVC), push teachers to rethink their teaching routines regarding goal clarity and to incorporate knowledge and skills learned in PD into their teaching. We chose to focus on goal clarity because the clear communication of lesson goals has been shown to have positive effects on students' perception of learning conditions, learning motivation and knowledge development. We coded and analyzed videotapes of two DV cycles in 2-minute segments as well as videotapes of pre and post teaching of the six DVC's participating teachers for the full lesson. Our findings indicate that the PD facilitator played an essential role in the video-based discussions about goal clarity and that the video-based discussions provided practice-based opportunities for the teachers to rethink their teaching routines. Furthermore, our findings show that teachers significantly changed their teaching practice from pre to post test by incorporating knowledge and skills learned in PD into their classrooms. With this study we added value to the question of how PD can be related to the teaching practice. In addition future implications for designing video-based facilitation to push teacher learning forward are discussed.

Session D 20

30 August 2017 10:15 - 11:45

Main Building C - C6

Single Paper

Higher Education

Higher Education, Motivation and Self-Efficacy

Keywords: Achievement, Biology, Competencies, Higher education, Metacognition, Mixed-method research, Motivation, Problem-based learning, Reflection, Researcher education, Self-efficacy

Interest group: SIG 04 - Higher Education

Chairperson: Kaethe Schneider, Friedrich Schiller University Jena, Germany

Cognitive and non-cognitive predictors of early academic achievement in higher education

Keywords: Achievement, Higher education, Metacognition, Motivation

Presenting Author:Jonas Willems, University of Antwerp, Belgium; **Co-Author:**Liesje Coertjens, Université catholique de Louvain (UCL), Belgium; **Co-Author:**Vincent Donche, University of Antwerp, Belgium

As in other European countries in which there is no entrance test to university, study success rates in Flanders' (Dutch speaking part of Belgium) first year of higher education (FYHE) are low. This has considerable psychological and financial costs for the individual student, the family and the society. Decades of research have been carried out to better understand why some students are more successful than others in FYHE. Despite this overwhelming amount of literature on determinants of academic achievement, the combination of cognitive and non-cognitive factors is less often studied. Therefore, the main aim of this research is to explore the extent to which the combination of cognitive (*prior knowledge*) and non-cognitive (*processing strategies, regulation strategies, academic motivation, self-concept self-efficacy*) variables predict academic achievement of students in FYHE, after controlling for pre-entry characteristics (*age, gender, prior education*) and adopting an integrative research perspective. More concretely, structural equation modelling was used to investigate the extent to which the aforementioned variables together predict grade point average and academic success (percentage of study points obtained) after the first semester of FYHE. Thus, students' academic achievement in FYHE is conceptualised by the seldom used measure of *early* academic achievement. Data of 335 first-year students within two faculties of science of a Belgian university college were gathered at the beginning of academic year 2015-2016. Results show that cognitive variables and pre-entry characteristics are important predictors of early academic achievement. However, evidence for the hypothesis that non-cognitive variables are determinants of early academic achievement, is limited.

Effect of undergraduate research on motivation and self-efficacy beliefs about research

Keywords: Higher education, Motivation, Researcher education, Self-efficacy

Presenting Author:Floris van Blankenstein, Leiden University, Netherlands; **Co-Author:**Nadira Saab, Leiden University, Netherlands; **Co-Author:**Roeland M. Van der Rijst, ICLON-Leiden University Graduate School of Teaching, Netherlands; **Co-Author:**Paul Van den Broek, Leiden University, Netherlands

Some research suggests that participating in undergraduate research increases feelings of self-efficacy about several

research skills. However, this evidence is scarce and moreover, there seems to be little evidence about the impact of undergraduate research on motivation for research. The aim of this study was to investigate how students' self-efficacy beliefs about collaboration and writing research papers, and their intrinsic motivation for doing research and writing research papers would develop over time while they participated in undergraduate research projects. During a one-year bachelor course, students practiced doing research in groups of around 25 students. They completed questionnaires three times during the year. In addition, 12 students were interviewed about their motivation and self-efficacy beliefs. Self-efficacy for collaboration and writing and intrinsic motivation for writing increased significantly over the year. Intrinsic motivation for research did not change significantly. The interview data suggest that experience is an important factor that explains increases in self-efficacy. Factors that may explain the lack of an increase in intrinsic motivation are a sense that the research project is irrelevant and too many rules that need to be followed when conducting research. Motivation may increase when students have more autonomous control over their research project.

Graduates' evaluations of the usefulness of their university education in early career situation

Keywords: Competencies, Higher education, Mixed-method research, Reflection

Presenting Author:Tarja Tuononen, University of Helsinki, Finland; **Co-Author:**Anna Parpala, University of Helsinki, Finland; **Co-Author:**Sari Lindblom, University of Helsinki, Finland

The development of graduates' generic skills at the university and their satisfaction of university education after entering the working life have been explored in many studies (Crebert et al. 2007; Tynjälä et al. 2006). These studies have mostly applied quantitative and group-level analysis. Research on individual qualitative differences has been scarce. In the present longitudinal mixed-method study, we aim to explore how graduates with different skills to evaluate their competences at the time of their graduation differ in their evaluations of the usefulness of their university education and job satisfaction in early career situation. The categorisation of graduates to either rich or limited descriptions of academic competences was based on our previous study (Authors, in press). The present study extends the previous study by exploring these graduates after three years of graduation. Follow-up questionnaire data were analysed using independent samples t-test and content analysis. The results showed that graduates with rich descriptions of their academic competences evaluated university education more useful in their current jobs than graduates with limited descriptions. There were no statistically significant differences between the graduates with rich and limited descriptions of their competences in neither satisfaction of the degree nor job satisfaction. The results however showed qualitative differences in graduates' experiences of the usefulness of university education and in what kind of challenges they have had in working life. This study indicates that graduates' skills to recognise their competences at the time of their graduation may affect the challenges they have in their future employability.

Biology students' learning outcomes, self-efficacy beliefs and study success in PBL course

Keywords: Biology, Higher education, Self-efficacy, Problem-based learning

Presenting Author:Heidi Hyytinen, University of Helsinki, Finland; **Presenting Author:**Viivi Virtanen, University of Helsinki, Finland; **Co-Author:**Heikki Hirvonen, University of Helsinki, Finland; **Co-Author:**Sari Lindblom, University of Helsinki, Finland

Self-efficacy beliefs and self-monitoring are beneficial for academic achievement. The present study analyses the relations between learning outcomes, self-efficacy beliefs, self-reported grades and course grades of the first- and second-year biology students (n=61) in problem-based learning environment. The self-report data measuring students learning outcomes and self-efficacy beliefs were collected in the end of field course in ecology research. The data were analysed with quantitative and qualitative procedures. Two different student groups were identified in the analysis, which showed differences in experiences of learning outcomes, but the groups did not differ in terms of the self-efficacy beliefs or course grades. The results further showed that students' self-reported grades differed from the course grades. Students whose course grades were higher than their self-reported grades scored the lowest on self-efficacy beliefs. The results indicate that students with lower levels self-efficacy more likely underestimate their grades. However, unclear assessment criteria can also explain the differences between students' self-reported grades and course grades.

Session D 21

30 August 2017 10:15 - 11:45

Main Building A - A31

Single Paper

Cognitive Science, Learning and Instructional Technology

Educational Technology

Keywords: Computer-assisted learning, Design based research, Distributed cognition, Educational Technology, Learning analytics, Primary education, Science education, Student learning, Survey Research, Teaching / instruction, Vocational education

Interest group: SIG 07 - Learning and Instruction with Computers

Chairperson: Katerina Vlckova, Masaryk University, Czech Republic

How students use smart phones and tablets in learning science and mathematics?

Keywords: Educational Technology, Primary education, Student learning, Survey Research

Presenting Author: Margus Pedaste, University of Tartu, Estonia; **Co-Author:** Olev Must, University of Tartu, Estonia; **Co-Author:** Äli Leijen, University of Tartu, Estonia; **Co-Author:** Mario Mäeots, University of Tartu, Estonia; **Co-Author:** Leo Aleksander Siiman, University of Tartu, Estonia; **Co-Author:** Külli Kori, University of Tartu, Estonia; **Co-Author:** Liina Adov, University of Tartu, Estonia

Smart phones and tablets are actively used in everyday life but it's not clear for what and how often these are used in learning context. In our study we investigated on what purposes and how often mobile devices were used in learning science and mathematics. We conducted a survey where 3521 students from 6th and 9th grade evaluated their frequency of using mobile devices in lessons and homework in three competences areas: information, communication and content creation. Hierarchical cluster analysis enabled to distinguish five groups of students: *digital natives*, *information students*, *communicating information students*, *content creation students*, and *nonusers*. The first four characterize students (50.1%) who use mobile devices for learning science and mathematics at least once in a week. The group of nonusers (49.9%) used mobile devices for learning once or twice in a month or less. Among these five general groups can be differentiated 11 sub-groups and the profiles of these groups help to design new interventions to support effective use of smart phones and tablets in learning. In the design process should be also taken into account information about students' gender and age group. Our results showed that the distribution of boys and girls as well as 6th and 9th grade students vary in different groups – boys belong more often to the groups *content creation students* and *digital natives*, the 9th grade students are more often in the group of *communicating information students* and, the 6th grade students in the group of *nonusers*.

Creating technology-based learning scenarios to support observation skills in VET schools

Keywords: Design based research, Educational Technology, Teaching / instruction, Vocational education

Presenting Author: Valentina Caruso, Swiss Federal Institute for Vocational Education and Training, Switzerland; **Co-Author:** Alberto Cattaneo, Swiss Federal Institute for Vocational Education and Training SFIVET, Switzerland; **Co-Author:** Jean-Luc Gurtner, University of Fribourg, Switzerland

Observation is a relevant skill for professionals in different fields. However, at present, very little pedagogical attention has been given to the instructional ways to promote the acquisition of this skill, especially in initial VET systems. In this study, we discuss the various conceptions of observation for the profession of clothing designers and suggest two instructional scenarios to foster the acquisition of this skill in Swiss VET schools. Each of the two scenarios was implemented in a paper-based version first and then in a technology-enhanced one, so to investigate also to what extent technology can contribute to the promotion of observation. Twenty-eight learning activities were run in two clothing designers' schools of Canton Ticino over one semester; they involved six teachers and sixty-eight learners. Data collection was carried out by means of semi-structured interviews with teachers and learners. All activities were video-recorded too. The data were analyzed using a structuring content analysis approach. Findings show that observation is a transversal skill in the curricula of the clothing designers, while visual cues generated by the learners and superimposed images could be two effective ways to promote observation. The use of technology is also perceived as an added value to increase the quality of teaching and the interactions between teachers and learners.

Interactivity is not sufficient for imagination-based integration of external representations

Keywords: Design based research, Distributed cognition, Educational Technology, Science education

Presenting Author: Prajakt Pande, Homi Bhabha Centre for Science Education, Tata Institute of Fundamental Research, India; **Presenting Author:** Aditi Kothiyal, Indian Institute Of Technology Bombay, India; **Co-Author:** Rwitajit Majumdar, Indian Institute of Technology Bombay, Mumbai, India; **Co-Author:** Harshit Agrawal, Homi Bhabha Centre for Science Education, Tata Institute of Fundamental Research, Mumbai, India; **Co-Author:** Sanjay Chandrasekharan, Homi Bhabha Centre for Science Education, Tata Institute of Fundamental Research, Mumbai, India

We report the design, development and testing of a fully manipulable computer interface, designed (a) as an intervention tool to support imagination-based integration of multiple external representations (MERs), and (b) as a probe to understand the cognitive processes involved in MER integration. The interface has fully manipulable and interconnected MERs (simulation, graph and equation) representing a simple oscillator (pendulum) system. The interface design is inspired by distributed and embodied cognition approaches. We assessed MER integration using this interface, with 7th grade students, who interacted with the interface for an hour. They then answered, as well as verbally reasoned about questions that tested MER integration. Students' actions on the interface (gaze and mouse clicks) were recorded during their interaction with the interface. These were correlated to their reasoning, to understand actions (patterns of interaction) that could have potentially led to integration. The results provide a very nuanced view of the relationship between manipulability/interaction and integration. Good performers (on the MER integration tasks) had a high level of interaction, but with significant variations between participants, suggesting that interaction is needed for integration, but there is no single interaction pattern supporting integration. However, students exhibiting similar interaction patterns as the good performers performed badly in the integration tasks. This suggests interactivity is not sufficient for MER integration. The results indicate that interactivity can scaffold MER integration, but cannot guarantee it. Support from facilitators is needed for MER integration, as in any other complex task where novices' attention needs to be guided.

Blended analytics: A first step in capturing and visualizing physical and digital learning processes

Keywords: Computer-assisted learning, Educational Technology, Learning analytics, Teaching / instruction

Presenting Author: Sarah Howard, University of Wollongong, Australia; **Co-Author:** Kate Thompson, Griffith University, Australia; **Co-Author:** Jie Yang, University of Wollongong, Australia; **Co-Author:** Jun Ma, University of Wollongong, Australia; **Co-Author:** Abelardo Pardo, University of Sydney, Australia

Current methods of classroom research have struggled to meaningfully capture the longitudinal and complex nature of learning processes. To complicate this, teachers are increasingly expected to “blend” their traditional face-to-face practice with learning in digital places. However, in doing this learning becomes increasingly invisible, as it has been difficult to capture how students learn through a digital device. Therefore, it has been difficult to understand how learning happens across physical and digital blended learning spaces. Multimodal methods are needed to capture a wider range of classroom data to understand how students interact, use digital technologies and other resources in these spaces in their learning processes. Tools to meaningfully communicate findings to teachers, to support students’ learning processes and learning design, are also needed. In this paper, we present a combined classroom data collection method, which includes observations in both physical and digital spaces. This paper will specifically address the first component: observation of the physical classroom, through a pilot study and early video analysis of a classroom video system in an Australian Year 1 classroom. The video analyzed shows five students’ working on a writing task. Results from video tracking show a range of student movement patterns, which can inform learning analytics design and unpack students’ learning processes. Implications of the findings, design for modeling observation data and developing learning analytics are discussed.

Session D 22

30 August 2017 10:15 - 11:45

Main Building A - A2B

Symposium

Learning and Special Education

Analysing video recorded social interactions: The case of students with special educational needs

Keywords: Learning and developmental difficulties, Learning disabilities, Metacognition, Reading comprehension, Secondary education, Self-regulation, Social interaction, Special education, Video analysis

Interest group: SIG 15 - Special Educational Needs

Chairperson: Sabine Zorn, INS HEA, France

Discussant: Baruch Schwarz, Hebrew University of Jerusalem, Israel

Analysing social interactions taking place in learning contexts provides us precious elements to understand cognitive and socio-emotional processes involved in learning. With the help of video data collection, we can now explore learning situations in ecological contexts. In the field of learning disabilities, however, this method has been only rarely used, thus leaving a part of educational situations unexplored. In this symposium, our aim is to present the interests (and the limits) of research using video data collection regarding students with special educational needs and/or disabilities. The four papers included focus on different kinds of learning situations and students with different SEN and/or disabilities. The first communication will focus on behaviours spontaneously produced by students with profound intellectual and multiple disabilities during class time in a special institute. The second one will explore help interactions between students with an autism spectrum disorder and their teachers in lower secondary classrooms. The third paper uses video recordings to analyse cognitive and metacognitive behaviours of adults with moderate intellectual disability during an intervention focused at improving functional reading competences. The last presentation uses video to analyse the effects of an intervention focusing on cognitive, metacognitive and self-regulation behaviours in young students in regular education. Together, these four communications make novel contributions to understanding the socio-cognitive issues of learners with SEN and/or disabilities and suggest new directions for promoting video recording in educational contexts.

Students with profound intellectual and multiple disabilities: Spontaneous behaviors in classroom

Presenting Author: Esther Atlan, INS HEA, France; **Co-Author:** Danièle Toubert, INSHEA, France; **Co-Author:** Minna Puustinen, INS HEA, France

Despite the law of February 11, 2005, which guarantees the right for schooling for all students with disabilities, only around 13% of young people with profound intellectual and multiple disabilities (PIMD) benefit from part-time schooling in France. The schooling of students with PIMD is particularly challenging because it involves reconsidering curriculum, pedagogy, and assessment. In this observational study, which is part of a larger longitudinal research project, we focused on behaviors students with PIMD spontaneously (i.e., without being explicitly invited to do so) produce in the classroom. The participants were ten students with PIMD, aged 8 to 15, who attended two one-hour classes per week during one school year; in the classroom there were a total of five students with PIMD and two teachers as well as some other professionals (e.g., educator), if necessary. Three randomly selected classes (i.e., one per trimester) were filmed during the school year and analyzed. The results showed that all the students produced spontaneous behaviors. Some of them were exclusively aimed at exploring the material they had at their disposal, but most students also produced spontaneous behaviors addressed to the teachers, the other professionals and/or the other students. The analyses further showed that the teachers didn’t always react to, or take into account the students’ spontaneous behaviors; most of the time, they didn’t seem to notice those behaviors at all.

Help interactions between adolescents with an autism spectrum disorder and their teachers

Presenting Author:Sabine Zorn, INS HEA, France; **Co-Author:**Minna Puustinen, INS HEA, France

At school, learning typically occurs through some form of social interaction between teachers and students. Moreover, social interactions have been reported to be one of the best means to reach understanding of learning processes, school events, and, more generally, students' social and cultural integration (Mondada, 1995). Furthermore, difficulties in social interactions are considered one of the key characteristics—and one of the two diagnostic criteria—of people with an autism spectrum disorder (ASD; American Psychiatric Association, 2013). Within this context, examining social interactions in the classroom between teachers and students with ASD is a way to enhance knowledge on schooling of these students. However, despite legislative changes all over the world (e.g., 2005 law in France), this topic has been only rarely investigated. To fill this gap, we analysed both teacher and student-initiated interactions aimed to help lower secondary students with ASD with their schoolwork, in regular and resource classrooms. Eleven students with ASD and seventeen teachers were filmed in their everyday classroom activities. The results showed that help provided by the teachers was mainly simple (as opposed to specific; Gombert & Roussey, 2007): go and see briefly the students to check their work, repeat explanations, etc. Students with ASD sought help from their teacher during class; some of their requests reflected a self-regulated attitude while others did not. The impact of our results on the schooling of students with ASD will be discussed.

Metacognitive strategies and self-regulated learning in students with disadvantaged backgrounds

Presenting Author:Sophie Brandon, University of Geneva, Switzerland; **Co-Author:**Chloé Barthassat, University of Geneva, Switzerland; **Co-Author:**Hildalill Rojas, Université de Genève, Unknown; **Co-Author:**Christine Hessels-Schlatter, University of Geneva, Switzerland

Metacognitive competences are important in school learning and it has been shown that specific metacognitive interventions lead to improvements in solving school tasks (e.g., Dignath, Büttner, & Langfeldt, 2008; Hessels-Schlatter, Hessels, Godin, & Spillmann-Rojas, in press). The aim of this study is to develop metacognition, self-regulated learning (SRL) processes and strategies in children from disadvantages socioeconomic backgrounds in a natural classroom setting. The research took place in a regular class with students between 5 and 6 years old and is a part of a larger project in two mainstream schools in Geneva. The training consisted of 24 sessions of 45 minutes each. In the morning, strategies were introduced one at a time and the students learned to apply these in curriculum unrelated (CU) tasks (e.g., games). After the morning break, the learned strategies were transferred to curriculum related (CR) tasks (e.g., French and Maths). Self-regulation learning (SRL), metaknowledge, strategies as well as performance were evaluated by means of online measures (video recording and trace data) and offline measures (interviews). The preliminary results show that online measures proved to be more appropriate for the evaluation of SRL behaviors during task execution for this type of population and an improvement from pretest to posttest on strategies, SRL and performance was found.

Intervention aimed at improving reading comprehension in adults with intellectual disability

Presenting Author:Sophie Brandon, University of Geneva, Switzerland; **Co-Author:**Marco Hessels, University of Geneva, Switzerland

This study aimed at fostering functional reading in adults with moderate intellectual disability (ID). We focused on developing strategies, and cognitive and metacognitive processes in persons with ID, to improve decoding and text comprehension. Four adults with ID from institutions in Switzerland and France participated in the 30 to 35 intervention sessions of 50 minutes each. The tasks included vocabulary exercises and phonemic awareness, short texts with direct questions and logical inferences. Furthermore, a memory aid with strategies that were perceived useful was elaborated by participants, to assist them during the reading comprehension tasks. Mediation was aimed at fostering cognitive and metacognitive knowledge, flexible use of strategies as well as the development of self-determination and autonomy. The participants were encouraged to ask questions about their activities, to contextualize information, to make choices, to verbalize and to discuss the strategies used. All sessions were video recorded. The videos were transcribed verbatim to analyse the type of mediation (direct or indirect), the frequency and adequacy of strategies used (including the memory aid), meta-knowledge (of oneself, tasks and strategies) and motivational variables (self-efficacy and attributive style). Use of external memory strategies and performance were further analysed through written productions of the participants. The preliminary results indicate that the mediation and the memory aid allow the participants to progress in reading decoding and comprehension and to have a better understanding of their competences and deficits in this domain.

Session D 23

30 August 2017 10:15 - 11:45

Pinni B - B3118

Symposium

Teaching and Teacher Education

What do (pre-service) teachers think, believe and feel regarding heterogeneous classrooms

Keywords: At-risk students, Attitudes and beliefs, Cultural diversity in school, Educational Psychology, Pre-service teacher education, Quantitative methods

Interest group: SIG 11 - Teaching and Teacher Education

Chairperson: Charlotte Dignath, Goethe-University Frankfurt, Germany

Organiser: Mareike Kunter, Goethe-Universität Frankfurt, Germany

Discussant: Helenrose Fives, Montclair State University, United States

Increasing mobility combined with the United Nations' promotion of inclusive classrooms have worldwide led to increasingly heterogeneous student populations, bringing along new challenges for (prospective) teachers. This symposium's goal is to investigate beliefs that (prospective) teachers hold regarding heterogeneous classrooms as one important aspect of teachers' professional competence. All four studies examine (pre-service) teachers' beliefs towards heterogeneity and its relationship with other aspects of teacher competence by means of innovative methods, in order to present up-to-date evidence in this relatively young field of research. The symposium starts with an overview of research of the last fifteen years through a literature review on international studies on teacher beliefs towards heterogeneity. Next, a study with a large sample of pre-service teachers reports on the dimensional structure of teacher beliefs regarding heterogeneity as well as on relations between teacher beliefs and teacher self-efficacy to teach in heterogeneous classrooms. The third study presents evidence from an experiment with pre-service teachers investigating teachers' implicit attitudes toward students with educational needs in relation to their explicit attitudes towards inclusive education and their attitudes towards their ability to teach students with educational needs. The symposium concludes with a comparative study on the teacher attitudes of pre-, primary, and secondary school pre-service teachers towards inclusive education. This symposium contributes to the research field of teacher beliefs towards heterogeneity by investigating teacher beliefs in-depth with different methods and research approaches in order to derive implications for future research and teacher training.

Teachers' beliefs regarding heterogeneous classrooms – a systematic literature review

Presenting Author: Charlotte Dignath, Goethe-University Frankfurt, Germany; **Co-Author:** Mareike Kunter, Goethe-Universität Frankfurt, Germany

Migration movements, changing demographics, and the introduction of inclusion in world-wide schools are leading to an increasingly heterogeneous student population and thus a challenge for educational systems. How do teachers *feel* and *think* about this changing situation? Based on the model of determinants and consequences of teachers' professional competence (Kunter et al., 2013), this literature review seeks to give an overview of teacher beliefs regarding heterogeneous classrooms, as well as of relations of beliefs with other aspects of teacher professional competence (e.g., professional knowledge, self-efficacy), and with teachers' professional practice and with learning opportunities. The literature search among studies published since 2000 yielded almost 6.513 studies. 420 studies met the selection criteria and are coded elaborately with a systematic coding scheme. Preliminary analyses of the first 196 coded articles reveal inconsistent results regarding teacher beliefs, differing among dimension of heterogeneity. Moreover, positive beliefs turned out to be related to greater teacher self-efficacy. Although teachers seem to be willing to engage with issues concerning heterogeneity, they have a limited knowledge of the concepts, which in turn affects their efficacy negatively. In most studies, teachers' field experience is positively related with their beliefs, knowledge, and self-efficacy. Therefore, many researchers argue for field experiences to create preservice teachers' interactions with people from heterogeneous backgrounds, accompanied by the promotion of self-reflection in order to help student teachers to connect their experiences with theoretical knowledge about heterogeneity.

Teacher students' attitudes towards diversity: Conceptualizing and testing a multidimensional model

Presenting Author: Sabine K. Lehmann-Grube, University of Augsburg, Germany; **Co-Author:** Andreas Hartinger, University of Augsburg, Germany; **Co-Author:** Robert Grassinger, University of Augsburg, Germany; **Co-Author:** Hans Peter Brandl-Bredenbeck, University of Augsburg, Germany; **Co-Author:** Ulrike Ohl, University of Augsburg, Germany; **Co-Author:** Manfred Riegger, University of Augsburg, Germany; **Co-Author:** Markus Dresel, University of Augsburg, Germany

Increasing diversity of students poses new challenges for teachers along with growing demands to account for their differential needs with respect to learning. As one of several factors of teachers' competence to deal with diversity in the classroom their attitudes towards the variety of students' characteristics and backgrounds can be assumed to be relevant. A bi-factorial model of attitudes towards student diversity is proposed differentiating four types of diversity as attitude objects (i.e., pupils' capabilities, language skills, immigration and socio-economic backgrounds) and three attitude facets (i.e., general valence, benefit for students, costs for teachers). A study with 1354 teacher students was conducted to test the model. Confirmatory factor analyses supported the assumed factorial structure. Relations with external characteristics underscore the usefulness of the differentiations made in the proposed model. In detail, different attitude profiles were evident for different student subpopulations and different relations with transmission and constructivist beliefs as well as self-efficacy beliefs were observed for different attitude dimensions.

Stereotypes and attitudes towards students with special educational needs and inclusive education

Presenting Author: Ineke Pit-ten Cate, University of Luxembourg, Luxembourg; **Co-Author:** Mireille Krischler, University of Luxembourg, Luxembourg; **Co-Author:** Sabine Krolak-Schwerdt, University of Luxembourg, Luxembourg

Decisions concerning the educational instruction and pathways of students with special educational needs (SEN) may be affected by general stereotypes and associated teachers' attitudes. Both stereotypes and attitudes affect judgments and behavior and hence may be pivotal for the success of inclusive education. More specifically, stereotypes and attitudes can elicit positive or negative expectations and judgments, which in turn can enhance or limit the successful inclusion of

students with SEN in regular classrooms. The current study investigated stereotypes of and teachers' implicit attitudes toward students with SEN in relation to teachers' explicit attitudes towards inclusive education. Results show that teachers hold ambivalent views of students with learning difficulties (i.e. low competence, high warmth), whereas students with behavioral problems are perceived as neither particularly (in)competent nor warm. These stereotypes matched teachers' implicit attitudes to the extent that implicit attitudes towards students with learning difficulties were more negative than towards students with behavioral problems. Although teachers expressed positive attitudes towards the benefits of inclusion they reported negative attitudes in regards to their ability to teach students with SEN. No associations were found between stereotypes and implicit attitudes. Implicit attitudes towards students with SEN were also not associated with explicit attitudes towards inclusive education. The warmth dimension of stereotype was however positively correlated with perceived ability to teach students with SEN. That is, perceived ability to successfully teach these students may rely on perceptions of these students' alleged sociability.

Australian Pre, Primary and Secondary School Pre-Service Teacher Attitudes to Inclusive Education

Presenting Author: Christopher Boyle, University of Exeter, United Kingdom

This study considered Australian pre-service teachers' attitudes toward the inclusion of additional support needs (ASN) students at all three levels of schooling (pre, primary, and secondary school). The study used a sample of 640 subjects whose attitudes were investigated using the Teacher Attitudes to Inclusion Scale Adapted (TAISA). The significant results of the study indicated secondary school focused pre-service teachers displayed less positive attitudes toward inclusion than pre-service teachers with a primary school focus. When considering the impact of additional variables such as previous special educational training and year level of enrolled study, significant differences in attitudes toward inclusion emerged across pre, primary and secondary school pre-service teacher cohorts.

Session D 24

30 August 2017 10:15 - 11:45

Main Building A - A3

Symposium

Teaching and Teacher Education

Becoming a teacher - Austrian, Estonian and Finnish teacher students' perceptions

Keywords: Attitudes and beliefs, Comparative studies, Mixed-method research, Pre-service teacher education, Reflection, Teacher Professional Development

Interest group: SIG 11 - Teaching and Teacher Education

Chairperson: Eeva Kaisa Hyry-Beihammer, University of Education Upper Austria, Austria

Discussant: Erika Löfström, University of Helsinki, Finland

During teacher education, student teachers have to develop their understanding of themselves as teachers, thus their teacher identities. Teacher identity can be explored through variety of theoretical and methodological perspectives. Our symposium focuses on the teachers' beliefs about (good) teaching and learning and the development of teachers' personal practical theories during the teacher education program. The symposium papers are presented in the context of different teacher education programs in Austria, Estonia, and Finland. All papers focus on researching of how to become a teacher, but the methodological approaches are different. Our theoretical aim is to uncover differences as well as similar patterns of teacher students' beliefs, role perceptions and personal practical theories across the three countries. Based on the results, the implications for teacher education are discussed in the papers and in the final discussion of the symposium.

Austrian student teachers' beliefs about (good) teaching and learning as a part of their PPTs

Presenting Author: Eeva Kaisa Hyry-Beihammer, University of Education Upper Austria, Austria; **Co-Author:** Petra Hecht, Pädagogische Hochschule Vorarlberg, Austria; **Co-Author:** Jan Boehm, University of Education Upper Austria, Germany

This paper focuses on Austrian student teachers' beliefs about good teaching at the beginning of their teacher studies. Studies show that prospective teachers' beliefs influence what is learned during their studies, but also that teacher education programs have an impact on student teachers' beliefs about the qualities of good teaching (Levin, 2008). We ask, 'What do these student teachers believe about good teaching and learning, and how do these beliefs inform their personal practical theories of teaching? The data consists of narrative interviews with 12 Austrian primary-school student teachers and 10 Austrian secondary-school student teachers. The students represent the diversity of student teachers in Austria with regard to age, gender, national background, and previous teaching experience. Following the narrative approach (Riessman, 2008), the aim is to listen to the student teachers' "voices" (Elbaz-Luwisch, 2005) through their stories of personal experience. Methods of content analysis and narrative analysis (Riessman, 2008) are used to investigate student teachers' beliefs about good teaching and learning.

Becoming a teacher in Estonia: perceptions of roles, beliefs and tensions in different programmes

Presenting Author: Tiina Anspal, University of Tartu, Estonia; **Co-Author:** Äli Leijen, University of Tartu, Estonia

This paper draws on three different studies carried out in Estonian context that aimed to explore teacher identity development during teacher education - across different study years and study programmes. Teacher identity is researched through student teachers image of themselves as teachers, teachers role and beliefs. Also worries, gaps and tensions that

arise in the dialogue between ideals and experiences were explored in the three studies that form the basis of this presentation. Combining the results of the studies indicate how the idealistic views of themselves as teachers and teachers role change with experiences during teaching practice. Worries, fears and tensions increasingly enter to the picture as student teacher understand the difficulty in achieving their high ideals. Analysis of the worries and tensions indicate that time-management issues should be addressed more during teacher education, especially in connection with teaching practice. Our data also suggest that subject teachers and primary teachers views and beliefs on teachers role tend to be different with primary teachers emphasising especially teachers' role as pedagogue and didactics specialist and subject teachers emphasising the role of the teacher as subject specialist and didactic specialist.

Finnish teacher students' beliefs: Case of University of Helsinki

Presenting Author:Katriina Maaranen, University of Helsinki, Finland; **Co-Author:**Katriina Stenberg, University of Helsinki, Finland; **Co-Author:**Liisa Karlsson, University of Eastern Finland, Finland; **Co-Author:**Harri Pitkaniemi, University of Eastern Finland, Finland

This study investigates teacher students' personal practical theories in the University of Helsinki, Finland. The study combines data from first and fourth year teacher students. The students constructed their personal practical theories, which are defined in this study as *pedagogical beliefs that guide their classroom actions*, by writing statements indicating *what is important to them is teaching*. The first year students' PPTs showed that when student teachers begin their teacher education, the majority of positions concern didactical issues, that is, how to promote pupils' studying and learning processes. In the fourth year students' PPTs three main categories were found: *the foundations of good teaching, the teacher*, and *the teacher's daily work*. The analysis of the statements shows that the notions of good teaching are very idealistic. The role of teacher education is considered in the process of promoting development of student teachers' teacher identity during their studies, and that it is good to have high aims and values for teaching, although in reality some of them might be difficult to achieve. We consider it important that the teachers are aware of their own values and beliefs, and they also need to be highly educated in order to be able to make their own pedagogical decisions and justify them.

Becoming a teacher - Austrian, Estonian and Finnish teacher students' perceptions

Presenting Author:Tiina Anspal, University of Tartu, Estonia; **Presenting Author:**Eeva Kaisa Hyry-Beihammer, University of Education Upper Austria, Austria; **Presenting Author:**Katriina Maaranen, University of Helsinki, Finland; **Co-Author:**Katriina Stenberg, University of Helsinki, Finland; **Co-Author:**Jan Boehm, University of Education Upper Austria, Germany; **Co-Author:**Petra Hecht, Pädagogische Hochschule Vorarlberg, Austria

During teacher education, student teachers have to develop their understanding of themselves as teachers, thus their teacher identities. Teacher identity can be explored through variety of theoretical and methodological perspectives. Our symposium focuses on the teachers' beliefs about (good) teaching and learning and the development of teachers' personal practical theories during the teacher education program. The symposium papers are presented in the context of different teacher education programs in Austria, Estonia, and Finland. All papers focus on researching of how to become a teacher, but the methodological approaches are different. Our theoretical aim is to uncover differences as well as similar patterns of teacher students' beliefs, role perceptions and personal practical theories across the three countries. Based on the results, the implications for teacher education are discussed in the papers and in the final discussion of the symposium.

Session D 25

30 August 2017 10:15 - 11:45

Virta - 120

Invited Symposium

Educational Policy and Systems

Community Led Educational Reform: co-defining futures, out of school learning & poverty proofing

Keywords: At-risk students, Citizenship education, Collaborative Learning, Cooperative / collaborative learning, Cultural diversity in school, Mixed-method research, Out-of-school learning, Parental involvement in learning, Secondary education, Social aspects of learning and teaching

Interest group: SIG 21 - Learning and Teaching in Culturally Diverse Settings

Chairperson: Liz Todd, Newcastle University, United Kingdom

Organiser: John O'Neill, Massey University, Nicaragua

Discussant: Rocio Garcia-Carrion, University of Deusto, Spain

This symposium aims to explore different aspects of community led educational reform. Some schools make community led reform a cornerstone of their institution – but bottom-up development is relevant for all schools. The first paper (Karen Laing and Liz Todd) researches the meaning that children, parents and teachers give to learning, both inside and outside of school, through choices about after school activities. This paper analyses the out of school activities of 11,762 young children using data from the Millennium Cohort Study (MSC). The second paper (Debbie Ralls) looks at what engagement means in an English co-operative school, drawing on the concept of relational engagement. Claire Forbes, in the third paper, explores a possible process for bottom-up reform, the co-creation of a future agenda involving young people and professionals, and supported by an assets map. In the final paper, Laura Mazzoli Smith and Liz Todd explore the involvement of young people, parents, teachers and governors in change with the aim of no longer, in schools, stigmatising

children who are living in poverty.

A range of social justice issues are addressed. Some of the questions asked include what does 'engagement' in school mean? What do we know about the meanings that the community gives to education? What are the reasons for bottom up development of services? What methods can we use for members of the school community to work together? This series of papers from Manchester and Newcastle Universities explores these questions.

Out of school hours activities: looking at school staff, parent and pupil meanings and theories

Presenting Author:Karen Laing, Newcastle University, United Kingdom; **Co-Author:**Liz Todd, Newcastle University, United Kingdom

The first paper (Karen Laing and Liz Todd) explores the meaning that children, parents and teachers give to learning, both inside and outside of school, through choices about after school activities. The implications of the meanings given to learning, especially out of school activities, for community led educational reform are considered. The out of school activities of 11,762 young children aged 5-11 were looked at using data from the Millennium Cohort Study (MSC). The possible association with attainment was considered by linking the MCS to the National Pupil Database (NPD). Interviews were held with head teachers, teachers, parents, pupils and activity providers in 10 schools. A number of differences are found in the prevalence of activities between rich and poor. The association of these activities with attainment for different groups of children is considered in terms of implications for policy and practice. Comparing economically disadvantage children with those who were not in the MCS, there was little difference in attendance of breakfast clubs or after school clubs but poorer children attended more religious activities after school and were less likely to have extra tuition or to attend a sports club. Attending after school clubs was associated with attainment for disadvantaged children. This research explored the theories that might account for the findings. The meanings given to activities by parents contributed to a richer understanding of the scholarisation of childhood. Implications for community led educational reform are discussed.

Forms and Understandings of Engagement in a Co-operative School Setting

Presenting Author:Deborah Ralls, University of Manchester, United Kingdom

The second paper (Debbie Ralls) looks at what engagement means in an English co-operative school. Drawing on Warren's (2009) concept of relational engagement, staff, parents, students and community members were asked about their engagement experiences. Engagement in action was observed to compare with the accounts given by teachers. This study focused on engagement between a co-operative school and its key stakeholders: the students, their parents and the community: Staff, parents, students and community members were asked about their engagement experiences. Engagement in action was observed to compare with the accounts given by staff. The study was thus able to take account of any links between the groups whilst acknowledging contrasts in approaches or understandings and to query why such differences may have been occurring.

Analysis looked at the extent to which activities were seen as engagement with rather than doing to. It was found that the co-operative school governance did indeed give more potential for democratic relational engagement. However, parents and the community tended to be viewed as outsiders and so engaged with differently to students. Co-operative schools face a dilemma - how to frame a more *relational* understanding of engagement in an English Education policy landscape of *doing to*? The difficulty in *doing with* stakeholders when current English Education policy seeks *to do to* schools, encouraging parents and community to do the same through the marketisation of schools and the rhetoric of freedom and choice.

Reform from the Bottom-Up. A grass-roots, assets-based approach improving young people's outcomes

Presenting Author:Claire Forbes, University of Manchester, United Kingdom

Claire Forbes explores a possible process for bottom-up reform, the co-creation of a future agenda involving young people and professionals, and supported by an assets map. This paper considers the diverse and multiple realities of young people's lived experiences within areas of significant socio-economic disadvantage, in order to suggest opportunities to develop policy interventions that are contextually appropriate. Asset Based Community Development (ABCD), a grass roots process developed in the United States, where existing but often unrecognized community assets are mapped, provides a possible means of making sense of the places, spaces and people that children in our most marginalised communities have reason to value and why. 10 student researchers carry out focus groups with 230 young people aged 11-15. Young people are revealed as rich in social capital and rarely making use of professional led services, instead identifying other enabling assets such as family, friends and social media. A student created assets map is used to facilitate work between the student researchers and professionals from 15 organisations to develop a co-defined future agenda.

Poverty proofing the school day: bottom-up reform a potential for real change

Presenting Author:Liz Todd, Newcastle University, United Kingdom

Laura Mazzoli Smith and Liz Todd explore the involvement of young people, parents, teachers and governors in change with the aim of no longer stigmatising children who are living in poverty. Our research investigates the use of Children North East's audit tool with 20+ primary and secondary schools to 'poverty proof' the school day. Methods included: observations of the process of working with young people in two schools; interviews with head teachers Children North East staff, and a Local Authority Advisor; observation of a staff training session; analysis of all parental, staff and governor

questionnaire data; and analysis of all school action plans. This allowed the research team direct access to the process and/or the views of staff in six of the 13 schools that have participated so far and indirect access to data from all. Similarities were found in the ways that schools inadvertently stigmatised pupils living in poverty and some imaginative solutions have been devised. These included extensive issues around ability/behaviour and setting, bullying, uniform, exams, extra-curricular activities, support for parents and families, food, homework, resources, transport, tutor groups/support for pupils, and school leadership and governance. This paper discusses the audit as a bottom up process with a potential for real change in schools. The action plans provide schools with recommendations to reduce stigma and cost within their school. However a number of the issues covered are arguably issues that local authorities, government and also society must address.

Session D 26

30 August 2017 10:15 - 11:45

Linna - K103

Invited Symposium

Motivational, Social and Affective Processes

Peer relations within schools: Associations with students' motivation and academic achievement

Keywords: Achievement, Educational Psychology, Emotion and affect, Goal orientation, Motivation, Peer interaction, Primary education, Reading comprehension, Social aspects of learning and teaching

Interest group: SIG 08 - Motivation and Emotion

Chairperson: Maria Tulis, University of Augsburg, Austria

Chairperson: Marion Reindl, University of Augsburg, Germany

Discussant: Jari-Erik Nurmi, University of Jyväskylä, Finland

Peers form an important social context that impact students' academic development. The composition of peer relations ranges from dyadic friendships, social networks within classrooms to broader relational structures within the school. Addressing different kinds of relationships and both students' and teachers' perspectives, this symposium aims to bundle recent work on peer relations within schools, designed to further our understanding of (a) direct and indirect effects on students' academic achievement (paper 1, 2 and 3), (b) the relative contributions of selection and socialization processes (paper 2), and (c) teachers' diagnostic competence to identify peer relations within their classes (paper 4). With every paper presented in this symposium we will gain deeper insights into the peers' impact on students' motivation and achievement, and how to help teachers to utilize this social resource. The first paper (Reindl, Tulis & Dresel) examines the best friends' impact on students' domain specific emotions and achievement in mathematics and English. The second paper (Kiuru et al.) focuses on peer selection and influence effects in children's reading skills. The third paper (Makara, Karabenick & Epstein) analyzes school peer social networks and their predictive value for academic achievement. The fourth paper (Harks, Zander & Hannover) complements the symposium with findings regarding teachers' perceptions of peer networks. Finally, our discussion will elaborate implications for theory and educational practice. In keeping with the conference theme "Education in the crossroads of economy and politics", the symposium highlights the importance of social relatedness—also, or even particularly, in the school context.

Associations between friends, academic emotions and achievement

Presenting Author: Marion Reindl, University of Augsburg, Germany; **Co-Author:** Maria Tulis, University of Augsburg, Austria; **Co-Author:** Markus Dresel, University of Augsburg, Germany

Based on emotional contagion theory, this study focuses on the effects of best friends' domain-specific academic emotions (enjoyment and boredom) on students' academic emotions, and their subsequent achievement. Based on a sample of 556 German students, structural equation models showed a positive effect of best friends' enjoyment on students' enjoyment. Best friends' enjoyment indirectly influenced achievement through students' enjoyment (indirect effect), whereas best friends' boredom had no effect on students' boredom and achievement. The results were consistent over two subjects (mathematics and English as a foreign language). Results will be discussed of increasing influence of friends as role models during puberty and whether the best friend can be identified as a resource or as a risk factor.

Peer Selection and Influence in Children's Reading Skills: A Social Network Approach

Presenting Author: Noona Kiuru, University of Jyväskylä, Finland; **Co-Author:** Dawn DeLay, Arizona State University, United States; **Co-Author:** Brett Laursen, Florida Atlantic University, United States; **Co-Author:** William Burk, Radboud University Nijmegen, Netherlands; **Co-Author:** Marja-Kristiina Lerkkanen, University of Jyväskylä, Finland; **Co-Author:** Anna-Maija Poikkeus, University of Jyväskylä, Finland; **Co-Author:** Jari-Erik Nurmi, University of Jyväskylä, Finland

This longitudinal study investigated (a) the extent to which children select new peers based on similarity in reading skills, and (b) the extent to which children are influenced by their peers' reading skills. The sample consisted of 1,003 Finnish children in Grades 1 to 4, for whom reading fluency and text comprehension were assessed. The same children were interviewed with respect to their self-concept of ability in reading at the end of kindergarten. The results of social network analysis showed that children had a tendency to choose new friends based on earlier similarity in reading fluency, but not in reading comprehension. Furthermore, children became more similar across time to their friends on reading fluency and reading comprehension. Children with both high self-concept of ability in reading and high reading fluency were particularly

prone to positive peer influence in regards to their reading fluency.

The Contribution of “Bonding” and “Bridging” Peer Relations to Students’ Academic Achievement

Presenting Author:Kara Makara, University of Glasgow, United Kingdom; **Co-Author:**Stuart Karabenick, University of Michigan, United States; **Co-Author:**Alanna Epstein, University of Michigan, United States

Peer relationships are an important component of the school context that impact students’ academic development. Using social network analysis, we examined how bonding (banding together in a close-knit group) and bridging (having social connections across groups) dimensions of students’ peer relations: (a) predict academic achievement and (b) are predicted by students’ social goals. Three measures of students’ centrality in the school peer social network (indegree, eigenvector centrality, and betweenness) were used to capture different dimensions of students’ peer relations. Social goals were conceptualized by Achievement Goal Theory, specifically social development, demonstration-approach, and demonstration-avoidance goals. 852 students were surveyed three times during a school year in order to assess their social goals, peer social networks, and academic achievement. Path-analytic models were used to estimate the longitudinal relations between social goals, the three dimensions of peer relations, and academic achievement. The results indicate that both bonding and bridging elements of peer relations positively predicted students’ academic achievement at the end of the year. There was consistent support for the benefits of social development goals on academic achievement, partially mediated through the dimensions of students’ peer relations, and a maladaptive effect of demonstration-avoidance goals on achievement, fully mediated by lower centrality in the peer network. Strengths of the study include the longitudinal design among the variables and the multiple indicators of students’ centrality within the school network to capture some of the complexity in peer relations. Theoretical and educational implications will be discussed.

Judging students’ peer-networks in class: A new facet of teacher diagnostic competence?

Presenting Author:Marvin Harks, Freie Universität Berlin, Germany; **Co-Author:**Lysann Zander, Freie Universität Berlin, Germany; **Co-Author:**Bettina Hannover, Freie Universität Berlin, Germany

Accuracy in teachers’ judgment of students’ competence is an important facet of teacher competence. We investigated an additional dimension of diagnostic competence: the extent to which teachers adequately perceive their students’ connectedness in the peer-network of the classroom. Teachers who are aware of how well individual students are integrated should be better at preventing social exclusion and at making use of the central position of highly connected students to foster cooperation and a positive learning climate. Actual peer-networks were measured using sociometric data, with every student indicating the peers he or she likes most. Teachers were asked to answer the same question for all students of their class (teacher perceived peer-network). Students’ were additionally asked to nominate peers who are liked most by others (student perceived peer-network). Besides the actual peer-network data, several motivation- related characteristics of the individual students were used as predictors of teacher and student perceived peer-networks. Teachers’ perceptions were strongly predicted by actual peer-networks. In addition, teachers perceived students the more connected the stronger their grades were and the more effort they invested at school. Students’ perceptions were also most strongly predicted by actual peer-networks. In addition, students’ perceived their peers to be the more connected the better their grades were and the more importance they assigned to good looks. Results suggest that teachers are quite good at judging students’ connectedness and that their diagnostic competence could be further enhanced if they knew about factors influencing (appearance) or not influencing (effort investment) students’ perceptions of peer-networks.

Session D 27

30 August 2017 10:15 - 11:45

Pinni B - B3116

Invited Symposium

Teaching and Teacher Education

Up-To-Date Approaches for Practice Related Opportunities to Learn in Teacher Education

Keywords: Cognitive development, Collaborative Learning, Communities of practice, Comparative studies, Conversation / Discourse analysis, Experimental studies, In-service teacher education, Peer interaction, Pre-service teacher education, Qualitative methods, Teacher Professional Development, Workplace learning

Interest group: SIG 11 - Teaching and Teacher Education

Chairperson: Inger Marie Dalehefte, University of Agder, Norway

Organiser: Annelies Kreis, Zurich University of Teacher Education , Switzerland

Organiser: Tina Seidel, Technische Universität München (TUM), Germany

Discussant: Paulien Meijer, Radboud University Nijmegen, Netherlands

Reflected teaching experience is considered to offer crucial opportunities to learn during initial teacher education, and professional development with in-service teachers. There is a long tradition of research on respective support processes and outcomes. The invited symposium of the SIG 11 combines four presentations about innovative approaches for practice related opportunities to learn in teacher education. Contribution 1 considers pre-service and mentor teachers as *peers* who work and learn together in local communities of practice in partner school contexts. It explores how competences are deepened and expanded while coping with real problems of everyday working life. Study 2 focuses with a cross-cultural perspective (East Asia, Britain) on cognitive strategies of expert, beginning, and novice teachers with respect to challenging

everyday situations. Participants differ in their verbalized thoughts as they consider possible actions for difficult classroom scenarios. Study 3 aims to test a practice-related approach to kindergarten teacher professional development for instructional support strategies by including gaze behavior into coaching. Measures of instructional quality and of gaze recordings from natural classroom settings are analyzed. Contribution 4 explores the quality of peer coaching planning dialogues. In the course of a bi-national experimental intervention study characteristics of spontaneous co-planning between student teachers is compared with co-planning according to content-focused peer coaching as a framework for productive lesson planning dialogues. The contributions will be critically discussed with respect to the applied methodological approaches, and their potential as opportunities for practice situated professional development of novice and expert teachers.

Peer-to-Peer-Mentoring in communities of practice: A partnership of pre-service and mentor teachers

Presenting Author:Urban Fraefel, University of Applied Sciences Northwestern Switzerland, Switzerland; **Co-Author:**Nils Bernhardsson-Laros, University of Applied Sciences Northwestern Switzerland, School of Teacher Education, Switzerland; **Co-Author:**Kerstin Baeuerlein, University of Applied Sciences Northwestern Switzerland, Switzerland; **Co-Author:**Sebastian Jünger, University of Applied Sciences and Arts Northwestern Switzerland, Switzerland

The intervention study “Partner schools for professional development” considers pre-service and mentor teachers as peers who work and learn together in local communities of practice and thus deepen and expand their knowledge and increase their professionalization. Instead of focusing on mentor teachers' evaluative guidance of pre-service teachers, the approach supports collaborative learning while coping with real problems of everyday working life. Our findings indicate that an intensified cooperation among peers comes about (1) with a greater willingness from student teachers to activate and to link knowledge resources, (2) with higher quality teaching while co-teaching, (3) with opportunities to further professional development in mentor teachers.

What's Going on in a Teacher's Mind? How Teachers Processes Difficult Classroom Scenarios

Presenting Author:Lisa Kim, University of York, United Kingdom; **Co-Author:**Robert Klassen, University of York, United Kingdom

Teachers are confronted with challenging situations at school everyday. With years of experience, teachers become more effective in responding to these situations. However, the developmental trajectory of how they cognitively process these situations is relatively unknown although this information can inform professional developmental practices and teacher education program selection practices. Our three-part mixed method studies use a think-aloud methodology, whereby participants verbalise their thoughts as they determine how they would respond in difficult classroom scenarios. Studies 1 and 2 examine the cognitive processing differences between expert, beginner, and novice teachers without and with pre-existing response options, respectively. Study 3 examines the cognitive processing differences between East Asian and British students to determine the cross-cultural generalizability of the findings from Studies 1 and 2. Quantitative analyses indicate that teachers at different stages of their career do not differ in their confidence of the accuracy of their responses. However, qualitative analyses indicate that the three groups differed in their cognitive strategies, content, and scope. Furthermore, East Asian students seemed to slightly differ in their approaches in processing the scenarios than British students. These three studies indicate that teachers do develop in their cognitive processing over their career, which can hence be used to inform culturally contextualised teacher professional developmental and selection practices.

Teachers' Gaze Recording: An Opportunity to Improve Teachers' Instructional Support Strategies?

Presenting Author:Antje von Suchodoletz, New York University Abu Dhabi, United Arab Emirates; **Co-Author:**Irene Skuballa, New York University Abu Dhabi, United Arab Emirates

Teachers across all grade levels struggle with providing high-quality instructional support. Teachers' gaze behavior may provide a potential informative pathway to reflect on teaching practices. The study aims to test a practice-related approach to kindergarten teacher professional development by including gaze behavior into coaching. Teachers are assigned to one of two conditions, *Instructional Support Strategies with Coaching* (ISS plus C) or *Instructional Support Strategies without Coaching* (ISS w/o C). We expect to pre-/post-intervention increases in instructional support, favoring teachers in the ISS plus C condition. Participants are 20 kindergarten teachers, randomly assigned to the conditions. Pre- and post-intervention data include measures of instructional quality (assessed with the CLASS Pre-K) and gaze recordings in natural classroom settings. Pre-intervention data suggests substantial variability in instructional support across classrooms. On average, the level of instructional support in the sample was low ($M = 2.52$, $SD = 0.83$). Results will be discussed with regard to innovative strategies to support teachers in reflecting on classroom interactions and enhancing skills needed to provide intentional and effective instructional activities that in turn will result in positive student outcomes.

Characteristics of Spontaneous Co-Planning vs Content-Focused Peer Coaching Between Student Teachers

Presenting Author:Annelies Kreis, Zurich University of Teacher Education, Switzerland; **Co-Author:**Stefanie Schnebel, University of Tübingen, Germany

Expert-novice mentoring is a traditional element in designing intentional opportunities to learn during field placements, and has been shown as fruitful for student teacher learning. Additionally, structured *peer coaching* can be expected to offer further opportunities to learn (OTL). In an interdisciplinary, mixed-methods, and bi-national project, we studied the outcomes of an intervention with Content-focused Peer Coaching (CPC) on student teacher interaction, learning and competence. CPC aims to foster a mode of co-constructive interaction, elaboration, and the content in lesson planning

dialogues between peers. This study explores, whether and how an ecologically valid training for CPC can enrich planning dialogues in comparison with spontaneous peer coaching. Student teachers of an intervention group (N=65) were trained for CPC as part of their regular study courses. After the training they were asked to plan a Biology lesson with a colleague. Participants of the control group (N=54) were assigned the same task, but did not have a CPC-training beforehand. Planning dialogues were videotaped, transcribed, and analyzed with pragma-linguistic discourse analysis. Results show that teacher students of the intervention group adopted the core features of CPC such as co-constructive elaboration. They discuss a broader variety of issues, and spend more time doing so than their colleagues of the control group. The study gives insights into possible processes, gains and limitations of structured/spontaneous peer coaching as a complementary OTL during school-based initial teacher education.

Session D 28

30 August 2017 10:15 - 11:45

Pinni B - B1096

Invited Symposium

Assessment and Evaluation

Navigating the interpersonal eddies of peer assessment

Keywords: Assessment methods and tools, Collaborative Learning, Peer interaction, Social aspects of learning and teaching

Interest group: SIG 01 - Assessment and Evaluation

Chairperson: Jan-Willem Strijbos, University of Groningen, Netherlands

Organiser: Jan-Willem Strijbos, University of Groningen, Netherlands

Organiser: Ernesto Panadero, Universidad Autonoma de Madrid, Spain

Discussant: Marieke van der Schaaf, Utrecht University, Netherlands

Peer assessment (PA) is an interpersonal process where students judge a performance of a peer (or multiple peers) quantitatively (scores or grades) and/or qualitatively (written or oral feedback), and stimulates students to share responsibility, reflect, discuss and collaborate with their peers. However, PA can simultaneously be an additional source of bias. Interpersonal variables (e.g., trust in the other, psychological safety, cooperativeness, reliability, etc.) and interpersonal relations (e.g., friendship, anonymity, etc.) can (a) mediate/moderate the CL processes, and thereby (b) act as another source of bias and reduce reliability and validity. This symposium presents four contributions that navigate the interpersonal eddies of peer assessment by (a) examining key sources of potential bias such as emotions, trust, friendship, PA format, etc., and (b) examining instructional design features and statistical solutions that might mitigate potential bias.

Reviewing the interpersonal variables that play a role in peer assessment

Presenting Author: Ernesto Panadero, Universidad Autónoma de Madrid, Spain

This narrative review analyzes the evidence on the interpersonal factors that influence peer assessment. All the evidence published since the first review on the topic, (van Gennip, Segers & Tillema, 2009) was included, a total of 26 articles. Searches in PsycINFO were conducted using the following combinations of key terms: PA + 'interpersonal'; + 'motivation'; + 'emotion'; + 'psychological safety'; + 'friendship'; + 'value diversity'; + 'value congruence'. Studies needed to fulfill three inclusion criterions: (1) empirical evidence of the effect of PA on social or human factors or vice versa had to be available; (2) the study had to be published and peer-reviewed, including doctoral dissertations; and (3) articles had to be available in English. From the reviewed empirical evidence, ten themes covered by previous research on interpersonal PA factors emerged: motivation, emotion, social factors, friendship, trust in the self as assessor, trust in the other as assessor, fairness/(dis)comfort, psychological safety, value diversity/congruence, and interdependence. These themes were further grouped into three categories namely: intra-individual factors, inter-personal aspects and cognitive aspects. There are two main conclusions. First, formative uses of PA decrease the interpersonal problems that PA elicit in students. Second, PA should not be implemented as a "side activity" but needs to be central to the curriculum to fulfill formative purposes if these were to be central to the teachers' pedagogical intentions.

Anonymity as instructional scaffold in peer assessment: Effects on peer feedback quality

Presenting Author: Tijl Rotsaert, Ghent University, Belgium; **Co-Author:** Ernesto Panadero, Universidad Autónoma de Madrid, Spain; **Co-Author:** Tammy Schellens, Ghent University, Belgium

Although previous research has indicated that providing anonymity is effective to create a safe peer assessment (PA) setting, continuously ensuring anonymity prevents students from experiencing genuine two-way interactive feedback dialogues. The present study investigates how fading anonymity over time can overcome this problem. 46 Bachelor students in Educational Studies participated in multiple PA cycles in which groups of students assessed each other's work. In this study students' evolution in peer feedback (PF) quality was measured. The content analysis of the PF messages revealed that the quality of the PF increases in the anonymous phase and that over time the PF quality in the consecutive non-anonymous sessions was of similar quality. Findings suggest that anonymity can be used as a valuable scaffold to ease students' importance level towards anonymity and their associated need for practice.

Inferring individual scores from group scores via peer assessment: Part 1 – Methodological review

Presenting Author: Jan-Willem Stribos, University of Groningen, Netherlands; **Co-Author:** Dominique Sluijsmans, Zuyd University of Applied Sciences, Netherlands; **Co-Author:** Karsten Stegmann, Ludwig-Maximilians-Universität (LMU), Germany

When asked about their experiences with Collaborative Learning (CL), students typically mention (a) unequal participation by students—up to free-riding, and (b) dissatisfaction with the assessment of CL. In fact, as inequality of participation increases – especially when there is a free-rider in a group – the call for diversified assessment intensifies. The topic of assessment has remained implicit in most research on CL, whereas it received some attention in research on Assessment and Evaluation. This contribution focuses on the challenge of juggling group-level and individual-level assessment information. More specifically, we conducted a methodological review on the use of Peer Assessment (PA) to infer individual scores from group scores. Twenty-eight studies were analysed with respect to the PA practices and formulae used. The findings reveal that (a) most studies reported the use of ‘group mean centering’ and some suggested revisions by considering PA accuracy or cheating, (b) most studies used a rating format but these varied strongly in number of categories, levels and values, (c) most articles concerned an empirical study or included empirical data in addition to a formula or methodological critique, (d) although contested in the literature more than half of the articles included SA in the computation, and (e) all articles reflected a lack of flexibility in terms of relative weighting of criteria.

Inferring individual scores from group scores via peer assessment: Part 2 – A simulation study

Presenting Author: Jan-Willem Stribos, University of Groningen, Netherlands; **Co-Author:** Karsten Stegmann, Ludwig-Maximilians-Universität (LMU), Germany; **Co-Author:** Dominique Sluijsmans, Zuyd University of Applied Sciences, Netherlands

Despite considerable research on instructional techniques to facilitate equal contribution to Collaborative Learning (CL), students regularly complain about a lack of effort by one or more group members and as a result students call for differentiated assessment – in particular in the case when a only a group score is awarded. Peer Assessment (PA) is a specific form of collaboration, aligns quite naturally with CL and can enhance positive interdependence by confirming and/or enabling (re)alignment with the shared goal and individual accountability by making members’ below, mean or above average contribution to CL visible. However, PA can simultaneously be an additional source of bias. Interpersonal variables (e.g., trust in the other, psychological safety, cooperativeness, reliability, etc.) and interpersonal relations (e.g., friendship, anonymity, etc.) can (a) mediate/moderate the CL processes, and thereby (b) act as another source of bias and reduce reliability and validity. Despite a considerable number of studies that applied PA for this purpose, the methodological review in Part 1 also highlighted serious limitations. This contribution discussed an attempt to revise the formula, while also incorporating the refinements that were suggested by various authors. A simulation study is reported to illustrate the robustness of the revised formula.

Session E 1

30 August 2017 12:00 - 13:30

Linna - K109

Poster Presentation

Developmental Aspects of Instruction, Higher Education, Learning and Social Interaction, Teaching and Teacher Education

PO: Professional Development and Phenomenography

Keywords: Achievement, Communities of practice, Conceptual change, Cooperative / collaborative learning, Design based research, Early childhood education, Mathematics, Mixed-method research, Numeracy, Phenomenography, Physical Sciences, Primary education, Qualitative methods, Secondary education, Self-efficacy, Student learning, Teacher Professional Development, Teaching / instruction, Workplace learning

Interest group: SIG 09 - Phenomenography and Variation Theory, SIG 14 - Learning and Professional Development

Chairperson: Sabine Fabriz, Goethe-Universität Frankfurt, Germany

Cooperative learning new software for the workplace – following work functions or work processes?

Keywords: Achievement, Cooperative / collaborative learning, Student learning, Workplace learning

Presenting Author: Mandy Hommel, TU Dresden, Germany

To meet demands of an effective way to learn and successfully apply new software for the workplace it is necessary to know which learning environment supports the learners best. This study investigates how the learning of the human resources software SAP ERP HCM is supported within a formal workshop setting by different conditions. Either the learning process follows a function (software structure menu), or process oriented conception (usual workaday processes), in a single learning or partner learning (dyadic) condition. Data of knowledge pre- and post-tests were gathered. Additionally, questionnaires about generalised learning strategies and learning experiences in open learning settings were used to control influences from these factors. The learning conditions seemed to influence the learning results differently. A superiority of learners in the process oriented dyadic condition was shown especially regarding tasks that demand remembering of concepts and procedures. For tasks demanding ‘application’ and ‘analysis’ the learning groups do not differ significantly. From the results it could be cautiously concluded, that dyadic learning with respect to the workaday processes supports the learning more than function or process oriented single learning, and function oriented dyadic learning.

The role of mentoring in early career physics teachers' professional identity construction

Keywords: Physical Sciences, Qualitative methods, Self-efficacy, Teacher Professional Development

Presenting Author:David Cameron, The Institute of Physics, United Kingdom; **Co-Author:**Anna Grant, AlphaPlus Consultancy Ltd, United Kingdom

This paper will report on the findings from theoretically informed empirical research on the effectiveness of a project providing subject-specialist mentoring for early career physics teachers in England, and the implications of these findings for the project's development and continued support and funding by government policy makers. The purpose of the research was to evaluate the extent to which the project achieved its objectives: to improve early career physics teachers' (ECTs) subject knowledge, pedagogical skills and confidence; and to support the ECTs' professional identity construction. The research explored the areas in which mentoring made a positive difference to participants' professional practice and identity, and reported on the project's limitations. The findings from the research led to a developmental dialogue between project managers and evaluators, based on an open relationship of trust and honesty, which aimed to identify the assumptions which underpinned the project, its intended and evidenced outcomes, and lead to propositions for refining both the delivery of the project and the ongoing evaluation strategy. By clarifying and strengthening the project in this way, a compelling case could be made to policy makers in the UK government for the importance of this work in supporting ECTs, the confidence of policy makers was cultivated and continued funding was secured beyond the intended endpoint of the project.

Developing a scalable lecturer professional development framework

Keywords: Communities of practice, Conceptual change, Design based research, Teacher Professional Development

Presenting Author:Thomas Cochrane, Auckland University of Technology, New Zealand; **Co-Author:**Vickel Narayan, Auckland University of Technology, New Zealand

Most tertiary teachers are motivated self-directed learners, but tend to teach how they were taught. Traditional approaches to professional development (PD) often lack tangible outcomes. Conceptual shifts in teaching practice are more likely to occur when teachers themselves act as learners within new pedagogical paradigms. The paper proposes a new model of PD as a network of communities of practice within a cMOOC, where sustained collaborative engagement with innovative teaching practice is recognised via CMALT (Certified Member of the Association for Learning Technologies) accreditation. CMALT has a similar standards-based framework to the Higher Education Academy (HEA) but emphasises the use and critique of learning technology. Recent evidence illustrates the potential of cMOOCs for effective PD. The paper proposes the development a cMOOC that leverages national and international collaboration and innovative teaching expertise, providing a pathway for participants' CMALT portfolios as evidence of new modes of practice and enhanced student outcomes.

A structural approach to the first ten natural numbers

Keywords: Early childhood education, Mathematics, Numeracy, Teaching / instruction

Presenting Author:Anna-Lena Ekdahl, Jönköping University, Sweden; **Co-Author:**Camilla Björklund, University of Gothenburg, Sweden

A structural approach to the first ten natural numbers

Pre-school teachers' different ways of handling the artefact 'snake-game'

X & X

Abstract

The aim of this paper is to report some findings from an analysis of an intervention study included in the FASETT-project. FASETT is based on the ideas of Neuman (1987) and Marton's (2015) theoretical conjecture, which says that children need to experience the ten natural numbers in terms of critical aspects, such as 'manyness' and part-whole aspects to learn to solve arithmetic problems.

The empirical data consists of video observations from nine pre-school teachers in a three-month time period where an activity called the 'snake-game' was conducted with 5-year-old children. 39 of these recordings were analyzed, focusing on how the teachers, in their pre-school groups, manifested the theoretical ideas of the artefact '5- and 10-snake'. The results point to differences in teachers' enactment of the ideas included in the activity and their improvement over time, for example in terms of how the teachers enacted the idea of finger patterns and numbers as structural relationship of parts and whole versus counting objects.

Qualitative differences in learning as a function of qualitative differences in teaching

Keywords: Phenomenography, Secondary education, Student learning, Teaching / instruction

Presenting Author:Ming Fai Pang, The University of Hong Kong, Hong Kong; **Co-Author:**Ference Marton, Göteborg University, Sweden

This presentation reports a study which aims to identify pedagogical principles that are critical to the development of financial literacy. An in-depth secondary analysis of the data collected in our earlier project was conducted. Two classes were chosen to be the object of study, on the ground that students who belonged to one class performed best in all the three post-tests, whereas those who belonged to another achieved the lowest scores throughout. The focus of the data

analysis was on the relationship between how the object of learning was enacted in the classroom and how the students experienced the object of learning (i.e. how the outcomes of their learning varied). We found that focusing on the powerful conceptual tools of economics built on the core financial concepts, and embedded in theory-based patterns of variation and invariance between tasks, illustrations, and so forth can help students develop a good grasp of those core financial concepts related to critical aspects that they need to consider when handling financial matters. Furthermore, the provision of relevant financial scenarios helps students learn from future situations that call for the exercise of financial literacy, and thus continue improving their financial literacy in the long term.

Light and Shadow in primary school - Towards elementary optics and understanding radiation

Keywords: Design based research, Mixed-method research, Phenomenography, Primary education

Presenting Author: Mona Holmqvist, Malmö University, Sweden; **Presenting Author:** Lydia Murmann, University of Bremen, Germany

The scientific explanation for shadows is counterintuitive. It focuses on the local absence of light. Perception of a figural shadow on the other hand, usually is a figure-ground experience, with the shadow representing the 'positive' image in the foreground and the illuminated environment the ground. Learning to explain shadows is a content of elementary and middle school curricula and a considerable number of studies that deal with children's conceptions of light and shadow are available. The first section of the poster shows that these findings can be structured by very few critical aspects of learning that belong to a set of phenomenographic categories (study 1). The second section of the poster shows how these findings are taken up for a current learning study in which the introduction of a model of light in primary school is focused (study 2). This is due to the insight, that exploring shadows does not provide a suitable basis for developing the knowledge needed for their explanation. Shadows rather distract attention from light. Therefore, teaching intends to provide exploration, insights and knowledge in contexts different from the ones they are later applied to. Methodologically the current study is based on a design-based research approach, more specifically a learning study. The methodology of learning studies was developed in Sweden and Hong Kong and combines the idea of lesson studies with variation theory. The model of light can also be viewed as the basis for cumulative learning towards understanding radiation in general.

Session E 2

30 August 2017 12:00 - 13:30

Pinni B - B3118

Poster Presentation

Cognitive Science, Culture, Morality, Religion and Education, Learning and Social Interaction, Teaching and Teacher Education

PO: Educational Theory

Keywords: Argumentation, Assessment methods and tools, Competencies, Content analysis, Conversation / Discourse analysis, Culture, E-learning / Online learning, Educational Psychology, Higher education, Language (Foreign and second), Learning approaches, Multicultural education, Problem solving, Problem-based learning, Reflection, Religious studies, School effectiveness, Science education, Secondary education, Social interaction, Teacher Professional Development, Writing / Literacy

Interest group: SIG 03 - Conceptual Change, SIG 04 - Higher Education, SIG 10 - Social Interaction in Learning and Instruction, SIG 19 - Religious and Spiritual Education, SIG 25 - Educational Theory

Chairperson: Mikko Vesisenaho, University of Jyväskylä, Finland

Classroom interaction in student presentations and follow-up discussions in a university EFL course

Keywords: Conversation / Discourse analysis, Higher education, Language (Foreign and second), Social interaction

Presenting Author: Frantisek Tuma, Masaryk University, Czech Republic

This paper presents selected outcomes of a qualitative analysis of classroom interaction during student presentations and follow-up discussions in an English as a foreign language (EFL) course conducted in a Bachelor's programme at a Czech university. Student presentations and subsequent discussions appear interesting both interactionally (e.g. collaborative aspects of "improvisation" during the presentation, the shift of control from the presenters towards the teacher after the presentation) and educationally, as these represent a student-centered activity, whose dynamics and organization remain relatively underresearched. The data (video-recordings of 11 90-minute lessons, 987 minutes) were collected as a case study of an intermediate EFL course for future teachers within a research project (GA ČR 15-08857S). To study the interactional dynamics, I used conversation analysis to analyze 12 presentations given by individuals or pairs. In this paper I will present the outcomes in the areas of the organization of repair during the presentations and the organization of turn-taking during the discussions. In presentations given by pairs, the presenters dealt with troubles (typically attempting to pronounce unknown words, problems with transitions) interactively using self-initiated peer-repair sequences, while individual students generally had to rely on self-repair. During the discussion phase, the participants always transitioned from turn-type pre-allocation (the students finished their presentation and typically asked for questions) to mediated turn-allocation (the teacher became a moderator and, finally, self-selected to ask several questions). At the end, I will compare the findings with relevant literature and evaluate the organization of presentations and discussions pedagogically.

Learning about religion in the formal education of a Finnish Reception Centre for asylum seekers

Keywords: Content analysis, Culture, Religious studies, Multicultural education

Presenting Author: Tapani Innanen, University of Helsinki, Finland

In 2015, Finland experienced the largest amount of refugees seeking asylum since the World War II. The Finnish authorities rapidly organised a network of Reception Centres where services including accommodation, the required financial aid, and some formal education are provided for asylum seekers. Most of these refugees come from Muslim majority countries, and they were facing the Finnish culture characterised by Lutheran Christianity. A larger academic research will in 2016–2017 be implemented in a Reception Centre situated in the Middle of Finland. The overall aim of the project is to investigate discourses and practices concerning religions, world views, and cultural traditions in the Reception Centre. The study, presented in this poster, is focused on the question how religion and religion related discourses are present in the situations of formal education available for the asylum seekers. There are three stages of formal education available for the asylum seekers: Early childhood education (under school aged children); Basic education (children in age of 6–16); Adult education. The theoretical framework of the study is threefold: Religion is understood in the way of lived religion. Educational instructions are situated in the Finnish legislation about Religious Education in the established school system. The acculturative importance of the pre-integrative formal education is seen in the frame of temporary and unsure living situation of the asylum seekers. The research material is gathered by an ethnographic approach, i.e. mainly in the ways of participant observations, discussions, and interviews. Some preliminary results are presented in the poster.

Promoting Students' STEM Literacy Skills Through a PBL Online Simulation

Keywords: Argumentation, Educational Psychology, Writing / Literacy, Problem-based learning

Presenting Author: Scott W Brown, University of Connecticut, United States; **Co-Author:** Kimberly Lawless, University of Illinois at Chicago, United States; **Co-Author:** Christopher Rhoads, UConn, United States

Problem-based learning (PBL) is an instructional design approach for promoting student learning, in context-rich settings. GlobalEd 2 (GE2) is PBL intervention that combines face-to-face and online environments during a 12-week simulation of international negotiations of science advisors on global water resource issues. The GE2 environment is described examining the impact it has had on middle school students' written scientific argumentation and the development of STEM literacy during the intervention. The data reported here are from three parallel simulations that include both GE2 intervention students and a comparison group of Normal Educational Practice (NEP) students who were administered pre- and post- assessments. Analyses employed HLM techniques on treatment and NEP groups revealing a significant positive impact on the written scientific argumentation scores of 1818 middle-grade students from two states and school environments (urban and suburban) with an effect size of 0.257 (p

Education into dialogue: Blogging across cultural and religious difference

Keywords: Conversation / Discourse analysis, E-learning / Online learning, Reflection, Multicultural education

Presenting Author: Rupert Wegerif, University of Exeter, United Kingdom

This paper combines theory development with an empirical study in order to explore and unpack the claim that dialogic education involves a direction of change upon an ontological dimension from monological bounded identity formations in the direction of more dialogic identity formations characterised by openness to the other and identification with the process of dialogue. Data is drawn from an evaluation of the Tony Blair Faith Foundation's Face to Faith programme which supports schools in over thirty different countries to engage in dialogue with each other through videos and blogs about issues of culture and religion with the specific aim of increasing dialogic open-mindedness. A corpus linguistics approach to analysing some of the blogging data, specifically reflection activities given to students before and after engaging in blogging with other schools, reveals shifts in identity and in level of complexity. This data analysis is supported by interviews with students and staff from 6 schools in three countries. The findings illustrate movement in the direction of becoming more dialogic in the context of internet mediated dialogue and so show the value of positing an ontological dimension from a more monologic identity to a more dialogic identity.

Paving the road to sustainable educational change

Keywords: Learning approaches, School effectiveness, Secondary education, Teacher Professional Development

Presenting Author: Mireille Hubers, University of Twente, Netherlands

An important challenge in education is to ensure sustainable changes in teachers' behaviour after they have participated in professional development programs. Research on sustainability is scarce, yet crucial for coming to a deeper understanding of the dynamic between professional development programs and the resulting on-the-ground responses and actions. As a result, there is an increasing demand for more knowledge about sustainability. Therefore, this theoretical paper will provide a framework for thinking about sustainability. Amongst other things, it covers the conceptualisation, the methodology, implications for the way in which professional development programs should focus on (teacher) learning, and lessons that can be learned from other disciplines. In this paper I argue that sustainability is composed of four essential characteristics: 1) long-term and school-wide change, 2) this change has a positive effect on students, 3) this effect is attributable to the professional development program, and 4) educators are able to act as knowledgeable agents. This definition has several implications for research designs. Amongst those is the requirement for using longitudinal designs, and determining the development of schools' organisational routines. The definition of sustainability also has implications for the way in which researchers think about their professional development program. The most important one is that a sole focus on individual

learning will not suffice to obtain sustainable changes. Rather, it should be combined with a focus on organisational learning. Implications for future research and the educational practice of the issues covered in this paper will be discussed as well.

Making scientific modeling tangible for problem solving – Assessment of the procedural dimension

Keywords: Assessment methods and tools, Competencies, Problem solving, Science education

Presenting Author: Susanne Digel, University of Koblenz-Landau, Germany; **Co-Author:** Alexander Kauertz, University of Koblenz-Landau, Germany; **Co-Author:** Patrick Löffler, University of Koblenz-Landau, Germany; **Co-Author:** Jochen Scheid, University of Koblenz-Landau, Germany

Large scale assessments of scientific literacy (as in PISA and TIMSS) shifted the focus of science education from a mere understanding of scientific concepts to their application in real-life contexts. PISA results suggest that there is a gap between availability and usability of content knowledge and strategies in problem solving. Students with appropriate problem solving skills seemed to fail to make use of it in context (production deficiency) and in physics context-based tasks the influence of content knowledge on problem solving performance is limited. Although considerable amount of research has been dedicated to the moderating variables of this discrepancy (e.g. motivation and metacognition), the competences needed to clear that hurdle remain unidentified. A promising basis for the application of problem-solving strategies and physics content knowledge is scientific modeling, since models “embody a form of flexible knowledge that can be applied to transfer problems” (Clement, 2000, p. 1042). Hence this project aims at answering the question how skills in scientific modeling foster the problem solving performance in context-based tasks. First scope of the study is to make scientific modeling tangible for problem solving. The deliverables are a normative competence model and the appendant assessment tool for scientific modeling that are empirically proven and can give indication how to foster these skills.

Session E 3

30 August 2017 12:00 - 13:30

Pinni B - B0039

Poster Presentation

Cognitive Science, Learning and Instructional Technology, Teaching and Teacher Education

PO: Comprehension of Text and Graphics

Keywords: Cognitive development, Cognitive skills, Competencies, Comprehension of text and graphics, Computer-assisted learning, Cooperative / collaborative learning, Early childhood education, Educational Psychology, Engineering, Experimental studies, Informal learning, Instructional design, Mathematics, Multimedia learning, Numeracy, Pre-service teacher education, Professions and applied sciences, Quantitative methods, Reading comprehension

Interest group: SIG 02 - Comprehension of Text and Graphics

Chairperson: Man Ching Esther Chan, The University of Melbourne, Australia

Investigating the integration of multimedia information by means of eye tracking

Keywords: Comprehension of text and graphics, Educational Psychology, Experimental studies, Multimedia learning

Presenting Author: Anne Schueler, Leibniz-Institut für Wissensmedien, Germany

The aim of the reported study was to investigate whether learners integrate information conveyed across different slides of a multimedia presentation with each other. In the learning phase, subjects ($N = 60$) were presented with information about the development of a tornado. In the control group, all information conveyed through the eight pages of the learning environment was consistent. In the experimental group, the third slide of the presentation contained information that was inconsistent to the information presented on the second slide. During learning, eye-movement behavior of learners was measured. Analyses revealed that the eye-movement behavior of the control and experimental group did not differ regarding slides containing consistent information in both conditions. However, groups differed regarding the third slide containing consistent information in the control, but inconsistent information in the experimental group: Here, learners of the experimental group had longer fixation times on text and picture, and more transitions between text and picture. These data show that learners of the experimental group detected the conflict, indicating that they tried to integrate the information of consecutive slides with each other.

Efficiency to process finger configurations predicts initial math performance

Keywords: Cognitive development, Early childhood education, Mathematics, Numeracy

Presenting Author: Josetxu Orrantia, University of Salamanca, Spain; **Co-Author:** Rosario Sánchez, University of Salamanca, Spain; **Co-Author:** Laura Matilla, University of Salamanca, Spain; **Co-Author:** Javier Rosales, University of Salamanca, Spain; **Co-Author:** David Munez, National Institute of Education / Nanyang Technological University, Singapore; **Co-Author:** Lieven Verschaffel, KU Leuven, Belgium

Previous research has shown that finger-based strategies play an important role in learning and understanding arithmetic. However, little research has examined young children's ability to process finger configurations, and its significance for emerging math abilities. In this study, we aimed at examining whether efficiency to process finger configurations is a unique

predictor for initial math competences before formal math instruction starts. We controlled for influence of domain-specific numerical precursor competencies and domain-general cognitive ability. Results from 102 Spanish kindergarteners showed that efficiency to process finger configurations predicted a unique and relevant part of the math performance. These results suggest that educational practices encouraging the use of finger configurations could be a bridge between numerical quantities and their symbolic representation, which would support the development of number and arithmetic.

Detecting errors in program flow diagrams: Comparing novices and advanced programmers

Keywords: Competencies, Comprehension of text and graphics, Engineering, Professions and applied sciences

Presenting Author:Markus Nivala, University of Gothenburg, Sweden; **Co-Author:**Florian Hauser, Ostbayerische Technische Hochschule (OTH) Regensburg, Germany; **Co-Author:**Helen Jossberger, University of Regensburg, Germany; **Co-Author:**Markus Reiss, Ostbayerische Technische Hochschule (OTH) Regensburg, Germany; **Co-Author:**Juergen Mottok, Ostbayerische Technische Hochschule (OTH) Regensburg, Germany; **Co-Author:**Hans Gruber, University of Regensburg, Germany

One of the key competences for a software engineer is the ability to understand visual representations of software, and to understand their correspondence to source code. Our aim is to study how programmers read and understand program diagrams and source code. The participants ($N = 33$) were novice ($n = 23$) and intermediate ($n = 10$) programmers. The experiment consisted of 12 stimuli, which included visual software diagrams and corresponding source codes. Half of the stimuli had an error in the code that caused a discrepancy between the code and the diagram. The participants were asked indicate whether code and diagram were identical in functionality. If not, they had to identify the error. Eye movements and performance were recorded. The preliminary analysis of the data focuses on performance, strategies and distribution of fixations. On average, the novices answered 82 per cent of the multiple choice questions correctly. The eye movements revealed three different reading strategies. The most common strategy was to start immediately comparing the diagram with the code. However, there were five novices who read either the code or the diagram first in its entirety. Furthermore, the novices spent slightly more time fixating on the source code than on the diagrams, which may indicate that they find it more difficult to understand. Unveiling the developing strategies and their expert counterparts helps us to understand what are the areas in which novices need the most support.

The Effects of Reading Goals on the Comprehension of Argumentative Text and Belief Change

Keywords: Cognitive skills, Comprehension of text and graphics, Informal learning, Reading comprehension

Presenting Author:Irene-Anna Diakidoy, University of Cyprus, Cyprus; **Co-Author:**Melina Ioannou, University of Cyprus, Cyprus; **Co-Author:**Stelios Christodoulou, University of Cyprus, Cyprus

Abstract Argumentative text is a primary medium of learning and belief formation, often providing the basis for decisions that range from trivial to critical. Past research has documented the high persuasive impact of argumentative text in the absence of a critical evaluation of its arguments and regardless of comprehension. The present study examined the extent to which readers will focus more on the argument line and apply critical evaluation processes when their goal is to evaluate the text as opposed to comprehend. Students were pretested on their initial beliefs and prior topic knowledge before reading one of two versions of two argumentative texts promoting claims on the basis of arguments varying in terms of a specific fallacy inclusion. Half of the students were instructed to read the texts for comprehension while the rest were instructed to read with the goal of evaluating their argument lines. After reading, all students evaluated the text and indicated the degree to which they agreed with the main claim they promoted. Comprehension measures included text recall and number of valid inferences generated in recall. The results indicated that students who read to evaluate recalled more text information and were less likely to change their initial beliefs as a result of reading than students who read for comprehension. However, the absence of any effects of argument quality on evaluation and belief change indicated a lack of critical evaluation. Findings are discussed in relation to their theoretical and educational implications.

Learning by teaching. Improving teacher students' reading strategy skills

Keywords: Cooperative / collaborative learning, Pre-service teacher education, Quantitative methods, Reading comprehension

Presenting Author:Nadine Spörer, University of Potsdam, Germany; **Co-Author:**Helvi Koch, Universität Potsdam, Germany; **Co-Author:**Jennifer Lambrecht, University of Potsdam, Germany; **Co-Author:**Thorsten Henke, University of Potsdam, Germany

Educational studies about reading instruction in regular classrooms indicated that teachers spend too little time instructing reading strategies. Moreover, teachers often have only limited knowledge about reading strategies and they do not know exactly how to implement reading strategy programs. Therefore, there is a need to provide future teachers with knowledge about the effective application of reading strategies and about methods how to teach these effectively. In this intervention study, we taught first semester students of teacher training how to instruct primary school students in using reading strategies. The aim of the study was to analyze whether and to what extent students benefited from the intervention within their own reading strategy skills. The sample consisted of $N = 74$ students who took part in one of two conditions: (a) a reciprocal teaching intervention and (b) a control group with an alternative training. Both conditions were designed as an introduction to scientific working techniques and one of the seminar's topics dealt with effective reading strategies. In the

intervention condition teacher students additionally learned how to implement reciprocal teaching in the classroom. Training success was assessed in a pre-posttest design with a standardized reading comprehension test and two self-constructed reading strategy tasks measuring students' declarative and procedural knowledge about strategy use. To compare the development of the students in the two conditions, repeated measures ANOVAs were estimated. At posttest, intervention students outperformed control students in reading strategy knowledge but not in reading comprehension.

Prerequisite Knowledge and Time of Testing in Learning with Animations and Static Pictures

Keywords: Comprehension of text and graphics, Computer-assisted learning, Instructional design, Multimedia learning

Presenting Author:Tim Kühn, University of Mannheim, Germany; **Co-Author:**Sabrina Navratil, University of Mannheim, Germany; **Co-Author:**Stefan Münzer, Universität Mannheim, Germany

Animations can possess an informational advantage compared to static pictures. This informational advantage is assured for the used animations of the current study. Thereby, it will be investigated whether the corresponding informational disadvantage of static pictures can be compensated when learners possess adequate prerequisite knowledge to be able to correctly infer this missing information. When correctly inferring the information with static pictures, learners are supposed to be more actively engaged. This higher engagement might especially pay-off in the long run. Hence, it will moreover be examined whether this supposed higher engagement will lead to a better lasting knowledge representation for learners with static pictures, meaning that learners with adequate prerequisite knowledge receiving static pictures might even outperform their counterparts receiving animations in a delayed test. To examine these assumptions, a 2x2x2-Between-Subject-Design with visualization format (static picture vs. animation), prerequisite knowledge (conveyed vs. not conveyed) and time of testing (immediate vs. after one week) as independent variables will be used. It is planned that 32 participants will serve in each condition, making in total 256 participants. Data collection is still in progress and the results will be presented and discussed at the conference.

Session E 4

30 August 2017 12:00 - 13:30

Main Building A - A35

Roundtable

Assessment and Evaluation, Educational Policy and Systems

RT: Educational Evaluation and Early Childhood Education

Keywords: Assessment methods and tools, Bilingual education, Conversation / Discourse analysis, Early childhood education, Educational policy, Motivation, School effectiveness, Social interaction, Teacher Effectiveness, Teaching approaches

Interest group: SIG 05 - Learning and Development in Early Childhood , SIG 23 - Educational Evaluation, Accountability and School Improvement

Chairperson: Carmen Zurbriggen, University of Fribourg, Switzerland

Teacher-child interactions with monolingual and multilingual kindergarteners

Keywords: Bilingual education, Conversation / Discourse analysis, Early childhood education, Social interaction

Presenting Author:Annegien Langeloo, University of Groningen, Netherlands; **Co-Author:**Mayra Mascareño, University of Groningen, Netherlands; **Co-Author:**Marjolein Deunk, University of Groningen, Netherlands; **Co-Author:**Maaïke van Rooijen, University of Groningen / GION, Netherlands; **Co-Author:**Jan-Willem Strijbos, University of Groningen, Netherlands

The interaction between teacher and child is the main proximal process for delivering learning opportunities to a child in educational settings, and therefore the main determinant of classroom quality. However, the same teacher input might represent different learning opportunities to children with diverse backgrounds. The current study will investigate the learning opportunities that monolingual and multilingual children experience through teacher-child interactions in early childhood education classrooms. Previous research shows that multilingual children have more managerial interactions, get briefer responses of the teacher in educative situations and receive less affirmations on correct responses than their monolingual peers. Therefore, we expect interactions to differ for children with diverse language backgrounds on, amongst others, the content of interaction, its level of complexity, and in types of conversational turns such as feedback types. Data will be collected in 20 Dutch kindergarten classrooms at three time points, all roughly three months apart. In each classroom, four children (aged 5-6 years) are selected of which two are multilingual. At each time point, video recordings are made to measure general classroom quality and to assess the individual teacher-child interactions. Data for time point 1 is currently being collected (October 2016). During the round table at EARLI, fragments from teacher-child interactions with monolingual and multilingual kindergartners will be discussed, aiming to refine a coding scheme for analyzing the data.

Agreement Between Students' and Principals' Ratings of Teacher's Use of Motivational Strategies

Keywords: Assessment methods and tools, Motivation, Teacher Effectiveness, Teaching approaches

Presenting Author:Christi Bergin, University of Missouri/Columbia, United States; **Co-Author:**David Bergin, University of Missouri/Columbia, United States; **Co-Author:**Eli Jones, University of Missouri/Columbia, United States

This paper addresses whether students and principals perceive teachers similarly regarding their use of motivational

strategies. Classroom observations and student surveys of teacher's effectiveness are widely used, but hotly debated, as U.S. policies push schools toward rigorous teacher evaluation. Little is known about the agreement between these two important sources of data. In the present study, data are from surveys of secondary students of 485 teachers who also experienced 3-5 classroom observations conducted by their principals throughout the school year in Missouri (USA). Principals completed annual training on how to do classroom observations using a standardized rubric. Student surveys were delivered online at school. Results suggest there is only modest overlap between students' and principals' perceptions when they are asked about a teacher's use of the same strategies. The mean of student survey items and the mean classroom observation ratings correlated $r = .236$ ($p = .000$). Our results are in accord with one other study that addressed this same research question conducted in Pittsburgh schools. Both the present study and the Pittsburgh study raise issues about leniency in principals' ratings of classroom observations.

The Principal Effect: Detecting Principal Error in Classroom Observations

Keywords: Assessment methods and tools, Educational policy, School effectiveness, Teacher Effectiveness

Presenting Author:Christi Bergin, University of Missouri/Columbia, United States; **Co-Author:**Eli Jones, University of Missouri/Columbia, United States

This study investigates the quality of principals' observations of teaching practices (OTP) in an authentic teacher evaluation system in the U.S. Data are from 250 school districts (421 principals, 4,640 teachers). Principals are trained annually to use a standardized rubric to score teaching effectiveness. Principals rated a standard set of classroom videos at Time 1, and a different set again a year later at Time 2; between these time periods principals rated four teaching episodes of teachers in their own buildings. Many-facets Rasch measurement (MFRM) was used to investigate the functioning of OTP ratings in teacher evaluation. Results suggest that all principals tended to be lenient with their own teachers, with substantial individual differences in leniency. Generally, principals used the scale consistently and differentiated between specific teaching practices within a single OTP. Results were similar for elementary and secondary schools. Thus, overall OTP ratings are meaningful and useful; OTP can distinguish between teachers of varying effectiveness. However, caution is warranted when comparing ratings across schools and ratings should generally be interpreted as inflated. MFRM techniques proved useful in identifying specific teaching practices that need improvement as well as principals (12%) who may need remediation in conducting OTP.

Session E 5

30 August 2017 12:00 - 13:30

Pinni B - B3109

Poster Presentation

Motivational, Social and Affective Processes, Teaching and Teacher Education

PO: Motivation and Self-Efficacy

Keywords: Achievement, Attitudes and beliefs, Educational attainment, Educational Psychology, Emotion and affect, Game-based learning, Goal orientation, Language (Foreign and second), Mathematics, Motivation, Primary education, Secondary education, Self-efficacy, Social aspects of learning and teaching, Teacher Effectiveness, Teaching / instruction

Interest group: SIG 08 - Motivation and Emotion

Chairperson: Jyrki Reunamo, University of Helsinki, Finland

Exploring Engagement Growth in Japanese Elementary Schools

Keywords: Game-based learning, Language (Foreign and second), Motivation, Primary education

Presenting Author:Quint Oga-Baldwin, Waseda University, Japan; **Co-Author:**Luke Fryer, University of Hong Kong, Hong Kong

@font-face { font-family: "Times"; }@font-face { font-family: " "; }@font-face { font-family: "@ "; }@font-face { font-family: "Cambria"; }p.MsoNormal, li.MsoNormal, div.MsoNormal { margin: 0cm 0cm 0.0001pt; font-size: 12pt; font-family: "Times New Roman"; }div.Section1 { } BackgroundEngagement and motivation have an interrelated, dynamic relationship. Theoretically, motivation may be used to predict how students will engage with their studies over time. This may further help to define how students develop within a specific course of study in relation to their classroom experiences. AimsUsing self-determination and engagement theories, we investigated how students' engagement grows over the course of two years in game-based foreign language classes. MethodsElementary school students from a suburban school district in Japan ($n = 478$) completed surveys during the 2013 and 2014 school years. Students' engagement was measured at five time points during their two years of English instruction. Latent Growth Curve (LGC) analysis was used to measure changes in their engagement. ResultsResults showed a clear positive trend for cognitive engagement over the course of two years. Behavioral engagement showed weak growth, while emotional engagement did not change. These findings indicate that students' behavior and enjoyment of their classroom activities may not change over time, reaching a stable point, while they may begin to engage in cognitive aspects of communication over the course of their studies.

Teachers' self-efficacy, goal orientations, and classroom behaviours – An interaction analysis

Keywords: Goal orientation, Motivation, Self-efficacy, Teaching / instruction

Presenting Author:Sindu George, Monash University, Australia

Teacher motivation was an underemphasized area of research until recently. The absence of a sound theoretical framework has been highlighted as the main reason for the lack of research in this area (Butler, 2007; Richardson & Watt, 2006). Since the 2000s, researchers have focused on systematic and theory-driven research on teacher motivation. For example, Watt and Richardson (2007) adopted expectancy-value theory for studying student teachers' motivation for entering teaching profession; Roth, Assor, Kanat-Maymon, and Kaplan (2007) employed self-determination theory to study autonomous motivation for teaching; and Butler (2007) adapted achievement goal theory to study teacher motivation in terms of their goal orientations. The current study presents an integrated perspective on teacher motivation incorporating two different constructs: teachers' self-efficacy from Bandura's social cognitive theory, and teachers' goal orientations from achievement goal theory under the overarching framework of 'expectancy X value' theory.

Academic optimism as a lived experience.

Keywords: Educational Psychology, Secondary education, Self-efficacy, Teacher Effectiveness

Presenting Author: Claire Lloyd, Liverpool Hope University, United Kingdom; **Co-Author:** Sue Cronin, Liverpool Hope University, United Kingdom

Over the past four decades, three organizational properties of schools have emerged that have consistently been found to exert a powerful influence on student achievement, even when controlling for SES. Properties include academic emphasis of the school, collective efficacy of the faculty, and the faculty's trust in parents and students – all of which are linked together as a single powerful latent construct called academic optimism (Hoy, Tarter, & Woolfolk-Hoy, 2006).

While instruments have been developed to provide robust quantitative measures of academic optimism (Hoy et al., 2006), there is less understanding of how this complex phenomenon operates within schools. The current study addresses this gap by seeking an understanding of the organisational properties of two urban United Kingdom secondary schools – one displaying the characteristics of high academic optimism and the other showing low optimism. A Case Study approach was adopted because of its focus on exploring phenomenon in real-life contexts to develop rich, contextualised understandings of everyday routines, roles and relations (Yin, 1981). Drawing on the phenomenological method, repeated interviews were conducted with school leaders and teachers to allow for multiple dimensions of academic optimism in schools to be revealed and understood (Stake, 2006). Preliminary results suggest that the everyday dynamics of the case school with high measures of optimism are qualitatively different from those in the school with low optimism. Further research will be undertaken to provide rich descriptions of life in these schools. This work will contribute to an understanding of academic optimism as a lived experience.

Self-Concept Mediates the Relation between Achievement and Emotions in Mathematics

Keywords: Achievement, Attitudes and beliefs, Emotion and affect, Mathematics

Presenting Author: Jojanneke van der Beek, Utrecht University, Netherlands; **Co-Author:** Sanne van der Ven, Utrecht University, Netherlands; **Co-Author:** Paul Leseman, Utrecht University, Netherlands; **Co-Author:** Evelyn Kroesbergen, Utrecht University, Netherlands

Mathematics achievement is related to positive and negative emotions such as enjoyment and anxiety. Based on Pekrun's control-value theory of achievement emotions, students' academic self-concept may be an important mediator of the relation between mathematics achievement and emotions. As emotions predict the likelihood of career aspirations in science or math, high achieving students are of special interest. The study aimed to investigate the mediating role of self-concept in the relation between mathematics achievement and emotions (i.e. enjoyment and anxiety), and to test possible differences in this mediating role between low, average, and high achieving students. Participants were 1014 ninth-grade students from eight urban secondary schools in the Netherlands. Through an online survey, including mathematical problems, students were asked to indicate their levels of mathematics enjoyment, anxiety and self-concept. Structural equation modeling was used to test the mediating role of self-concept in the relation between mathematics achievement and emotions. Multigroup analyses were performed to compare these relations across the three achievement groups. Results confirmed full mediation of the relation between achievement and emotions in mathematics by self-concept. Furthermore, we found higher self-concepts, a higher level of enjoyment in mathematics and a lower level of math anxiety in high achieving students compared to average and low achievers. No differences across these achievement groups were found in the relations of the mediational model. The pivotal role of self-concept in relation to emotions and achievement in mathematics should encourage educators to be aware of the ways in which they shape their students' self-concept.

Arabic Language Learners' Self-Efficacy and its Sources

Keywords: Language (Foreign and second), Motivation, Self-efficacy, Social aspects of learning and teaching

Presenting Author: Laura Page, University of Kentucky, United States; **Presenting Author:** John Eric Lingat, University of Kentucky, United States; **Co-Author:** Hadeel Ali, University of Denver, United States; **Co-Author:** Ellen Usher, University of Kentucky, United States; **Co-Author:** Parth Patel, University of Kentucky, United States; **Co-Author:** Tiffany Thomas, University of Kentucky, United States

This study examined beliefs of emerging Arabic speakers and their sources of self-efficacy. While the enrollment of students in Arabic as a foreign language course continues to increase (MLA, 2016), minimal research has been conducted to understand the beliefs of students learning how to speak Arabic since it is one of the least commonly studied foreign languages in the United States (Alkhateeb, 2014). Ninety-two Arabic language students were surveyed in a large, public university in the Southeastern United States regarding their speaking self-efficacy beliefs and the sources of their self-

efficacy. Oral language proficiency scores were provided through teacher ratings. In addition, this study examined the differences between male and female students.

Socio-demographic and academic predictors of educational aspirations of elementary school students

Keywords: Educational attainment, Educational Psychology, Motivation, Primary education

Presenting Author: Iris Marušić, Institute for Social Research, Croatia; **Co-Author:** Josip Šabić, Institute for Social Research, Croatia

Research efforts in various contexts have indicated that young persons' educational aspirations are strong determinants of their educational and more general life choices and outcomes. Students with higher educational aspirations have greater motivation and higher educational attainment, as do those for whom parents and teachers hold higher educational expectations and aspirations. The proposed research aims to examine some determinants of pupils' educational aspirations at the transitional period of Croatian elementary education, when pupils decide about their future educational trajectory into secondary education. The first set of variables examined are gender and parental education followed by a set of relevant academic variables such as achievement, self-concept and learning strategies. This research was carried out on a sample of 231 eight-graders from 36 schools. Participants completed a questionnaire assessing educational level of their parents, school achievement, academic self-concept, learning strategies and their aspirations for secondary school. Two-step binomial logistic regression was performed to determine the effects of the selected variables on the likelihood of students' aim to enrol in a grammar or vocational school. The model with both sets of predictors correctly classified 84.8% of students according to their aim to enrol in a grammar school. The only significant predictors were school achievement and academic self-concept, indicating that students with better school grades who consider themselves as more academically able aim to enrol grammar school.

Session E 6

30 August 2017 12:00 - 13:30

Main Building C - C2

Roundtable

Teaching and Teacher Education

RT: Teacher Education and Methods in Learning

Keywords: Collaborative Learning, Communities of learners, Cooperative / collaborative learning, Design based research, In-service teacher education, Mixed-method research, Qualitative methods, Reflection, Researcher education, Teacher Professional Development

Interest group: SIG 11 - Teaching and Teacher Education, SIG 17 - Methods in Learning Research

Chairperson: Antoine Lecat, Université catholique de Louvain (UCL), Belgium

Engaging in Lesson Study: How it Impacts Teachers' Learning and Professional Agency?

Keywords: Collaborative Learning, Cooperative / collaborative learning, In-service teacher education, Teacher Professional Development

Presenting Author: Mihaela Miteşcu Manea, The National University of Arts "George Enescu" Iasi, Romania

The initial phase of an exploratory study focusing on understanding how Romanian teachers learn to teach for diversity and inclusion allowed for an insight into what matters most to the teachers and to their schools in the course of learning. The findings in this early stage of our research had become indicative of teachers' preferred strategies of finding and affirming, in the space of the schools' common practices, specific positions regarding the challenges of teaching and learning for diversity and inclusion. Emphasis on confinement to the traditional boundaries of discipline specialization and the habitual approach to educational change by deploying ready-made meanings and procedural prescriptions for action in a top-down dynamic of delegating responsibility for efficient action in the classroom, have restricted practitioners from developing contextualized, collaborative practices of professional learning by inquiring and experimenting with the various tools of the profession available in their schools. Drawing on cultural historical activity theory framework, the proposed study aims at an exploration of the effects on Romanian teachers' language and understanding of professional agency, whilst for the first time engaging in Lesson Study (Dudley, 2013) approaches to planning and learning to teach for diversity and inclusion. The implications for research and for educational practice of first findings in this exploratory study are proposed for discussion.

Exploring configurations of personal and situational factors in teachers' identity development

Keywords: Communities of learners, Qualitative methods, Reflection, Teacher Professional Development

Presenting Author: Gonny Schellings, Eindhoven University of Technology, Netherlands; **Co-Author:** Janine Mommers, Eindhoven University of Technology, Netherlands; **Co-Author:** Maaike Koopman, Eindhoven University of Technology, Netherlands; **Co-Author:** Douwe Beijaard, Eindhoven University of Technology, Netherlands

Learning to teach is a process strongly influenced by configurations of personal and situational factors. Beginning teachers should find a satisfying balance between what they personally find important for learning to teach and the professional demands or expectations expressed in standards and set by their schools. During four professional development meetings, 40 beginning teachers from 13 secondary schools were supported to become aware of these personal and situational factors that shape their professional identity development. The teachers wrote short reflection reports and answered

reflective questions. These data were transformed into portraits of each teacher; subsequently these portraits were analysed for configurations of personal and situational factors. Some portraits included similar personal factors, such as being perfectionistic, other portraits included similar situational factors, such as getting support from colleagues. A broad concern such as experiencing work load consisted of different configurations, namely, being perfectionistic and feeling no support, or being perfectionistic and experiencing high demands. Different configurations led to different kinds of behaviour (e.g., taking own responsibility) or feelings (e.g., feeling insecure) of beginning teachers. In all, beginning teachers should become aware of their configurations of personal and situational factors to give direction to their construction of a professional identity.

Shifting positions when engaging in practice through Design-Based Research

Keywords: Design based research, Mixed-method research, Qualitative methods, Researcher education

Presenting Author: Roland Hachmann, University of Southern Denmark, Denmark; **Co-Author:** Lea Tilde Rosenlund, University of Southern Denmark, Denmark; **Co-Author:** Jens Jørgen Hansen, University of Southern Denmark, Denmark

In this round table discussion, we wish to portray and negotiate different perspectives of participation as a basic condition when conducting Design-Based Research. The position of the researcher is not fixed and must adjust and adapt in-process, and in collaboration with practitioners.. Although the literature on Design-Based Research addresses perspectives on roles of the researcher, and the co-designers or practitioners, we find that focus is often on skills needed, e.g. being an expert in the field, rather than on the phenomena of shifting positions in the phases and contexts of research. We propose the phenomenon of shifting positions as consequential to the scope and outcomes of a project. Discussing these shifts in relation to benefits and challenges particular to the Design-based Research approach is necessary to stimulate awareness of these issues. As these issues are valuable to both researchers and practitioners, considering them may generate recommendations on how to prepare for these shifts when conducting Design-Based Research. To illustrate how positions shift in actual practice, we draw upon two empirical studies conducted in the context of Teacher Education Programme. We present one case where the researcher is positioned as a second teacher within the classroom, and another case where the researcher needs to renegotiate his position as co-designer and researcher after an intervention in the design experiment. Our goal is to gather ideas and contributions through discussion of the concept and characterisation of shifting positions, collectively considering how this concept may advance Design-based research.

Session E 7

30 August 2017 12:00 - 13:30

Linna - K110

Poster Presentation

Higher Education, Instructional Design

PO: Higher and Doctoral Education

Keywords: Assessment methods and tools, Conversation / Discourse analysis, Doctoral education, Engineering, Experimental studies, Higher education, Inquiry learning, Instructional design, Literacy, Mathematics, Misconceptions, Motivation and emotion, Problem-based learning, Qualitative methods, Quantitative methods, Science education, Social interaction, Synergies between learning - teaching and research, Teaching / instruction

Interest group: SIG 04 - Higher Education

Chairperson: Hanke Korpershoek, University of Groningen, Netherlands

First-year students approach interdisciplinarity in Nanoscience course

Keywords: Conversation / Discourse analysis, Higher education, Science education, Social interaction

Presenting Author: Anna-Leena Kähkönen, University of Jyväskylä, Finland

Interdisciplinary studies, as well as interdisciplinary work, is on the rise in the society. This study looks at understanding interdisciplinarity from point of view of Nanoscience students. How do they recognize and use disciplines in group work, during their first interdisciplinary course in a Nanoscience program? The discipline-related social interaction is studied with conversation analysis of group discussions. For improving the course, desired outcomes, such as learning to appreciate and rely on disciplinary knowledge of others, are mapped. The studied interactions and tasks they occur in tell us which types of tasks can help students understand disciplines and interdisciplinarity and how they approach these themes as parts of their identities.

Empirical Investigation of Challenges for PBL Stakeholders in Engineering Education

Keywords: Engineering, Higher education, Qualitative methods, Problem-based learning

Presenting Author: Daniel Rees Lewis, Northwestern University, United States; **Presenting Author:** Spencer Carlson, Northwestern University, United States; **Co-Author:** Matthew Easterday, Northwestern University, United States; **Co-Author:** Elizabeth Gerber, Northwestern University, United States

Project-Driven Learning (PDL), including project- and problem-based learning, can effectively teach authentic practices and knowledge. PDL involves many interrelated practices and technologies that researchers and practitioners continually improve. To design practices and technologies that PDL stakeholder willing adopt and thus scale widely, we must design understand the perceived challenges of PDL stakeholders. In this work, we study university students and instructors

involved with Engineering PDL. We ask, what do students and instructors in Engineering PDL perceive as their greatest challenges? We interviewed 99 Engineering Education PDL stakeholders; including 53 undergraduate and graduate students and 46 university instructors, from 27 different universities. We analyzed interview data using grounded theory to identify PDL challenges for a variety of stakeholder. We found that students perceived their greatest challenges to be managing a complex process and peers collaboration. Specifically, they face challenges related to interpreting varied instruction, team planning, accountability, and getting regular feedback and validation on project plans and direction. Instructors' perceive their greatest challenge as managing multiple semi-independent teams. Specifically, they face challenges tracking teams, providing enough feedback to students, setting up projects before the class starts, and untangling team performance to give individuals formative and summative assessments. To design pedagogical practices and technologies that will be widely adopted within Engineering PDL, engineering education must address these student and instructor challenges.

Disciplinary Practices and Multiple Literacies: How Can they Meet in the Middle?

Keywords: Inquiry learning, Instructional design, Literacy, Teaching / instruction

Presenting Author:Joshua Radinsky, University of Illinois at Chicago, United States; **Co-Author:**Iris Tabak, Ben-Gurion University of the Negev, Israel; **Co-Author:**Uzi Bami, Ben-Gurion University of the Negev, Israel

Higher education faces a number of challenges, including the need to socialize learners into the practices of particular disciplines, as well as provide an essential education to prepare learners for citizenship. Specifically, individuals require the capacity to critically evaluate information sources, which increasingly include sophisticated data representations and visualizations. Such representations are not necessarily intuitive, and often require specialized knowledge to recognize their qualities, and their signification in different domains. We propose an approach to the design of instruction in higher education that aims to meet the goal of disciplinary socialization while also cultivating the knowledge and skills needed to engage with the multi-literacy demands of contemporary citizenship. This approach calls for instructors to not only incorporate problem solving in their higher education courses, but to design these problems with an eye toward both disciplinary and everyday skills. In this approach, learners are encouraged to employ sophisticated data-rich visualizations to solve two types of problems: problems that reflect core questions in the domain of study; and problems that reflect the application of domain principles to everyday lives. In this way, learners can develop a grounding in the discipline that goes beyond factual knowledge; consider the relevance of disciplinary learning to their lives—even if they do not pursue a professional career in the discipline; and hone multi-literacy skills enabling them to better use and interpret the sophisticated data-rich representations that are becoming part and parcel of citizenship in the knowledge society.

Which facets of interest do influence the study success at the study entry phase in mathematics?

Keywords: Higher education, Mathematics, Quantitative methods, Motivation and emotion

Presenting Author:Stefanie Rach, University of Paderborn, Germany; **Co-Author:**Stefan Ufer, Ludwig-Maximilians-Universität (LMU), Germany; **Co-Author:**Timo Kosiol, Ludwig-Maximilians-Universität (LMU), Germany

Studies report a high dropout rate in academic mathematical study program. Individual interest is discussed as an important prerequisite for successful mathematical learning processes. For this assumption, empirical studies give however only little evidence. One reason might be that the questionnaires are too imprecise to measure a person-object-relationship. At the transition school-university in particular, the learning object change from an application oriented school subject to a scientific discipline. In this project, we hypothesize that interest in academic mathematics practices influence the study success in the study entry phase, in contrast to interest in school mathematics practices. To investigate this question, we develop a questionnaire (with six to eight items a scale) that differ between the specific interest object (school or academic mathematics practices). 184 bachelor and 140 teacher students deal with the questionnaire at the beginning of the first semester in mathematics. After six weeks, students rated their study satisfaction. At the end of semester, students had to succeed in mathematical tests. In regression analysis, the estimated affective components do not show a significant impact on the achievement of mathematical knowledge, only cognitive related prerequisites explain variance in the tests ($N=76$, $R^2=.46$ resp. $N=55$, $R^2=.28$). In contrast, besides study program ($\beta=.14$, p

Picturing roles: Activation of PhD candidates' role identities as researchers and teachers

Keywords: Doctoral education, Experimental studies, Higher education, Synergies between learning - teaching and research

Presenting Author:Alessa Hillbrink, University of Münster, Germany; **Co-Author:**Regina Jucks, WWU Münster, Germany

In Germany, most PhD candidates in psychology have both research and teaching duties right from the beginning. According to role identity theory (McCall, 2003), individuals hold different identities and roles that influence their motivation and behavior. This becomes evident in the work life at the university: One context, e.g. a seminar, requires a teacher role and according teacher behavior, another context, e.g. a colloquium, requires a researcher role and according researcher behavior. Shifting from one context to another, a shift in the focus of the self-conception from one role to another is necessary. We examine the reactivity of German PhD candidates' role identities to context cues using pictures typical of research or teaching. In a preliminary study, 35 PhD candidates rated whether 30 pictures were representative of research and/or teaching. The most representative pictures of each field are used as stimuli in an experimental between-subjects design, where PhD candidates are involved with either research pictures, teaching pictures or a mixture of both. Subsequently, their current role identity (researcher and/or teacher) is derived from written statements about their work as

PhD candidates. We hypothesize that the role-focus depends on the type of pictures seen before, with research pictures being associated with a higher focus on the researcher role and teaching pictures with a higher focus on the teacher role. In addition, visual material is generated that may be helpful in future research on the two core academic roles, as well as in professional development courses for young academics.

Assessment task using concept map with errors to support accurate feedback for the students

Keywords: Assessment methods and tools, Higher education, Misconceptions, Science education

Presenting Author: Paulo Correia, University of Sao Paulo, Brazil; **Co-Author:** Gisele Cabral, University of Sao Paulo, Brazil

Assessment tasks play a key role to keep students engaged to address conceptual challenges meaningfully. Accurate and frequent feedback is critical to foster pedagogic resonance, *i.e.*, the bridge between teacher knowledge and student learning. Student-generated concept maps (Cmaps) have been the preferred choice to design Cmap-based assessment tasks. The use of Cmap with errors (elaborated by teachers) has been explored to disseminate concept mapping in classroom routine. The aim of this paper was to test an assessment task based on Cmap with errors to help the teacher to give accurate feedback to the students. First-year undergraduate students (n=59) responded to an assessment task about molecular biology. Ten propositions presented misconceptions and the students needed to identify and explain the errors. Hierarchical cluster analysis (HCA) was carried out to verify natural clusters among the propositions with errors and the students' responses. Principal component analysis was executed to confirm the clustering patterns obtained by HCA. The propositions formed 4 clusters (A-D; similarity=79.2%) that revealed different levels of difficulty to identify/explain the errors. Students' responses formed 4 clusters (I-IV; similarity=67.2%) that revealed different levels of performance on task. The Cmap with error assessment task produced valuable information about students' conceptual understanding. Customised feedback was delivered to the students, avoiding the one-size-fits-all approach commonly used in real classrooms. Moreover, the teacher could revise the instructional approach/materials using robust information. At last, Cmaps with errors are also amenable for on-line learning platforms, and the accurate feedback can become automatically delivered.

Session E 8

30 August 2017 12:00 - 13:30

Main Building C - C5

Poster Presentation

Culture, Morality, Religion and Education, Learning and Social Interaction, Motivational, Social and Affective Processes

PO: Social Interaction

Keywords: Achievement, Arts, Communities of learners, Computer-supported collaborative learning, Cooperative / collaborative learning, Culture, Educational Psychology, Informal learning, Peer interaction, Primary education, Quantitative methods, Quasi-experimental research, Science education, Social aspects of learning and teaching, Social interaction, Social sciences, Technology

Interest group: SIG 10 - Social Interaction in Learning and Instruction

Chairperson: Tobias Rolfes, University of Koblenz-Landau, Germany

Participatory roles in small groups working in a virtual collaborative science learning environment

Keywords: Computer-supported collaborative learning, Educational Psychology, Peer interaction, Science education

Presenting Author: Olli-Pekka Heinimäki, University of Turku, Finland; **Co-Author:** Anne-Elina Salo, University of Turku, Finland; **Co-Author:** Marja Vauras, University of Turku, Finland

In this paper, participatory roles in productive small student groups working in a collaborative virtual science learning environment are examined. The study took place in six upper secondary schools in advanced-level biology and chemistry courses. The students worked in 39 small groups of three or two students. Teacher support was provided. In all three 75-95 minutes working sessions, both teachers and peer groups were videotaped and audio recorded, when the students were conducting a scientific experiment in a virtual collaborative science learning environment. Finally, the groups prepared and carried out presentations about their collective outcomes (= group outcome). Outcomes were evaluated on six levels (from 1 = low- to 6 = high+) by independent science experts in regard to the research plan, hypothesis, conclusions and quality of scientific language. Altogether six triads (two low, two averages and two high outcomes groups) were chosen for the role analysis. The identification of participatory roles is based on observable, verbal or non-verbal inputs at the turn level. The video data is analyzed with Noldus Observer XT 12 program. Preliminary outcomes show the same kind of role patterns that were found in the study of Volet et al (2016): High performing groups adopted more content focused roles and showed more flexibility in role taking and role distribution among the group members than lower performing groups. However, also some meaningful differences were identified. In-depth analyses for all six groups will be conducted.

The effect of cooperative learning on group work skills of pupils in Dutch primary education

Keywords: Cooperative / collaborative learning, Peer interaction, Primary education, Quasi-experimental research

Presenting Author: Marij Veldman, University of Groningen, Netherlands; **Co-Author:** Roel J. Bosker, Rijksuniversiteit Groningen, Dept of Education and GION, Netherlands; **Co-Author:** Tom Snijders, University of Groningen, dep. of sociology, Netherlands; **Co-Author:** Simone Doolaard, University of Groningen, Netherlands

Although research on cooperative learning emphasizes the positive effects on student outcomes, there is limited use of cooperative learning in schools. Success for All - The Netherlands (SfA-NL) tries to increase (the quality of) group work in Dutch primary education. The main research question of the study is whether the SfA-NL program leads to improved group work skills of primary school pupils. A quasi-experimental design with a treatment and a control group is used. At the end of school year 2015-2016 grade 1 pupils (6- and 7-year-old children) executed a cooperative learning task in small groups of four pupils (N = 152), which was recorded on video. When the cooperative learning task took place, the pupils of the treatment group had followed SfA lessons for a whole school year. The observation instrument of Blatchford, Baines, Rubie-Davies, Bassett and Chowne (2006) that is used, involves four categories to measure the group work: socioemotional ethos, group participation, discourse topic and type of pupil-pupil dialogue. At this moment, video coding is ongoing. After completing the coding, treatment and control group will be compared by using multilevel analysis. Findings will be presented at the conference. In general terms, it is predicted that changes in behavior as a result of involvement in the SfA-program will lead to more effective group work.

Using Twitter data to understand participation in a science outreach campaign

Keywords: Informal learning, Science education, Social aspects of learning and teaching, Technology

Presenting Author: Adam Maltese, Indiana University, United States

In this poster we will share the results of our research on a recent social media campaign run by Science Friday, a major science-related radio show with > 1M listeners each week in the United States. The campaign was #CephalopodWeek and focused on Twitter. We captured ~13,000 tweets that were part of this campaign. We will discuss the process of collection and share results on who participated and the nature of their participation. Initial results indicate that most of the content was posted by the main participating organizations with most of the activity being retweets of that information. We believe the results of this work can provide organizations with information on how they might expect their social media followers to participate in a campaign.

Indigenous Participation in Arts Education: A framework for increasing learning outcomes

Keywords: Arts, Communities of learners, Culture, Social aspects of learning and teaching

Presenting Author: Robert Barton, Griffith University, Australia

This paper presentation examines current approaches to teaching and learning for Indigenous students globally. It explores how the role of the arts and arts education as a vehicle for realising social justice particularly through storytelling is vital for success for Indigenous students in schools. Results for Indigenous students continue to sit well below that for the non-Indigenous population, demonstrating the need for such an approach. This presentation will therefore suggest that stories and storytelling is a key and more appropriate pedagogical approach for better engaging Indigenous students particularly through the arts and arts education. Stories and storytelling provide important social and cultural functions for Indigenous students. A stronger focus on this approach will ensure that cultural diversity is not a barrier to education participation and performance but rather an enabler. A prospective framework for designing and developing narratives through arts-based practice for Indigenous students is shared. The model is causal in its structure and relationship between each focal point as the story line moves down from 'Why?' and then from left (History?) to right (Where?). The framework is visual in its presentation provides a road map of the journey students will undertake throughout the course of a lesson/topic area. Students can be engaged both in the design and development of content against each element of the model or the teacher can choose to use the framework as a basis for developing their lesson structure and underpinning narrative for its delivery to the class.

School social work in Switzerland. Characteristics and factors of interprofessional collaboration

Keywords: Primary education, Quantitative methods, Social interaction, Social sciences

Presenting Author: Monique Brunner, University of Bern, Switzerland; **Co-Author:** Ueli Hostettler, PHBern – University of Teacher Education, Switzerland; **Co-Author:** Simone Ambord, University of Bern, Switzerland; **Co-Author:** Roger Pfiffner, Bern University of Applied Sciences, Switzerland

Today schools deal with a number of emerging social issues. This places new demands on the division of work and on the collaboration between different professional groups, including services of school social work which have recently been established in many Swiss schools. Yet, little research has examined how school social workers collaborate with relevant actors within schools. The present study addresses this gap by exploring the existing forms of collaboration between school social workers, principals and teachers. Based on an interdisciplinary approach, the study identifies factors that influence interprofessional collaboration. More specifically, the study should help to achieve a better understanding of how external pressures due to social problems, resource adequacy, leadership, role perception, and the organization of social work influence the collaboration among the various actors involved. By doing so, the project will contribute to the advancement of basic research on school social work and on interagency collaboration between schools and youth welfare services. At the same time, researchers invest in facilitating the transition of knowledge from basic research to the field of practice. It is expected that the various actors will make use of research findings when reflecting their professional practice and when developing new directions for their actions. To obtain the data from several hundred schools, online surveys and paper-and-pencil questionnaires are used for data gathering. For data analysis, descriptive analyses, linear regression analysis as well as mediation analysis are performed.

Teacher-Student Relationships From Kindergarten to Sixth Grade and Students' School Adjustment

Keywords: Achievement, Educational Psychology, Social aspects of learning and teaching, Social interaction

Presenting Author:Rianne Bosman, University of Amsterdam, Netherlands; **Co-Author:**Debora Roorda, University of Amsterdam, Netherlands; **Co-Author:**Ineke van der veen, Kohnstamm Institute, University of Amsterdam, Netherlands; **Co-Author:**Helma Koomen, University of Amsterdam, Netherlands

This study used a person-centered approach to identify teacher-student relationship trajectories from kindergarten to sixth grade. Additionally, predictors of relationship trajectories and students' motivation and academic adjustment in sixth grade were examined in a Dutch sample. Teachers reported about relationships with individual students ($N = 1300$) in kindergarten, grade 3, and grade 6 (i.e., closeness, conflict, and dependency), and they provided information about externalizing problem behaviors in kindergarten. In sixth grade, students performed on math and reading tests and completed questionnaires about task motivation and self-efficacy. Latent class growth analyses demonstrated three trajectories for closeness: high and stable (normative), very high and decreasing, and moderate and increasing. For conflict, low and stable (normative), low and increasing, and high and decreasing trajectories were found. For dependency, a low and decreasing (normative) and a low and increasing trajectory were found. Boys, students with lower verbal abilities, and students with more externalizing problem behavior were overrepresented in non-normative trajectories. Students with low teacher-student closeness in kindergarten or enduring exposure to negative teacher-student relationships during elementary school (low and increasing levels of conflict and dependency), scored lower on achievement tests and motivation at the end of elementary school than students in normative trajectories.

Session E 9

30 August 2017 12:00 - 13:30

Pinni B - B4117

Roundtable

Educational Policy and Systems, Higher Education, Lifelong Learning

RT: Lifelong Learning and Researcher Careers

Keywords: At-risk students, Doctoral education, Educational policy, Lifelong learning, Out-of-school learning, Peer interaction, Quantitative methods, Researcher education, Science education, Vocational education, Workplace learning

Interest group: SIG 14 - Learning and Professional Development, SIG 24 - Researcher Education and Careers

Chairperson: Katharina Thies, Germany

Acquisition of hard-to-learn knowledge in the domain of geriatric care nursing

Keywords: Out-of-school learning, Peer interaction, Workplace learning, Lifelong learning

Presenting Author:Bianca Steffen, University of Paderborn, Germany; **Co-Author:**Michael Goller, University of Paderborn, Germany; **Co-Author:**Christian Harteis, University of Paderborn, Germany

This contribution aims to investigate the learning process of newly hired geriatric care nurse assistants. The main focus of this interview study with 14 German geriatric nurses was (1) to identify knowledge that is hard to learn but simultaneously highly important for the daily job as a nurse assistant as well as (2) to clarify which of this knowledge cannot be gained solely with already existing activities and strategies. First findings implicate two domains being particularly hard to learn. The findings of this study will be used to deduce practical implications of how to improve the current learning process of such nurse assistants

Different Effects of Department Prestige on Post-PhD Job Placement

Keywords: Doctoral education, Quantitative methods, Researcher education, Science education

Presenting Author:Jakob Tesch, DZHW - German Centre for Research on Higher Education and Science Studies, Germany

This paper investigates the effect of the PhD granting department's prestige on the postdoctoral job placement of PhDs. Previous studies have discussed three main types of effects of department prestige on job placement, namely prestige effects, selection effects and training effects. The study will analyze whether prestige effects are mediated by measures of past achievements and career preferences as measures for selection and training effects. Job placement is analyzed using longitudinal data from the German Doctoral Candidates and Doctorate Holders Study ProFile. Job placement is conceptualized as placement in academic R&D in comparison to placement in other sectors, the change in university after the PhD and job income. Prestige is conceptualized using data on visibility of research output from the Leiden Ranking. Both data sources - Leiden Ranking and ProFile - will be matched and multi-level regression models will be computed to assess the effect of prestige on job placement while controlling for career preferences, PhD grades and earlier achievements.

Lifelong learning policies and their implications for young adults at risk in Germany

Keywords: At-risk students, Educational policy, Vocational education, Lifelong learning

Presenting Author:Alina Florentina Boutiuc-Kaiser, University of Education Freiburg, Germany

This paper explores how lifelong learning (LLL) policies influence or change the individual life projects of youth and young adults at risk like students at risk of leaving school, with migration background, early school leavers, youth and young adults not in school nor in training (NEETs), single parents, etc. As these groups are heterogeneous their living conditions, their

position in the education system or in the transition school to work and their freedom and autonomy in biographical decisions vary at local and regional German level substantially. In many cases the LLL policies push youth and young adults at risk to assume standardized life projects according to economic needs, and thus create new life course normality expectations forgetting to take into account individual specific contexts and the fact that life courses became more and more de-standardized.

Session E 10

30 August 2017 12:00 - 13:30

Main Building E - E222

Roundtable

Instructional Design, Teaching and Teacher Education

RT: Teacher Education and Professional Development

Keywords: Comparative studies, Competencies, Conceptual change, Design based research, Instructional design, Pre-service teacher education, Primary education, Science education, Special education, Teacher Professional Development

Interest group: SIG 11 - Teaching and Teacher Education, SIG 15 - Special Educational Needs

Chairperson: Lucie Mottier Lopez, University of Geneva, Switzerland

Supporting sustainable professional development in teachers implementing STEM education

Keywords: Design based research, Primary education, Science education, Teacher Professional Development

Presenting Author: Mireille Hubers, University of Twente, Netherlands; **Co-Author:** Maaïke Endeldijk, University of Twente, Netherlands

Globally, there is an increasing focus on teaching all students Science, Technology, Engineering and Mathematics (STEM) from primary education onwards. This resulted in many professional development programs that aim to support teachers in providing such content to their students. However, it is challenging to sustainably change the way in which teachers' incorporate STEM in their curriculum. To gain more insight into this sustainability challenge, the present study aims to determine 1) what factors influence the sustainability of STEM interventions, 2) how the development of such factors can be monitored, and 3) what the design requirements are for instruments assessing sustainability. The present design-based study focused on five interventions that target the way in which teachers use STEM in their daily educational practice (e.g., stimulating students' 21st century skills). These interventions were selected in collaboration with the Dutch national centre of expertise in STEM education ("Tech Your Future"). For each intervention, the principal investigator and two participating schools were included in the present study. A semi-structured interview scheme was used to individually interview the participants. Member-checks were performed to ensure the correctness of the interpretations. Amongst other things, school leadership, resources and teachers' knowledge and attitudes about STEM were found to be important factors influencing teachers' professional development. Moreover, in measuring sustainability, attention should be paid to the degree to which elements of the professional development program are implemented (e.g., through using student evaluations). The theoretical and practical implications of these findings will be discussed.

Fostering teacher trainees' assessment skills with real-life learning tasks

Keywords: Competencies, Design based research, Instructional design, Pre-service teacher education

Presenting Author: Christiane Klein, University of Freiburg, Germany; **Co-Author:** Stephanie Herppich, University of Freiburg, Germany; **Co-Author:** Matthias Nückles, University of Freiburg, Germany; **Co-Author:** Joerg Wittwer, University of Freiburg, Germany

Assessing students in classroom teaching is a complex skill. Consequently, its acquisition in teacher preparation requires trainings that emphasize the complex nature of assessing students. The 4-Component-Instructional-Design (4C/ID) model developed by van Merriënboer (1997) is an evidence-based approach to the training of complex skills. At the heart of this model is the use of holistic real-life learning tasks. So far, the 4C/ID model has not been applied for learning assessment skills in German teacher's training programs. Thus, we designed a long-term training for acquiring assessment skills based on this model. The training possesses two central elements, namely, learning tasks that address variable authentic assessment situations and a development portfolio to support and continuously monitor skill acquisition. To evaluate the extent to which the training fosters learning, we plan to compare teacher trainees who participate in the training with teacher trainees who take part in a training that is not designed in accordance with 4C/ID principles. Moreover, to examine the process of skill acquisition in more detail, we analyze the development portfolios. Based on the data collected, we will discuss the potential of the designed training to promote assessment skills and provide insights into the processes involved in acquiring the complex skill of assessing students.

Mindsets About Inclusion. A Comparison Between Concept Maps of German and Finnish Student Teachers

Keywords: Comparative studies, Conceptual change, Pre-service teacher education, Special education

Presenting Author: Franziska Greiner, Friedrich Schiller University of Jena, Germany; **Co-Author:** Baerbel Kracke, University of Jena, Germany

The struggle between policy and education features strongly in the discourse about inclusion. On the one hand there is a clear requirement on the German education system since the 2009 ratification of the Convention on the Rights of Persons

with Disabilities (CRPD); and on the other German teachers' and student teachers' thinking and action is influenced by a long tradition of a selective school system and society. In contrast to Germany, Finland's education system is known as model example. Maybe this could be explained through Finland's ten year head start (see Comprehensive Instruction Law of 1999) has allowed for more time to develop open mindsets and elaborate knowledge structures. Using concept maps – a method which is verified to be effective for usefully indicating students' mentality and its structure (Reiska et al., 2008) – the presentation will compare the knowledge structures and mindsets of German and Finnish student teachers. Using qualitative variables (e.g. structure complexity and proposition choice) and quantitative variables (e.g. number of concepts and propositions) in comparing constructed concept maps it will be seen whether Finnish student teachers have more differentiated, elaborate and well-structured concept maps than German students.

Session E 11

30 August 2017 12:00 - 13:30

Main Building E - E221

ICT Demonstration

Learning and Instructional Technology

BRiTE: An online resource to develop capacity for professional resilience

Keywords: Design based research, Learning analytics, Motivation and emotion, Pre-service teacher education

Interest group: SIG 08 - Motivation and Emotion

Chairperson: Gerry Geitz, Netherlands

This ICT Demonstration will present the five BRiTE online modules. These were developed in Australia in response to concerns regarding early career attrition and teacher wellbeing. They aim to develop the knowledge, skills and strategies of pre-service teachers to develop their capacity for resilience. The presentation will cover the rationale and the theoretical and evidence-based underpinning of the modules' content and design features. Also included will be research relating to their effectiveness, impact and uptake and how learning analytics are being used to interpret patterns of module usage. Participants will have the opportunity to engage with the modules using computers in the laboratory setting or their own devices and to discuss the application of the modules to other countries and professions.

BRiTE: An online resource to develop capacity for professional resilience

Presenting Author: Susan Beltman, Curtin University, Australia; **Presenting Author:** Caroline Mansfield, Murdoch University, Australia; **Presenting Author:** Ralph Delzepich, RWTH Aachen University, Germany

This ICT Demonstration will present the five BRiTE online modules. These were developed in Australia in response to concerns regarding early career attrition and teacher wellbeing. They aim to develop the knowledge, skills and strategies of pre-service teachers to develop their capacity for resilience. The presentation will cover the rationale and the theoretical and evidence-based underpinning of the modules' content and design features. Also included will be research relating to their effectiveness, impact and uptake and how learning analytics are being used to interpret patterns of module usage. Participants will have the opportunity to engage with the modules using computers in the laboratory setting or their own devices and to discuss the application of the modules to other countries and professions.

Session E 12

30 August 2017 12:00 - 13:30

Main Building C - C1

ICT Demonstration

Learning and Instructional Technology

Writing in Digital Environments: A 21st Century Approach to Actionable Analytics

Keywords: Collaborative Learning, Competencies, Learning analytics, Writing / Literacy

Interest group: SIG 12 - Writing

Chairperson: Sirpa Eskelä-Haapanen, University of Jyväskylä, Finland

Designed by faculty at the University of South Florida in consultation with colleagues throughout the United States and Europe, *My Reviewers (MyR)* provides teachers and administrators with the tools and resources they need to improve students' collaboration and writing competencies. An e-learning environment that facilitates feedback on student writing, peer review, and team projects, *MyR* provides document markup tools and actionable writing analytics that empower instructors to offer better feedback in less time. *MyR*'s real-time analytics provide the data that learning institutions need to facilitate student success. Administrators, instructors, and students can access personalized, adaptive analytics to understand student progress, instructor response, and program performance in real time. *My Reviewers* is used by approximately 12,000 students each year at USF and 2200 students in the *Critical Writing Program* at the University of Pennsylvania. Thanks to NSF funding, *The Role of Instructor and Peer Feedback in Improving the Cognitive, Interpersonal, and Intrapersonal Competencies of Student Writers in STEM Courses*, faculty in STEM courses at MIT, Dartmouth, NCSU, USF, and UPENN are deploying *My Reviewers* to research the efficacy of peer review. Abroad, *My Reviewers* is used by students in the English for Academic Purposes at Malmö University (Sweden) and by doctoral students working on their

dissertations at the University of Tartu (Estonia). The *My Reviewers* corpus serves as a vigorous site of interdisciplinary research, including over 450,000 reviews of texts and thousands of instructor comments, student comments, survey responses, and rate-the-rater scores.

Writing in Digital Environments: A 21st Century Approach to Actionable Analytics

Presenting Author: Joseph Moxley, USF, United States

Designed by faculty at the University of South Florida in consultation with colleagues throughout the United States and Europe, *My Reviewers* (*MyR*) provides teachers and administrators with the tools and resources they need to improve students' collaboration and writing competencies. An e-learning environment that facilitates feedback on student writing, peer review, and team projects, *MyR* provides document markup tools and actionable writing analytics that empower instructors to offer better feedback in less time. *MyR*'s real-time analytics provide the data that learning institutions need to facilitate student success. Administrators, instructors, and students can access personalized, adaptive analytics to understand student progress, instructor response, and program performance in real time. *My Reviewers* is used by approximately 12,000 students each year at USF and 2200 students in the *Critical Writing Program* at the University of Pennsylvania. Thanks to NSF funding, *The Role of Instructor and Peer Feedback in Improving the Cognitive, Interpersonal, and Intrapersonal Competencies of Student Writers in STEM Courses*, faculty in STEM courses at MIT, Dartmouth, NCSU, USF, and UPENN are deploying *My Reviewers* to research the efficacy of peer review. Abroad, *My Reviewers* is used by students in the English for Academic Purposes at Malmö University (Sweden) and by doctoral students working on their dissertations at the University of Tartu (Estonia). The *My Reviewers* corpus serves as a vigorous site of interdisciplinary research, including over 450,000 reviews of texts and thousands of instructor comments, student comments, survey responses, and rate-the-rater scores.

Session E 13

30 August 2017 12:00 - 13:30

Main Building A - A06

ICT Demonstration

Learning and Instructional Technology

The SMI Digital Classroom. A multi-station data collection framework for educational research.

Keywords: Computer-assisted learning, Educational Psychology, Student learning, Technology

Interest group: SIG 27 - Online Measures of Learning Processes

Chairperson: Fabian T. C. Schmidt, Leibniz Institute for Science and Mathematics Education (IPN), Germany

SMI SensoMotoric Instruments GmbH (Berlin, Germany) has launched SMI Digital Classroom, an integrated framework for educational research on behavioral correlates of attention, learning and memory based on eye tracking and connected physiological sensors. The SMI Digital Classroom promises a wealth of behavioral data about temporal and spatial characteristics of student behavior when interacting with screen-based educational material. You can, for example, assess what works in a classroom environment and what doesn't, where and when students' attention is won and lost. The solution has been designed specifically for researchers interested in students' individual learning strategies during knowledge acquisition and retrieval, teacher expertise and classroom management skills as well as content improvement and development of truly adaptive learning environments. One researcher, located at a single PC, can deploy behavioral experiments to up to 40 student laptops or computers, monitor student progress, interact with single students if required via messages and alerts, and monitor incoming research-grade data quality. No matter if all students are accomplishing the same experimental protocol, or if every student is provided with distinct learning content, the SMI Digital Classroom allows for automatic data synchronization and aggregation, allowing you to get to results immediately after data collection. The framework doesn't require deep technical or methodological expertise, allowing also educational researchers new to the field of eye tracking and physiological sensor acquisition to focus on scientific hypotheses and gain insights that shape student-centered training schemes, curriculum and learning strategies.

The SMI Digital Classroom. A multi-station data collection framework for educational research.

Presenting Author: Markus Plank, SensoMotoric Instruments GmbH, Germany

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framework doesn't require deep technical or methodological expertise, allowing also educational researchers new to the field of eye tracking and physiological sensor acquisition to focus on scientific hypotheses and gain insights that shape student-centered training schemes, curriculum and learning strategies.

Session E 14

30 August 2017 12:00 - 13:30

Pinni B - B4116

ICT Demonstration

Learning and Instructional Technology

Supportive hints in a digital environment to foster adolescents' expository text comprehension

Keywords: Computer-assisted learning, Educational Technology, Learning Technologies, Reading comprehension

Interest group: SIG 07 - Learning and Instruction with Computers

Chairperson: Simon Beausaert, Maastricht University, Netherlands

Over the last decades the research focus in the domain of learning and instruction has shifted towards digital applications and environments. With the use of new technologies and web 2.0 most ICT programs seem promising, but often empirical research to prove their effectiveness is lacking. After conducting a scientific literature review on the topic of digitally supported middle school text comprehension programs, it was decided to design a program based on existing knowledge and specific practical needs. The researchers developed the lay-out and the content of the program in co-creation with teachers and 7th-grade students. In doing so, the result was a web-based digital environment: Gazelle. This acronym (in Dutch) stands for motivated and active self-regulated reading. Gazelle aims at fostering comprehensive reading, since many educators emphasized their students' struggle with expository texts (e.g., in geography and history, where students need to read vast amounts of text). Comprehensive reading is supported by cognitive, metacognitive and motivational scaffolds called 'hints'. The program logs students' performance, their use of hints, and their judgement of learning (JOL). At the same time, the program provides relevant output for teachers, such as an overview of student progress and results. The questions used in Gazelle are categorized based on specific skills, such as causation or recognizing the main idea. This way, teachers can not only see which students are struggling with text, but also which skills need to be developed.

Supportive hints in a digital environment to foster adolescents' expository text comprehension

Presenting Author: Marlies ter Beek, University of Groningen, Netherlands; **Co-Author:** Leonie Brummer, University of Groningen, Netherlands; **Co-Author:** Anouk Donker-Bergstra, Rijksuniversiteit Groningen, Dept of Education and GION, Netherlands; **Co-Author:** Marie-Christine Opdenakker, University of Groningen, Netherlands

Over the last decades the research focus in the domain of learning and instruction has shifted towards digital applications and environments. With the use of new technologies and web 2.0 most ICT programs seem promising, but often empirical research to prove their effectiveness is lacking. After conducting a scientific literature review on the topic of digitally supported middle school text comprehension programs, it was decided to design a program based on existing knowledge and specific practical needs. The researchers developed the lay-out and the content of the program in co-creation with teachers and 7th-grade students. In doing so, the result was a web-based digital environment: Gazelle. This acronym (in Dutch) stands for motivated and active self-regulated reading. Gazelle aims at fostering comprehensive reading, since many educators emphasized their students' struggle with expository texts (e.g., in geography and history, where students need to read vast amounts of text). Comprehensive reading is supported by cognitive, metacognitive and motivational scaffolds called 'hints'. The program logs students' performance, their use of hints, and their judgement of learning (JOL). At the same time, the program provides relevant output for teachers, such as an overview of student progress and results. The questions used in Gazelle are categorized based on specific skills, such as causation or recognizing the main idea. This way, teachers can not only see which students are struggling with text, but also which skills need to be developed.

Session E 15

30 August 2017 12:00 - 13:30

Main Building E - E301

Workshop

Learning and Instructional Technology

Using VR technology to bring more learning opportunities in STEM courses

Keywords: Design based research, Educational Technology, Inquiry learning, Science education

Interest group: SIG 07 - Learning and Instruction with Computers

Chairperson: Marion Crauwels, KU LEUVEN, Belgium

Promoting STEM education has been explicitly emphasized in Chinese educational policy. However, there lacks competent teachers and resources to implement STEM into science classes in schools. And the imbalanced distributions of the educational resources within China further slows down the process of implementing STEM in schools. In response, the courses based on immersive VR technology were designed and expected to bring the equal opportunities to schools for carrying out STEM programs. Based on the affordances of the VR technology, the researchers designed authentic STEM

learning programmes for students. With the development of the VR technology, especially, the popular head-mounted VR devices enable the students to explore the contexts could not be explored in the real world (expanding the space and time zone; or the interesting places with different accesses). The students can conduct observations and even data collections within the virtual world. With other real-world science tools, the students can carry out the data analysis or experiments guided by the instructors. Then the students can create their own virtual worlds to present their study results or test their hypothesis. Based on initial empirical studies, it was found that by experience the nature of scientific inquiry in various virtual contexts, the secondary schools students in China indicated more positive attitudes towards the science. The further study is carried on, such as analyzing students' academic achievement in a compared study. Therefore, this workshop invites participants to experience the VR-supported STEM courses and discuss about the integration of VR technology and STEM courses.

Using VR technology to bring more learning opportunities in STEM courses

Presenting Author: Xiaomei Yan, Beijing Normal University, China

Promoting STEM education has been explicitly emphasized in Chinese educational policy. However, there lacks competent teachers and resources to implement STEM into science classes in schools. And the imbalanced distributions of the educational resources within China further slows down the process of implementing STEM in schools. In response, the courses based on immersive VR technology were designed and expected to bring the equal opportunities to schools for carrying out STEM programs. Based on the affordances of the VR technology, the researchers designed authentic STEM learning programmes for students. With the development of the VR technology, especially, the popular head-mounted VR devices enable the students to explore the contexts could not be explored in the real world (expanding the space and time zone; or the interesting places with different accesses). The students can conduct observations and even data collections within the virtual world. With other real-world science tools, the students can carry out the data analysis or experiments guided by the instructors. Then the students can create their own virtual worlds to present their study results or test their hypothesis. Based on initial empirical studies, it was found that by experience the nature of scientific inquiry in various virtual contexts, the secondary schools students in China indicated more positive attitudes towards the science. The further study is carried on, such as analyzing students' academic achievement in a compared study. Therefore, this workshop invites participants to experience the VR-supported STEM courses and discuss about the integration of VR technology and STEM courses.

Session E 16

30 August 2017 12:00 - 13:30

Pinni B - B3111

ICT Demonstration

Teaching and Teacher Education

Responding to Student Writing Using Screencast Technology

Keywords: Student learning, Teaching / instruction, Technology, Writing / Literacy

Interest group: SIG 12 - Writing

Chairperson: Venera Gashaj, University of Bern, Switzerland

Screencast technology allows an instructor to scroll through a student's essay or other work onscreen, highlighting or marking up areas of the text while talking to the student. The result is a brief (usually 5-minute) video that the student can then watch and listen to, and replay if necessary. Research has shown that, compared to conventional written feedback, screencasts provide far more information in less time, are perceived by students far more positively, create more positive affect, and are more effective instructionally (Author, 2016; Author, in press). This interactive ICT session will first explain and demonstrate the use of screencast technology for responding to student work. Participants will then try out the technology using one of several brief pieces of student writing appropriate to the age group of their students. Several other uses for screencasting will then be demonstrated, such as the use of screencast for peer review, formative teacher response, and formal evaluation. A list of screencast programs (some free) will be provided, along with a summary of the research showing the positive outcomes of responding to student work using the technology.

Responding to Student Writing Using Screencast Technology

Presenting Author: Christopher Anson, North Carolina State University, United States

Screencast technology allows an instructor to scroll through a student's essay or other work onscreen, highlighting or marking up areas of the text while talking to the student. The result is a brief (usually 5-minute) video that the student can then watch and listen to, and replay if necessary. Research has shown that, compared to conventional written feedback, screencasts provide far more information in less time, are perceived by students far more positively, create more positive affect, and are more effective instructionally (Author, 2016; Author, in press). This interactive ICT session will first explain and demonstrate the use of screencast technology for responding to student work. Participants will then try out the technology using one of several brief pieces of student writing appropriate to the age group of their students. Several other uses for screencasting will then be demonstrated, such as the use of screencast for peer review, formative teacher response, and formal evaluation. A list of screencast programs (some free) will be provided, along with a summary of the research showing the positive outcomes of responding to student work using the technology.

Session E 17

30 August 2017 12:00 - 13:30

Main Building A - A34

ICT Demonstration

Learning and Instructional Technology

Let's talk student engagement: Connecting teachers and students using learning analytics

Keywords: At-risk students, Higher education, Learning analytics, Student learning

Interest group: SIG 04 - Higher Education

Chairperson: Sui Lin Goei, Windesheim University of Applied Sciences, Netherlands

Student (dis)engagement is a frequently debated topic in higher education worldwide. Many post-compulsory education providers invest heavily, in terms of financial and human resources, into the enhancement of student retention and success. As higher education institutions are increasingly being measured for the effectiveness of returns on students' investment, it is not surprising that attempts to measure engagement are made through national student surveys to probe success and excellence at both the student and institutional level. Learning analytics data provides a lens into engagement. However, remotely collected system log data do not provide a picture of the 'whole' student and other data such as feedback, formative assessment, attendance and student demographics may inform action in any given pedagogical context. In this ICT demonstration, participants will have the opportunity to explore hands-on a cross-institutionally developed learning analytics tool that connects teachers with all students, not just those at risk. The featured tool is underpinned by personalizing the student experience at scale via persuasive text messages which are based on teacher-defined criteria of what constitutes engagement. The aim is to enable teachers to leverage learning analytics in their own educational contexts without having to be data or IT experts. Access to the tool and examples of learner data will be provided via a cloud-based environment. During the presentation, participants will be invited to engage in discussions about how we can define, measure and encourage student engagement, considering our shared experiences as teachers, learning designers, data analysts and IT experts.

Let's talk student engagement: Connecting teachers and students using learning analytics

Presenting Author: Marion Blumenstein, University of Auckland, New Zealand; **Co-Author:** Jenny McDonald, The University of Auckland, New Zealand; **Co-Author:** Catherine Gunn, The University of Auckland, New Zealand; **Co-Author:** Steve Leichtweis, The University of Auckland, New Zealand

Student (dis)engagement is a frequently debated topic in higher education worldwide. Many post-compulsory education providers invest heavily, in terms of financial and human resources, into the enhancement of student retention and success. As higher education institutions are increasingly being measured for the effectiveness of returns on students' investment, it is not surprising that attempts to measure engagement are made through national student surveys to probe success and excellence at both the student and institutional level. Learning analytics data provides a lens into engagement. However, remotely collected system log data do not provide a picture of the 'whole' student and other data such as feedback, formative assessment, attendance and student demographics may inform action in any given pedagogical context. In this ICT demonstration, participants will have the opportunity to explore hands-on a cross-institutionally developed learning analytics tool that connects teachers with all students, not just those at risk. The featured tool is underpinned by personalizing the student experience at scale via persuasive text messages which are based on teacher-defined criteria of what constitutes engagement. The aim is to enable teachers to leverage learning analytics in their own educational contexts without having to be data or IT experts. Access to the tool and examples of learner data will be provided via a cloud-based environment. During the presentation, participants will be invited to engage in discussions about how we can define, measure and encourage student engagement, considering our shared experiences as teachers, learning designers, data analysts and IT experts.

Session E 18

30 August 2017 12:00 - 13:30

Pinni B - B3110

ICT Demonstration

Learning and Instructional Technology

Music, Math, and LEGO: Using tangibles on a multi-touch table to teach abstract concepts.

Keywords: Computer-assisted learning, Instructional design, Multimedia learning, Student learning

Interest group: SIG 07 - Learning and Instruction with Computers

Chairperson: Benjamin Caspar Fauth, University of Tübingen, Germany

Tangibles are physical objects with embedded digital information, e.g. visualization or sound, which can be used to support the understanding of abstract concepts like fractions or musical notations. To exploit the advantages of tangibles as tools for teaching and learning not only new technologies but also new teaching methods are needed. In this demonstration we will use video examples to describe the development and implementation of such a combination of a tool and teaching

methods. In an eight weeks long extracurricular course we use tangibles on a multi-touch table (MTT) to simultaneously teach abstract mathematical as well as musical concepts. The course is based on using LEGO-like bricks of different lengths as representations for musical notes by adding digital information of sound duration to them. In combination with a music application on the MTT musical patterns (melodies, harmonies, and rhythms) can be built and played. Structural similarities between musical and mathematical patterns are used in the course to derive composing techniques from familiar mathematical operations like geometrical translations. From our research on this course we expect to gain new insights on benefits of tangibles for learning of abstract mathematical and musical concepts.

Music, Math, and LEGO: Using tangibles on a multi-touch table to teach abstract concepts.

Presenting Author:Jennifer Mueller, University of Tübingen, Germany; **Co-Author:**Uwe Oestermeier, Leibniz-Institut für Wissensmedien (IWM), Germany; **Co-Author:**Susana Ruiz Fernandez, Leibniz-Institut für Wissensmedien (IWM), Germany; **Co-Author:**Peter Gerjets, Leibniz-Institut für Wissensmedien (IWM), Germany

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Session E 19

30 August 2017 12:00 - 13:30

Main Building C - C7

ICT Demonstration

Assessment and Evaluation

Video-based assessment of teachers' professional vision of inclusive classrooms

Keywords: Assessment methods and tools, In-service teacher education, Pre-service teacher education, Quantitative methods

Interest group: SIG 01 - Assessment and Evaluation

Chairperson: Tine Nielsen, University of Copenhagen, Denmark

Globally, schools and teachers are facing a growing diversity in student populations, which is reflected in worldwide educational policies to implement more inclusive learning environments. According to the literature, (student) teachers need to be supported in their new role as facilitators of inclusion, as they play a major role in the success of these inclusive policies. As a consequence, an important step is to increase their ability to recognize and interpret effective teaching strategies in dealing with student diversity. This is conceptualized by Stürmer, Könings and Seidel (2013) as professional vision. Researchers have relied extensively on video as a means for studying professional vision. One way to study professional vision through video is the method of comparative judgement. However, the method of comparative judgement has not yet been applied to study (student) teachers' professional vision through video. Therefore, the project "POTENTIAL – Power to teach All!" developed a video-based comparative judgement instrument to measure (student) teachers' professional vision of inclusive classrooms. Two validation studies - an expert study and pilot study - took place to inquire the validity of the instrument. Results of both studies confirm the validity of the videography instrument to measure (student) teachers' professional vision of inclusive classrooms in a standardized way. This instrument will be presented during the ICT demonstration.

Video-based assessment of teachers' professional vision of inclusive classrooms

Presenting Author:Karolien Keppens, Ghent University, Belgium; **Co-Author:**Iris Roose, Ghent University, Belgium; **Co-Author:**Esther Gheysens, Vrije Universiteit Brussel (VUB), Belgium; **Co-Author:**Ruben Vanderlinde, Ghent University, Belgium; **Co-Author:**Piet Van Avermaet, Ghent University, Belgium; **Co-Author:**Katrien Struyven, Vrije Universiteit Brussel, Belgium

Globally, schools and teachers are facing a growing diversity in student populations, which is reflected in worldwide educational policies to implement more inclusive learning environments. According to the literature, (student) teachers need to be supported in their new role as facilitators of inclusion, as they play a major role in the success of these inclusive policies. As a consequence, an important step is to increase their ability to recognize and interpret effective teaching strategies in dealing with student diversity. This is conceptualized by Stürmer, Könings and Seidel (2013) as professional vision. Researchers have relied extensively on video as a means for studying professional vision. One way to study professional vision through video is the method of comparative judgement. However, the method of comparative judgement has not yet been applied to study (student) teachers' professional vision through video. Therefore, the project "POTENTIAL

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Session E 20

30 August 2017 12:00 - 13:30

Main Building A - A05

Workshop

Higher Education

Exploring pedagogical and curricular decisions for research based activities across Europe.

Keywords: Higher education, Synergies between learning - teaching and research, Teacher Professional Development, Teaching approaches

Interest group: SIG 04 - Higher Education

Chairperson: Miriam Sarid, Israel

Undergraduate research in higher education receives more and more attention. For both approaches there exist several models and typologies aiming to put different characteristics of research based learning into order (e.g. Healey & Jenkins 2009, Brew 2013, Levy & Petrulis 2012, Huber 2014, Stang 2016). Angela Brew has criticized that most models do not differentiate between curriculum and pedagogy (Brew 2013). As a response to this critique Brew developed herself “a framework for curricular and pedagogical decision-making” (Brew 2013) that she claims to be holistic.

We have analyzed Brews model and developed it further to separate more clearly the curriculum and the pedagogy. Our new model will be the core element of the workshop. Through this workshop we want participants a) to become acquainted with a framework for pedagogical and curricular decision making on research-based learning based on the model by Angela Brew (2013) and further developed by Lübcke, Reinmann & Heudorfer (2016, unpublished), b) to discuss the “typical” level of autonomy given to students with regard to design and perform research in their respective countries, and c) to discuss the “typical” level of autonomy given to teachers in designing research-based learning activities in their respective countries

Exploring pedagogical and curricular decisions for research based activities across Europe.

Presenting Author: Eileen Lübcke, Hamburger Zentrum für Universitäres Lehren und Lernen (HUL), Germany; **Co-**

Author: Anna Heudorfer, Hamburg Centre for University Teaching and Learning, Germany

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Session E 21

30 August 2017 12:00 - 13:30

Pinni B - B3117

ICT Demonstration

Assessment and Evaluation

A Digital Platform for the Assessment of Competences (D-PAC)

Keywords: Assessment methods and tools, Competencies, Educational Technology, Psychometrics

Interest group: SIG 01 - Assessment and Evaluation

Chairperson: Tommi Kokkonen, University of Helsinki, Finland

To ensure the development of competences in education, performance assessments are key. In these assessments, students are asked to create a (written) product or to give a presentation. Evaluating performance assessments is problematic, however, as assessors differ in how they interpret and use rating criteria. As a result, analytic scoring procedures, which are traditionally used for the rating of performance assessments, face problems in reliability and validity. Therefore, D-PAC introduces a digital tool that uses pairwise comparisons as an alternative scoring method. According to

the law of comparative judgement (Thurstone, 1927), people are far more reliable in comparing the quality of two performances, than in making absolute judgements about the quality of a single performance. Moreover, by including multiple assessors, who all have their own perspectives of what a quality performance comprises, the validity of this method is warranted. Based on the pairwise comparisons of all assessors, the tool provides a rank-order of students' performances. So far, 26 user groups used D-PAC for the evaluation of performance assessments in a wide variety of domains. Results from these try-outs indicate that D-PAC is a credible tool. In general, D-PAC ratings were more reliable and valid than analytic ratings. Further, D-PAC can be used to promote learning, by providing feedback to both students and assessors. In this ICT session, the different functionalities of D-PAC will be demonstrated and the possibilities and drawbacks of using D-PAC for research and educational purposes will be discussed.

A Digital Platform for the Assessment of Competences (D-PAC)

Presenting Author:Renske Bouwer, University of Antwerp, Belgium; **Co-Author:**Marije Lesterhuis, University of Antwerp, Belgium; **Co-Author:**Maarten Goossens, University of Antwerp, Belgium; **Co-Author:**Sven De Maeyer, University of Antwerp, Belgium

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Session E 22

30 August 2017 12:00 - 13:30

Pinni A - A2088

ICT Demonstration

Learning and Instructional Technology

New era of collaboration – Demonstrating conversational knowledge creation technology

Keywords: Design based research, Educational Technology, Knowledge creation, Learning Technologies

Interest group: SIG 07 - Learning and Instruction with Computers

Chairperson: Els Boshuizen, Open University of the Netherlands, Netherlands

The demonstration shows how a new software prototype (designed in Engaging Working Culture Project) supports new era of collaboration; digitally mediated conversational knowledge creation. Prototype helps participants to create shared artefacts in order to develop new understanding both individually and collectively. This EWC prototype was designed based on student-activating inquiry-, project- and problem-based approaches to learning and de. Especially, focusing on 1) activate and diagnose, 2) support the learning process and 3) evaluate the changes in thinking and acting *Engaging Learning Model* (Lonka, 2012). Phases are supported by constant feed forward by peers and the teachers. The EWC prototype can be used in various organizations and educational institutions to improve knowledge creation practices. Our working hypothesis is that this EWC prototype may accelerate learning processes by making conceptions overt to discussion and reflection. First pedagogical pilot group of this design-based study were eight math and science student teachers. The actual software testing was carried out during a brief study period. In the beginning, participants filled in a questionnaire. The sessions were filmed and observed and learning journals were also written. Feedback and evaluation conversations took place during the piloting period. It appeared that our EWC software solution provided a new kind of social plane for discussion and socially shared understanding. The participants were instantly able to make use of the possibilities of the EWC prototype. The participants of EARLI ICT demonstration can test the prototype and experience its effects in practice.

New era of collaboration – Demonstrating conversational knowledge creation technology

Presenting Author:Niina Halonen, University of Helsinki, Finland; **Co-Author:**Kalle Juuti, University of Helsinki, Finland;

Co-Author:Erika Maksniemi, University of Helsinki, Finland; **Co-Author:**Olli Sarvi, University of Helsinki, Finland; **Co-**

Author:Kirsti Lonka, University of Helsinki, Finland

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Session E 23

30 August 2017 12:00 - 13:30

Pinni A - A3103

ICT Demonstration

Learning and Instructional Technology

Classroom data management and interactive teaching with OneNote and EverNote: ICT Demonstration

Keywords: Computer-supported collaborative learning, E-learning / Online learning, Learning Technologies, Technology

Interest group: SIG 07 - Learning and Instruction with Computers

Chairperson: Anne-Elina Salo, University of Turku, Finland

ICT (information and communication technology) has become a vital component of our professional and private life (Tulodziecki/Herzig/Grafe 2010, 13). With School 4.0, Industrialization 4.0, Digital Transformation and ICT Literacy the new digital media is now also conquering the classrooms. Teachers and human resource developers in the vocational sector work on new opportunities to benefit from the advantages of tablet classes, BYOD (bring your own device concepts) and CYOD (choose your own device) on both sides of the dual education system (Dormann/Schmieden/Gerholz 2016, 52). Furthermore, this development reflects the influence of ICT on the students' acquisition of job-related competences for their future profession. So far the use of ICT in classes and the ICT competences of students seem to be expandable (ICILS 2013[1]). One reason for the poor amount of integration of ICT in classes is the lack of feasible didactic concepts (BITKOM 2011, 30). Particularly, in tablet classes and ICT-test programs in schools OneNote or EverNote are appropriate software to support ICT. Both software programs are mainly cloud based teaching solutions. The participants of this ICT demonstration will experience the diverse opportunities of working with OneNote and EverNote in classrooms. Both tools are largely unknown software programs of Microsoft and Apple and provide a variation of opportunities for teachers and educators. It will also be possible to integrate BYOD concepts into the demonstration. In an interactive exchange the participants will evaluate and criticize the presented software.

[1] The data of the study was based on younger students but it seems to be transferable in many ways.

Classroom data management and interactive teaching with OneNote and EverNote: ICT Demonstration

Presenting Author:Markus Dormann, Otto-Friedrich-Universität Bamberg, Germany

ICT (information and communication technology) has become a vital component of our professional and private life (Tulodziecki/Herzig/Grafe 2010, 13). With School 4.0, Industrialization 4.0, Digital Transformation and ICT Literacy the new digital media is now also conquering the classrooms. Teachers and human resource developers in the vocational sector work on new opportunities to benefit from the advantages of tablet classes, BYOD (bring your own device concepts) and CYOD (choose your own device) on both sides of the dual education system (Dormann/Schmieden/Gerholz 2016, 52). Furthermore, this development reflects the influence of ICT on the students' acquisition of job-related competences for their future profession. So far the use of ICT in classes and the ICT competences of students seem to be expandable (ICILS 2013[1]). One reason for the poor amount of integration of ICT in classes is the lack of feasible didactic concepts (BITKOM 2011, 30). Particularly, in tablet classes and ICT-test programs in schools OneNote or EverNote are appropriate software to support ICT. Both software programs are mainly cloud based teaching solutions. The participants of this ICT demonstration will experience the diverse opportunities of working with OneNote and EverNote in classrooms. Both tools are largely unknown software programs of Microsoft and Apple and provide a variation of opportunities for teachers and educators. It will also be possible to integrate BYOD concepts into the demonstration. In an interactive exchange the participants will evaluate and criticize the presented software.

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Session E 24

30 August 2017 12:00 - 13:30

Engaging Global Business Education – How to implement innovative digital pedagogical practices?

Keywords: Computer-supported collaborative learning, E-learning / Online learning, Educational Technology, Technology

Interest group: SIG 07 - Learning and Instruction with Computers

Chairperson: Anne Milatz, University of Jena, Germany

In this demonstration you will learn how to implement innovative pedagogical practices that meet the latest requirements of education (Finnish National Board of Education, 2015; European Parliament, 2015). This will be actualized via a pedagogical system that has been designed into a digital platform to create an engaging learning environment. This environment provides the possibility to implement 21st skills, student-activating learning practices and business-related education into high-school courses. Furthermore, the solution provides a network to link working life and educational institutes as well as various events to foster the educational objectives, for example *Slush Youth Exhibition* in Finland. *Engaging Global Business Education* (EGBE) is an ambitious attempt to design technology-mediated pedagogical practices based on the *Engaging learning model* (Lonka, 2012) to bridge the gap between formal education and the needs of future work life. The practices together with corresponding material will be integrated into high school education through a user-friendly and advanced digital learning environment (provided by Claned Ltd). At the moment, 12 high-schools all around Finland are involved in the piloting phase of the project. Based on the outcomes of the testing phase, four global business courses for high-school students are going to be ready to use in 2017. In future, the aim is also to implement customized versions of the courses to primary education, higher education and even companies. During this demonstration you will also hear about the first waves of feedback, which has been very promising so far.

Engaging Global Business Education – How to implement innovative digital pedagogical practices?

Presenting Author: Lauri Vaara, University of Helsinki, Finland

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Session E 25

30 August 2017 12:00 - 13:30

Main Building A - A31

Workshop

Motivational, Social and Affective Processes

Positive pedagogy as a tool in the digital communication between teachers and custodians

Keywords: Mixed-method research, Motivation, Primary education, Values education

Interest group: SIG 08 - Motivation and Emotion

Chairperson: Katrien Cuyvers, University of Antwerp, Belgium

Keywords: Mixed-method research, Primary school, Values education, Social interaction This paper describes a positive pedagogy intervention in 7 primary school classrooms. The main focus is on teaching character strengths and highlight the positive and supportive communication between teachers and custodians. The Finnish educational reform of the national curriculum 2016 highlights the importance of active and positive collaboration between schools and custodians in order to support students. Positive communication is a key to co-operation with schools and families (Barge & Loges, 2003; Martin & Hagan-Burke, 2002). Schools and families should build trust, equality and mutual respect between one another in order to help students in the best possible way (Kumpulainen et al., 2014). Both, parents and teachers identify trust as a vital component of effective family-school relationship (Dunst, Johanson, Rounds, Trivette, & Hamby, 1992) and effective communication is the requirement for building trust (Adams & Christenson, 2000). According to new curriculum, schools should also confirm the capability of students by recognizing and using their strengths (Finnish National core curriculum 2014). Highlighting and communicating about strengths also creates a solid base in the collaboration between schools and

parents (Sointu, 2014).

Positive pedagogy as a tool in the digital communication between teachers and custodians

Presenting Author: Anne-Mari Kuusimäki, University of Helsinki, Finland; **Co-Author:** Lotta Uusitalo-Malmivaara, University of Helsinki, Finland

Keywords: Mixed-method research, Primary school, Values education, Social interaction This paper describes a positive pedagogy intervention in 7 primary school classrooms. The main focus is on teaching character strengths and highlight the positive and supportive communication between teachers and custodians. The Finnish educational reform of the national curriculum 2016 highlights the importance of active and positive collaboration between schools and custodians in order to support students. Positive communication is a key to co-operation with schools and families (Barge & Loges, 2003; Martin & Hagan-Burke, 2002). Schools and families should build trust, equality and mutual respect between one another in order to help students in the best possible way (Kumpulainen et al., 2014). Both, parents and teachers identify trust as a vital component of effective family-school relationship (Dunst, Johanson, Rounds, Trivette, & Hamby, 1992) and effective communication is the requirement for building trust (Adams & Christenson, 2000). According to new curriculum, schools should also confirm the capability of students by recognizing and using their strengths (Finnish National core curriculum 2014). Highlighting and communicating about strengths also creates a solid base in the collaboration between schools and parents (Sointu, 2014).

Session E 26

30 August 2017 12:00 - 13:30

Main Building E - E350

Workshop

Learning and Instructional Technology

Quality of MOOCs: Results of research surveys and discussion of MOOC Quality Reference Framework

Keywords: E-learning / Online learning, Informal learning, Learning Technologies, Survey Research

Interest group: SIG 07 - Learning and Instruction with Computers

Chairperson: Brigitte Rollett, University of Vienna, Austria

This interactive workshop addresses the quality of Massive Open Online Courses (MOOCs) and is organized by MOOQ, the European Alliance for Quality of MOOCs. Main goals of the interactive MOOQ workshop are: (1) the discussion of the results from the four online surveys, and (2) the presentation and discussion of the Quality Reference Framework (QRF) for MOOCs based on extensive desktop research and literature reviews and the results from the online surveys with four groups of target audiences: MOOC learners, designers, implementers, and providers.

Leading question is: How can the findings from the four online surveys and the new QRF improve future MOOCs? The interactive workshop of 90 minutes combines different methods: In the first short part, the results of the four online surveys are presented and discussed in a question-and-answer session. In the second part (60 minutes), the QRF developed by MOOQ is briefly introduced and afterwards debated in detail in an Interactive World Cafe: All quality dimensions and their indicators are investigated how they fit and contribute to improve the quality of MOOCs for learners, designers, providers and decision makers. The results from the small groups on quality dimensions are presented and integrated in plenary. Finally, next steps towards future collaboration and activities are explored by all participants.

Intended audiences are all experts, practitioners and novices sharing interest in Open Education and the quality of MOOCs: Contributions by conference participants as well as by online participants commenting via twitter are most welcome and encouraged.

Quality of MOOCs: Results of research surveys and discussion of MOOC Quality Reference Framework

Presenting Author: Christian M. Stracke, Open University of the Netherlands, Netherlands

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KEYNOTES - PART 1 1

30 August 2017 13:45 - 15:15

Tampere Hall - Small Auditorium

EARLI Keynote Session

Learning and Instructional Technology

The Power of Learning Analytics: Is There Still a Need for Educational Research?

Keywords: E-learning / Online learning, Educational Technology, Learning analytics, Quantitative methods

Interest group: SIG 27 - Online Measures of Learning Processes

Chairperson: Eleni Kyza, Cyprus University of Technology, Cyprus

Across the globe many institutions and organisations have high hopes that learning analytics can play a major role in helping their organisations remain fit-for-purpose, flexible, and innovative. A broad goal of learning analytics is to apply the outcomes of analysing data gathered by monitoring and measuring the learning process. Learning analytics applications in education are expected to provide institutions with opportunities to support learner progression, but more importantly provide personalised, rich learning on a large scale. Substantial progress in learning analytics research has been made in the last few years. Researchers in learning analytics use a range of advanced computational techniques (e.g., Bayesian modelling, cluster analysis, natural language processing, machine learning) for predicting which learners are likely to fail or succeed, and how to provide appropriate support in a flexible and adaptive manner.

In this keynote, I will argue that unless educational researchers at EARLI embrace some of the key principles, methods, and approaches of learning analytics, educational researchers may be left behind. In particular, a main merit of learning analytics is linking large datasets of actual learning processes and outcomes with learning dispositions and learner characteristics. Using evidence-based approaches rapid insights and advancements are developed how learning designs and learning processes can be optimised to maximise the potential of each learner. For example, our recent research with 151 modules and 133K students at the Open University UK indicates that learning design has a strong impact on student behaviour, satisfaction, and performance. Learning analytics can also drive learning in more “traditional”, face-to-face contexts. For example, by measuring emotions, epistemological expressions, and cross-cultural dialogue, social interactions can be effectively supported by innovative dashboards and adaptive approaches. I aim to unpack the advantages and limitations of learning analytics and how EARLI researchers can embrace such data-driven research approaches.

The Power of Learning Analytics: Is There Still a Need for Educational Research?

Presenting Author: Bart Rienties, Open University, United Kingdom

Across the globe many institutions and organisations have high hopes that learning analytics can play a major role in helping their organisations remain fit-for-purpose, flexible, and innovative. A broad goal of learning analytics is to apply the outcomes of analysing data gathered by monitoring and measuring the learning process. Learning analytics applications in education are expected to provide institutions with opportunities to support learner progression, but more importantly provide personalised, rich learning on a large scale. Substantial progress in learning analytics research has been made in the last few years. Researchers in learning analytics use a range of advanced computational techniques (e.g., Bayesian modelling, cluster analysis, natural language processing, machine learning) for predicting which learners are likely to fail or succeed, and how to provide appropriate support in a flexible and adaptive manner.

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KEYNOTES - PART 1 2

30 August 2017 13:45 - 15:15

Tampere Hall - Big Auditorium

EARLI Keynote Session

Educational Policy and Systems

Evidence-based Education and the Role of Teacher Education

Keywords: Educational policy, Quantitative methods, School effectiveness, Teacher Effectiveness

Interest group: SIG 11 - Teaching and Teacher Education

Chairperson: Daniel Muijs, University of Southampton, United Kingdom

During the last decades, educational policy has turned towards evidence-based decisions. Evidence helps to identify problems early, serves as a basis for planning, gives feedback on developments or justifies programmes. Educational policy also follows with interest what research is finding out, e. g. about conditions of successful schooling. Even when researchers conclude that the quality of teaching is more important than the quality of school structures, politicians may get convinced. Consequently, they suppose that scientific evidence could help to improve educational practice. This hope is still shared by teachers who may want to know e.g. how to cope with the increasing diversity in their classrooms. What are implications of these observations? First of all, it seems that fundamental debates on evidence-based education have become obsolete. Nevertheless, we still have to discuss approaches and methods for synthesizing findings. And we have to continue and intensify research on “what works” in education. Before this background my presentation will focus consequences of the shift towards evidence-based education for teacher training. Teacher education can play a key role for the successful implementation of evidence-based education; but strategies are needed to address these new challenges. In order to discuss such strategies, possible functions of teacher education for evidence-based education should be differentiated. Teacher education could be adjudicated e.g. the function of a filter (critical analysis of evidence), the responsibility of qualifying teachers in initial teacher training as well as across their career, the task of implementing evidence (in materials, tools, technologies). Last but not least, teacher education has to take care that teachers learn to decide responsible-minded and in line with professional standards of a goal- and value-oriented education. Based on that, some specific challenges shall be addressed in the end: Teacher education has to develop competence in target- group-specific science communication. And could teacher education benefit from approaches of translational research?

Evidence-based Education and the Role of Teacher Education

Presenting Author: Manfred Prenzel, Technical University of Munich (TUM), Germany

During the last decades, educational policy has turned towards evidence-based decisions. Evidence helps to identify problems early, serves as a basis for planning, gives feedback on developments or justifies programmes. Educational policy also follows with interest what research is finding out, e. g. about conditions of successful schooling. Even when researchers conclude that the quality of teaching is more important than the quality of school structures, politicians may get convinced. Consequently, they suppose that scientific evidence could help to improve educational practice. This hope is still shared by teachers who may want to know e.g. how to cope with the increasing diversity in their classrooms. What are implications of these observations? First of all, it seems that fundamental debates on evidence-based education have become obsolete. Nevertheless, we still have to discuss approaches and methods for synthesizing findings. And we have to continue and intensify research on “what works” in education. Before this background my presentation will focus consequences of the shift towards evidence-based education for teacher training. Teacher education can play a key role for the successful implementation of evidence-based education; but strategies are needed to address these new challenges. In order to discuss such strategies, possible functions of teacher education for evidence-based education should be differentiated. Teacher education could be adjudicated e.g. the function of a filter (critical analysis of evidence), the responsibility of qualifying teachers in initial teacher training as well as across their career, the task of implementing evidence (in materials, tools, technologies). Last but not least, teacher education has to take care that teachers learn to decide responsible-minded and in line with professional standards of a goal- and value-oriented education. Based on that, some specific challenges shall be addressed in the end: Teacher education has to develop competence in target- group-specific science communication. And could teacher education benefit from approaches of translational research?

KEYNOTES - PART 1 3

30 August 2017 13:45 - 15:15

Main Building A - Main Auditorium

EARLI Keynote Session

Cognitive Science

Eye Follow You: Effects of Gaze Cues on Learning

Keywords: Educational Psychology, Educational Technology, Instructional design, Multimedia learning

Interest group: SIG 27 - Online Measures of Learning Processes

Chairperson: Hans Gruber, University of Regensburg, Germany

In this keynote I will present the findings from a five-year research project about the effects of gaze cues on learning (funded by a NWO Vidi grant – what’s in a name).

Other people’s faces, and especially their eyes, are real attention magnets. Eyes quickly and automatically capture our attention, and this mechanism presumably evolved because eye gaze provides us with very powerful social cues that help us understand the intentions of others.

In this project, we investigate whether we can use gaze cues to improve learning from video modeling examples, in which

a model (instructor) demonstrates and explains how to perform a task.

I will discuss research on the effects of both direct gaze cues (i.e., the model's eyes/head turn towards the task) and indirect gaze cues on attention and learning. Indirect gaze cues are created by recording the model's eye movements and displaying them as, for instance, circles or dots overlaid on the video.

Both types of gaze cues are expected to help synchronize the students' with the model's attention, which should help students follow the model's explanation. Therefore, this 'joint attention' is expected to enhance students' learning from video modeling examples—at least under conditions in which the explanation would otherwise remain unclear.

Last but not least, I will present studies on how gaze displays are interpreted. We may be naturally attuned to direct gaze, but can we correctly infer the intentions and thoughts of others from a moving circle or dot? Come and see for yourself!

Eye Follow You: Effects of Gaze Cues on Learning

Presenting Author: Tamara Van Gog, Utrecht University, Netherlands

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Session F 1

30 August 2017 15:45 - 17:15

Main Building A - A3

Single Paper

Higher Education

Higher Education

Keywords: Achievement, Assessment methods and tools, Cognitive skills, Competencies, Content analysis, Higher education, Instructional design, Quantitative methods, Reflection, Student learning, Survey Research, Synergies between learning - teaching and research

Interest group: SIG 04 - Higher Education

Chairperson: Lotta Uusitalo-Malmivaara, University of Helsinki, Finland

Non-cognitive skills as admission criteria for university: A systematic review

Keywords: Achievement, Assessment methods and tools, Cognitive skills, Higher education

Presenting Author: Tine Nielsen, University of Copenhagen, Denmark; **Co-Author:** Ida Sophie Friderichsen, University of Copenhagen, Denmark

The aim of this review was to explore which non-cognitive skills (NCS) are used as alternative admission criteria (AAC) to higher education, that is alternative to grade point average, and the benefits of using NCS for this purpose. A systematic search of the databases REX, PsycINFO, ERIC and Google Scholar resulted in a pool of 809 studies. A screening according to five inclusion criteria resulted in a final number of 46 studies investigating 9 different readily defined NCS as AAC and a further 11 different NCS-like AAC. Analyses showed that NCS in most studies were able to predict academic performance at university and that NCS had an attrition protective effect resulting in fewer students dropping out. The NCS and NCS-like AAC that predicted academic performance at university the best were found to be self-efficacy and admission interviews. The NCS and NCS-like AAC that most strongly predicted attrition at university were found to be personality traits and a secondary quota procedure with diverse content. The findings of this review emphasize why it is important to study NCS as admission criteria within a higher educational context. Thus, using NCS as a sole admission procedure or in combination with cognitive measures holds promise both research-wise and in relation to student performance and

attrition. Keywords: Review, non-cognitive skills, admission criteria, higher education, academic success, dropout

The R-Comp - A New Instrument to Assess University Students' Research Competences

Keywords: Competencies, Higher education, Quantitative methods, Synergies between learning - teaching and research

Presenting Author: Franziska Boettcher, Freie Universität Berlin, Germany; **Co-Author:** Felicitas Thiel, Freie Universität Berlin, Germany

University students' research competences can be encouraged by *research oriented teaching*. The purpose of this study is to introduce a valid instrument for the evaluation of *research oriented teaching* in higher education in various academic disciplines. This new instrument (*R-Comp*) has been developed on the basis of the *RMRC-K-model* (Authors, 2014) consisting of five dimensions: skills in reviewing the state of research, *methodological skills*, skills in reflecting on research findings, communication skills, and content knowledge. In order to examine the underlying factor structure of the R-Comp, factorial validation was performed. Data were collected from 391 university students in their Bachelor's or Master's degree and PhD programs from various academic disciplines. Results of confirmatory factor analyses showed first evidence for the instrument's intended factor structure. Sub-dimensions could be identified for all dimensions. There is some first evidence of a valid assessment of student research competences on the basis of a generic competence model. Future directions as well as potential application contexts are presented.

Development and validation of the Reflection in Business Education Questionnaire (RIBEQ)

Keywords: Higher education, Reflection, Student learning, Survey Research

Presenting Author: Luci Gommers, University of St.Gallen, Switzerland; **Co-Author:** Tobias Jenert, University of St.Gallen, Switzerland; **Co-Author:** Taiga Brahm, University of Tübingen, Germany; **Co-Author:** Dietrich Wagner, University of St.Gallen, Switzerland

Student reflection is considered both a crucial feature of high-quality learning as well as an important objective in Higher Education. Despite its apparent relevance for educational practice, most of the research on reflection remains at a conceptual level (Boud & Walker, 1998; Mann, Gordon & MacLeod, 2007), whilst empirical research mainly focuses on measuring students' reflection levels. There is little empirical evidence going beyond case studies and qualitative accounts, regarding the effectiveness of specific interventions (e.g. portfolios) to develop reflective skills. Thus, the purpose of this research was to develop and validate an instrument for measuring student reflection in Higher Education in general and business schools in particular. The questionnaire is designed to measure students' reflection in three dimensions: students' reflection levels, their attitudes towards reflection, and supporting and hindering factors influencing students' reflection processes. A pre-test was conducted at two different universities in Switzerland and Germany to validate the Reflection in Business Education Questionnaire (RIBEQ). In total, 64 students filled in the survey. Exploratory factor analyses and reliability tests showed satisfactory psychometric qualities of the RIBEQ. This study can support further research on student reflection and its development. Also, the questionnaire can be used as a diagnostic instrument for business schools to trace students' development over time. From a practical point of view, it can also be applied to identify supporting and hindering factors at a particular higher education institution in order to develop practical interventions targeting these factors.

Key situations in service learning initiating reflection on civic engagement

Keywords: Content analysis, Higher education, Instructional design, Reflection

Presenting Author: Karl-Heinz Gerholz, University of Bamberg, Germany; **Co-Author:** Silvia Leicht, University of Bamberg, Germany; **Co-Author:** Andreas Rausch, University of Mannheim, Germany

Service learning can be described as an educational tool that is characterised by students giving service to the community and having a learning experience. Previous research has shown that service learning has the potential to promote personality development, especially in the sense of a sensitization for civic engagement. However, the findings of the empirical studies are ambiguous. While some findings show that service learning can foster an understanding of social issues and attitude to be engaged, others revealed no such effect. The reason for these inconsistent findings could be related to the applied method. The considered studies have focused more on in a retrospective manner rather than on a process-oriented approach. In order to get a deeper understanding of the parameters relevant for sensitization, focusing on the process is very promising. Through a service learning course, the students may be confronted with social issues in different ways with different persons at different places. The aim of the present study is therefore to identify key situations and experiences that initiate thinking about civic engagement as a basis for sensitization. First results indicate that there are two main kinds of situations that initiate the reflection on civic engagement – social interaction and problem solving activities.

Session F 2

30 August 2017 15:45 - 17:15

Linna - K103

Single Paper

Teaching and Teacher Education

Teacher Education

Keywords: Argumentation, Collaborative Learning, Content analysis, Conversation / Discourse analysis, Higher education, In-service teacher education, Lifelong learning, Pre-service teacher education, Problem solving, Qualitative methods, Quantitative methods, Self-efficacy, Teacher Professional Development, Teaching / instruction, Teaching approaches

Interest group: SIG 11 - Teaching and Teacher Education

Chairperson: Merel van der Wal, Radboud University Nijmegen, Netherlands

Teacher resilience in adverse contexts: Issues of professionalism and professional identity

Keywords: In-service teacher education, Teacher Professional Development, Teaching approaches, Lifelong learning

Presenting Author: Maria A. Flores, University of Minho, Portugal

Over the last fifteen years or so, resilience has emerged as a field of research, not only in countries that experience high rates of attrition, but also in contexts in which the teaching profession has gone through policy and social changing circumstances affecting its social and economic status. This paper presents data from a wider funded research project aimed at examining existing conditions for teacher leadership and professional development in challenging circumstances. A mixed-method research design was devised. The project included a national survey in which 2702 teachers participated (phase I); semi-structured interviews to principals in 11 schools located in different regions of the country; focus group to 99 teachers and focus group to 108 students (phase II) and a professional development programme in 5 schools located in northern Portugal, in which 66 teachers participated (phase III). Findings highlight teachers' strong professional values, their sense of professionalism and their capacity for resisting and for being resilient (despite negative policy environment) as well as their sense of identity as teachers emerged from the data in explaining teacher resilience. The relational and affective dimension of teaching was highlighted in teachers' accounts and it was of paramount importance as a key source of motivation (despite the external factors leading to lack of motivation such as lack of career prospects, salary cuts, worsening of working conditions and unemployment), resilience and hope in teaching.

“Better ask critically...” – A training in critical argumentation for pre-service teachers.

Keywords: Argumentation, Collaborative Learning, Conversation / Discourse analysis, Pre-service teacher education

Presenting Author: Elisabeth Mayweg-Paus, University of Münster, Germany; **Co-Author:** Monja Thiebach, University of Münster, Germany; **Co-Author:** Regina Jucks, WWU Münster, Germany

Critical questioning is crucial for being able to successfully construct knowledge within collaborative argumentation on science-related issues. Regrettably, laypeople often lack the required skills and intrinsic motivation to do so. In a 1 x 2 between-subjects design (training vs. no training), the present study investigated if training the members of a dyad on critical questioning individually promotes their critical questioning behavior in discourse and their subsequent argumentation behavior. Results of content analyses show corresponding beneficial effects of the training. Furthermore, analyses revealed a marginal positive effect of the training on general critical thinking scores. The training also succeeded in ensuring students' intrinsic motivation. Implications for developing further trainings to promote critical argumentation and critical thinking are discussed.

What Factors Predict Teachers' Problem-Solving and Their Seeking of Social Support?

Keywords: Problem solving, Quantitative methods, Self-efficacy, Teaching / instruction

Presenting Author: Stephan Kielblock, Justus Liebig University Giessen / Macquarie University Sydney, Germany;

Presenting Author: Amina Fraij, Justus Liebig University Giessen, Germany; **Co-Author:** Jeremy Monsen, Tri Borough Consortium of Educational Psychologists (ELCEP), United Kingdom; **Co-Author:** Oliver Böhm-Kasper, Bielefeld University, Germany; **Co-Author:** Vanessa Dizinger, Bielefeld University, Germany

Teachers are critical to the delivery of high-quality instruction which facilitates effective pupil learning outcomes. The need for teachers' to be rigorous and systematic as they go about solving real world classroom problems is emphasised in the literature. Other studies stress the importance of the social dimension in supporting effective teacher problem-solving. This study asked what factors impact upon teachers' reported responses to stressful classroom situations: problem-solving and/or seeking social support. A large number of German teachers (n=1783) were surveyed in 2008 as part of a project looking at collaboration and stress. This data was analysed statistically. Results showed that teacher problem-solving is predicted by level of self-efficacy and effectiveness of classroom management, whereas seeking social support is predicted by self-efficacy, gender and years of teaching experience.

Student teachers' beliefs of an ideal teacher training at the university

Keywords: Content analysis, Higher education, Pre-service teacher education, Qualitative methods

Presenting Author: Barbara Moschner, Carl von Ossietzky Universität Oldenburg, Germany; **Co-Author:** Juliane Schlesier, University of Oldenburg, Germany; **Co-Author:** Uta Wagener, University of Oldenburg, Germany; **Co-Author:** Monika Reimer, Carl von Ossietzky Universität Oldenburg, Germany; **Co-Author:** Iris Lüschen, Carl von Ossietzky Universität Oldenburg, Germany

There is hardly any research that addresses the issues of teacher education from the students' perspective. Therefore our study explores ideas of teacher education students in regard to an ideal curriculum and organization of teacher education at the university. The sample consisted of 170 students, aged 20 to 42. 120 students participated in 22 focus groups and 50

students were interviewed. The resulting audio and video data was transcribed and analyzed using the method of content analysis according to Mayring (2015). The summarizing content analysis shows four main categories concerning (1) practical experiences, (2) organizational aspects, (3) study regulations, and (4) suggestions for improvement. The results show, that teacher education students have a strong desire to have more learning experiences directly in the schools. Another key aspect related to an ideal study plan in their opinion was a better organization of the schedule and the modules. Possible consequences of these results are discussed in regard to a better teacher education curriculum.

Session F 3

30 August 2017 15:45 - 17:15

Main Building C - C8

Single Paper

Assessment and Evaluation, Higher Education, Lifelong Learning, Teaching and Teacher Education

Professional Development and Workplace Learning

Keywords: Assessment methods and tools, At-risk students, Collaborative Learning, Communities of learners, Informal learning, Mixed-method research, Quantitative methods, Secondary education, Self-efficacy, Social interaction, Teacher Professional Development, Video analysis, Workplace learning

Interest group: SIG 14 - Learning and Professional Development

Chairperson: Marc Stadtler, University of Münster, Germany

Video-based comparative judgement as a method to measure teachers' professional vision

Keywords: Assessment methods and tools, Secondary education, Teacher Professional Development, Video analysis

Presenting Author: Iris Roose, Ghent University, Belgium; **Co-Author:** Piet Van Avermaet, Ghent University, Belgium; **Co-Author:** Wendelien Vantieghem, Vrije Universiteit Brussel (VUB), Belgium; **Co-Author:** Ruben Vanderlinde, Ghent University, Belgium

Professional vision has been identified as an important element of teacher expertise (Sherin & Van Es, 2009). Professional vision is defined as teachers' ability to recognize and interpret effective teaching strategies (Stürmer et al., 2013). Researchers have relied extensively on video to study professional vision. However, the method of comparative judgement through video has not yet been applied to study teachers' professional vision in a standardized way. The "POTENTIAL – Power to teach All!" Project is developing a video-based comparative judgement instrument to measure teachers' professional vision of inclusive classrooms in a standardized way. The first part of the paper outlines the development of the video-based comparative judgement instrument. The conceptual model of teachers' professional vision of inclusive classrooms, the method of comparative judgement and the framework for validating the instrument is described. The second part presents two studies as a first step in the validation of the instrument. The first study is an expert study ($n > 45$) to inquire the validity of the content of the videos and investigate whether different types of experts come to a different ranking of the videos. The second study is a pilot with teachers from secondary education ($n > 30$) to provide evidence for the structure of the instrument and the response processes. On the basis of these two studies, further investigation of the use of video-based comparative judgement as a method to study teachers' professional vision is discussed.

On the determinants of (in)formal learning of teachers : A cross-sectional mixed-method study

Keywords: Informal learning, Mixed-method research, Teacher Professional Development, Workplace learning

Presenting Author: Antoine Lecat, Université catholique de Louvain (UCL), Belgium; **Co-Author:** Simon Beausaert, Maastricht University, Netherlands; **Co-Author:** Isabel Raemdonck, Université Catholique de Louvain, Belgium

Are our teachers able to keep up with changing insights and knowledge within their domain, are they ready for innovative didactical approaches and technological innovations? According to Dirk van Damme, The Head of the Centre for Educational Research and Innovation (CERI) of the OECD (2014) teachers in Europe do not show sufficient expertise to cope with these challenges. In other words, they have to learn to become better teachers. Given the dynamic environment of schools, investment in human capital is crucial and implies a strategic approach of supporting teachers' continuous professional development. The professional development is both formal and informal in nature, and research on teachers' informal learning is more limited (Hoekstra, Brekelmans et al., 2009). However, various studies suggest that informal learning is the most used type of learning in the workplace (e.g. Hicks, Bagg, Doyle & Young, 2007; Skule & Reichbron, 2002). This study will investigate the teachers' (in)formal learning. Questionnaires will examine relations between teachers' learnings and their antecedents (e.g. perceived job security, learning climate, teachers' experience). Furthermore, interviews will examine the reason of these relations between the variables under study. A special focus will be placed on the characteristics of informal learning through different examples.

Examining teacher self-efficacy in the context of Lesson Study practice

Keywords: Collaborative Learning, Communities of learners, Self-efficacy, Teacher Professional Development

Presenting Author: Tijmen Schipper, Windesheim University of Applied Sciences, Netherlands; **Co-Author:** Olli-Pekka Malinen, Niilo Mäki Institute, Finland; **Co-Author:** Sui Lin Goei, VU University Amsterdam, Netherlands; **Co-Author:** Siebrich De Vries, University of Groningen, Netherlands; **Co-Author:** Klaas van Veen, University of Groningen, Netherlands

This study uses a quasi-experimental design to examine whether teachers' self-efficacy levels increase as a result of

participating in Lesson Study (LS), which is a collaborative classroom- and inquiry-based professional development approach. Assuming that LS supports teachers to focus explicitly on students' learning, Bandura's theory was used to determine whether teachers feel more efficacious to execute teacher behavior related to student engagement, instructional strategies and classroom management. Given a relatively small research sample of 64 secondary school teachers and an unequal distribution of teachers in the experimental (N=44) and comparison group (N=20), non-parametric tests were used to detect differences between these groups. The intervention consisted of two Lesson Study cycles in one academic year and the overarching aim of all Lesson Study teams was to increase differentiated classroom behavior. A significant increase of teacher self-efficacy in terms of student engagement and instructional strategies was found in the Lesson Study group as opposed to no significant differences in the comparison group. This study on teacher self-efficacy adds to the growing body of mainly qualitative literature on the outcomes of Lesson Study.

Relationships between patterns of risk and success concerning the transition into labour market

Keywords: At-risk students, Quantitative methods, Social interaction, Workplace learning

Presenting Author:Anja Gebhardt, University of Teacher Education St.Gallen, Switzerland; **Co-Author:**Chantal Kamm, University of Zurich, Switzerland; **Co-Author:**Christian Bruehwiler, University of Teacher Education St.Gallen, Switzerland; **Co-Author:**Philipp Gonon, Institut für Erziehungswissenschaft, UZH, Switzerland; **Co-Author:**Stefanie Dernbach, University of Zurich, Switzerland

Referring to the high biographical and societal importance of successful transitions into the labour market, more research is needed to conduct vocational orientation processes, their underlying opportunities and support systems. This study aims at illuminating relationships between personal, familial, scholar and occupational risk factors and success indicators concerning the second transition. The analyses are based on a mixed sample design (longitudinal sample n=104, special interest sample n=302). Results show that occupational-related factors and the academic achievement at the end of compulsory school are most relevant for the second transition. Latent class analyses were run to identify patterns of risk and success. The analyses show three different success patterns, which based on theoretical and empirical considerations can be named as "average performer", "low performer" and "high performer". Furthermore with regard to various risk and protective support factors three patterns were identified, classifying the youth into groups named "good initial position and good support", "moderate initial position and bad support" and "bad initial position and good support". Based on a combination of risk and success patterns, considerations of optimizing support offers will be discussed in the presentation.

Session F 4

30 August 2017 15:45 - 17:15

Linna - K109

Single Paper

Instructional Design, Motivational, Social and Affective Processes

Conceptual Change

Keywords: Citizenship education, Collaborative Learning, Conceptual change, Content analysis, Emotion and affect, History, Instructional design, Metacognition, Qualitative methods, Reasoning, Social sciences, Teaching / instruction

Interest group: SIG 03 - Conceptual Change

Chairperson: Gyongyver Molnar, University of Szeged, Hungary

Multiple perspectives and narratives of the national past in Dutch school history textbooks

Keywords: Content analysis, History, Qualitative methods, Teaching / instruction

Presenting Author:Marc Kropman, University of Amsterdam, Netherlands; **Co-Author:**Carla Van Boxtel, University of Amsterdam, Netherlands; **Co-Author:**Jannet van Drie, University of Amsterdam, Netherlands

Scholars have discussed the need for textbooks that actively involve students in the construction of representations of the past and contribute to students historical thinking and reasoning ability. Authors of school history textbooks face the dilemma of stimulating historical thinking including the acknowledgement of multiple perspectives and critical examination of historical representations versus providing an overview of basic historical facts and concepts. Our main research question is: To what extent does narratives of the Dutch national past in school history textbooks include multiple perspectives? Two Dutch textbooks were analyzed on: a) The main components of a narrative: historical actors, time, events and developments and causal relations; b) The lexis, metaphors and rhetoric that are used in school history textbooks; c) The perspectives presented (historical sources, spatial frame, historical actors, narrative plots and dimensions of historiography). The two textbooks are in use in the intermediate stream in secondary education preparing for higher professional education. The topic analysed was the Dutch Revolt. Teachers see the Dutch revolt as very suitable for teaching multiple perspectives. Our analysis shows that the perspective taken in both textbooks is political. The focus is on political power, freedom of religion, taxes and government. The inclusion of multiple perspectives is absent in the narratives of the Dutch past. This study shows that even in a context in which multiperspectivity is emphasized as part of developing historical thinking skills and in which teachers believe it is easy to include multiple perspectives, multiple perspectives are not included in the textbooks.

Making history relevant: learning about the history of democracy through challenging group tasks

Keywords: Collaborative Learning, History, Instructional design, Metacognition

Presenting Author:Carla Van Boxtel, University of Amsterdam, Netherlands; **Co-Author:**Jaap Schuitema, University of Amsterdam, Netherlands

Teaching about the history of democracy contributes to students' ability to discuss fundamental questions about democracy and the insight that democracy is never a finished project. However, motivating students to engage in reasoning about the history of democracy can be challenging for teachers. This study investigated the potential of enriching a regular lesson unit in Dutch upper pre-university education with group tasks that aim to make history relevant and engage students in historical reasoning. We developed five design principles for group tasks: 1) Focus on substantive concepts that are part of the history curriculum; 2) Use open-ended problems or inquiry questions; 3) Make history content relevant; 4) Provide little structure, and 5) Ask for a common product. A quasi-experimental study with pre- and post test was conducted to investigate the effects. In the experimental condition (306 students, 14 classes), two-third of the textbook assignments were replaced by seven group tasks developed according to the design principles. In a case study we examined the quality of the collaborative learning process of one of the groups. Multilevel analyses showed that students in the experimental condition scored significantly higher on the post-test than students in the control group. Analysis of the interaction during three group tasks showed that the students engaged in collaborative historical reasoning and were able to regulate their work. History teachers can use the design principles to develop tasks that provide a motivating context for historical inquiry and the appropriation of concepts and insights important for participation in democratic societies.

How much politics is there? Students' understandings of the role of values in political science

Keywords: Conceptual change, Emotion and affect, Social sciences, Teaching / instruction

Presenting Author:Linda Ekström, Luleå University of Technology, Sweden; **Co-Author:**Cecilia Lundholm, Stockholm University, Sweden

One of the specific characteristics of the political science subject is the inherent existence of values. This characteristic poses a range of challenges for everyone involved in political science teaching. However, there seems to be a lack of interest on how this affects teaching political science as well as a lack of interest in how students experience this situation. In this paper we report on a study investigating how values within the discipline constitutes a learning dilemma for students with first semester under graduates. The results show how students oscillate between different ways of making sense of perceived existence of values in teaching, and use different - equally unproductive - strategies to handle the dilemma. These findings are important for advancing our understanding of learning political science, and in particular, in identifying specific learning challenges in this domain. By conducting empirical research in this area, the study also contributes to a wider discussion on the scholarship of teaching and learning political science (Craig 2014) in a fruitful way.

Students as political animals: Exploring understanding of politics in social science education

Keywords: Citizenship education, Conceptual change, Reasoning, Social sciences

Presenting Author:Cecilia Lundholm, Stockholm University, Sweden; **Co-Author:**Johan Sandahl, Stockholm University, Sweden

School subjects such as social science have versatile goals that can be described as internal and external. The internal goals are closely connected to the academic disciplines and the external goals are formulated by the political sphere and includes, among other things, the democratic values society wants students to be incorporated in as well as students engagement in public deliberation. These different goals can give birth to dilemmas for both teachers and students when they engage in highly political topics. In educational research these challenges have been discussed as epistemic cognition, motivated reasoning and conceptual change but correspond mainly to internal goals of school subjects. In order to understand the structures of the dilemmas this paper focuses on students' understanding prior to teaching and how they reason about different political views on the welfare state. The data consists of written responses, year 10 students, on two different accounts of the good welfare state, one liberal and one social democratic. The data was used to identify possible thresholds in students' analytical frames of reference, and normative reasoning. Even though several students recognise ideological ideas, few students approached the topic from a social science perspective, distinguishing facts from opinions. One key issue, possibly a threshold, is that students fail to recognise the difference between 'politics' and 'the study of politics'. The study contributes to the understanding of the influence of normativity on students' thinking and is an attempt to bridge the dilemma of combining internal and external goals of teaching and learning.

Session F 5

30 August 2017 15:45 - 17:15

Pinni B - B0039

Single Paper

Learning and Social Interaction, Teaching and Teacher Education

Social Interaction in Learning and Instruction - D

Keywords: Achievement, Collaborative Learning, Educational attainment, Educational Psychology, Learning and developmental difficulties, Mixed-method research, Primary education, Quantitative methods, Self-efficacy, Social interaction, Teaching / instruction, Video analysis

Interest group: SIG 10 - Social Interaction in Learning and Instruction

Chairperson: Jenefer Husman, University of Oregon, United States

The association between educational dialogue and academic performance

Keywords: Collaborative Learning, Mixed-method research, Primary education, Social interaction

Presenting Author:Heli Muhonen, University of Jyväskylä, Finland; **Co-Author:**Eija Pakarinen, University of Jyväskylä, Finland; **Co-Author:**Helena Rasku-Puttonen, University of Jyväskylä, Finland; **Co-Author:**Anna-Maija Poikkeus, University of Jyväskylä, Finland; **Co-Author:**Marja-Kristiina Lerkkanen, University of Jyväskylä, Finland

The association between educational dialogue and academic performance

Heli Muhonen, Eija Pakarinen, Helena Rasku-Puttonen, Anna-Maija Poikkeus, Marja-Kristiina LerkkanenUniversity of Jyväskylä

AbstractEducational dialogue is regarded as crucial for students' learning (e.g., Alexander, 2000; Mercer, 2008) but only few studies have provided clear evidence of specific learning gains associated with it. There is a need for empirical evidence on the benefits of educational dialogue to student outcomes. The aim of the study was to examine to what extent is educational dialogue associated with students' performance in academic subjects. We recorded 155 Grade 6 lessons from 46 classrooms and identified the level of the quality of dialogue and feedback from the video-recordings using the CLASS-S. The association between the quality of educational dialogue and students' grades in academic subjects were analysed using multilevel modelling. Educational dialogue was positively associated with students' grades in language arts and physics/chemistry when students' gender, parents' educational background and teacher's work experience were controlled for. In order to describe what the educational dialogues are like, language arts and physics/chemistry lessons were qualitatively analysed. Transcribed lessons were read through several times to ensure the dialogic interaction and to identify the episodes of educational dialogue. Several educational dialogues were identified relying on Alexander's (2006) five principles of dialogic teaching. The findings suggest that students' learning might benefit from educational dialogue. The results of this study are in high importance since there are only very limited previous evidence about the association between educational dialogue and students' academic performance.

School achievement: Does social behavior matter?

Keywords: Achievement, Educational attainment, Learning and developmental difficulties, Social interaction

Presenting Author:Julia Becherer, University of Kiel, Germany; **Co-Author:**Olaf Koeller, Leibniz Institute for Science and Mathematics Education, Germany; **Co-Author:**Friederike Zimmermann, University of Kiel, Germany

Prior research gives evidence to suggest that dissocial behavior and prosocial behavior are related to school achievement. Little is known, however, about the incremental contribution of social behavior to school achievement over and above known predictors and for different measures of achievement such as school grades or standardized tests. Therefore, the purpose of this study was to examine whether adolescent student's dissocial and prosocial behavior influences school achievement as assessed by school grades and standardized achievement tests in mathematics and German while controlling for prior achievement, intelligence, and motivational variables. Altogether four subsamples of 7th and 9th graders with a total *N* of 4410 were investigated. Structural equation modeling consistently revealed in all subsamples that dissocial behavior and prosocial behavior incrementally contributed to school grades in mathematics and German over and above the known predictors. Effects of social behavior on test scores in German occurred only in one subsample of 7th graders, whereas test scores in mathematics were consistently related to dissocial behavior in all four subsamples. Overall, the results strongly support the relevance of investigations into the relationships between dissocial and prosocial behavior and school achievement.

Interpersonal adaptation in teacher-student interaction

Keywords: Educational Psychology, Quantitative methods, Social interaction, Video analysis

Presenting Author:Heleen Pennings, Utrecht University, Netherlands; **Co-Author:**Mieke Brekelmans, Utrecht University, Netherlands; **Co-Author:**Jan van Tartwijk, Utrecht University, Netherlands

We investigated how teachers' and students' interpersonal behaviour patterns unfold and adapt to each other over time, during the lesson start. Using a continuous coding approach, observers rated moment-to-moment levels of Agency and Communion in teacher and student behaviour during the first 10 minutes of a lesson in 35 classrooms. Based on the resulting time-series data we derived several indicators of interpersonal adaptation (e.g., entrainment of linear trends, synchronicity of rhythmic qualities). We examined to what degree the principle of interpersonal complementarity of interaction between people (sameness for Communion, oppositeness for Agency) applies to teacher-student interaction and how the specific professional role and status of the teacher would affect this. Our expectations of interpersonal adaptation were basically confirmed in the present study. In most of the 35 classrooms, teacher and student behaviour during the lesson start was consistent with the overall principle of interpersonal complementarity. The results were also in line with expectations about violations of the general principle, given the professional role of the teacher (e.g., refrainment from hostility). Our exploration of the relation between momentary interpersonal dynamics and long-term teacher interpersonal style supported our conjecture that attention to micro-processes in classrooms (e.g., pattern of variability, anticipation of behaviour) adds to outcome-oriented, macro-level investigations of teacher-student interaction.

The Link Between Teacher Self-Efficacy and Student Achievement Depends on Teachers' Perspective

Keywords: Achievement, Educational Psychology, Self-efficacy, Teaching / instruction

Presenting Author:Marjolein Zee, University of Amsterdam, Netherlands; **Co-Author:**Peter de Jong, University of Amsterdam, Netherlands; **Co-Author:**Helma M. Y. Koomen, University of Amsterdam, Netherlands

The present study sought to explore the extent to which students' reading and math achievement are predicted by teachers' self-efficacy toward individual students (i.e., student-specific TSE) and toward the classroom (i.e., both general and aggregated student-specific TSE). General and student-specific TSE scales and standardized achievement tests were administered among a sample of 360 fourth-to-sixth grade students and 49 teachers from 19 regular elementary schools across the Netherlands. Multilevel structural equation modeling was used to test for direct relationships. Results indicated that neither students' reading achievement, nor their mathematics performance was predicted by their teachers' general TSE, after accounting for students' background characteristics. These findings held regardless of whether the general or aggregated TSE measure was used. In contrast, moderate positive associations were noted between student-specific TSE and both measures of academic achievement. The results of this study seem to support the assumption that the association of teachers' self-efficacy with students' reading and math achievement depends on teachers' perspective.

Session F 6

30 August 2017 15:45 - 17:15

Pinni B - B3111

Single Paper

Assessment and Evaluation, Developmental Aspects of Instruction, Learning and Instructional Technology

Educational Effectiveness and Teaching

Keywords: Instructional design, Learning and developmental difficulties, Literacy, Mathematics, Misconceptions, Primary education, Reading comprehension, Secondary data analysis, Student learning, Teacher Effectiveness, Teacher Professional Development, Teaching / instruction, Writing / Literacy

Interest group: SIG 18 - Educational Effectiveness

Chairperson: Floris van Blankenstein, Leiden University, Netherlands

Effects of Meaning-Focused Instruction on Reading Comprehension in Grade 1 in Estonia and Finland

Keywords: Literacy, Primary education, Reading comprehension, Teaching / instruction

Presenting Author:Jenni Ruotsalainen, University of Jyväskylä, Finland; **Co-Author:**Piret Soodla, Tallinn University, Estonia; **Co-Author:**Anna-Maija Poikkeus, University of Jyväskylä, Finland; **Co-Author:**Marja-Kristiina Lerkkanen, University of Jyväskylä, Finland

Children differ in their pre-skills in literacy reading which sets a challenge for reading instruction at school entry. Practices in early primary years' literacy instruction can be divided into code-focused and meaning-focused activities (e.g. Connor et al., 2009) which need to be balanced to match children's reading skill development. In the present study audiotapes from grade 1 literacy lessons in Estonia and Finland were coded with respect to amount of meaning-focused (MF) instruction during the lessons. The aim was to examine the effects of the amount of MF instruction on children's reading comprehension when children's concurrent reading fluency (RF) was taken into account. In Estonia children differed in their reading comprehension based on their reading fluency. In Finland the least fluent readers had the lowest reading comprehension scores whereas the average readers had similar reading comprehension results as the most fluent readers. Reading comprehension scores were especially poor among Finnish children in the low-RF group who attended high-MF lessons, and they benefitted most if they attended average-MF lessons. Increases in MF instruction had a positive effect on children's reading comprehension among Finnish children who belonged to the average- or high-RF group. No similar effects were found for the Estonian children. The findings suggest that average rather than high amount of meaning-focused instruction contributes to better reading comprehension skills among children in Grade 1.

Utilizing Three Different Lenses to Study Teaching Quality: Do They Lead to Similar Conclusions?

Keywords: Mathematics, Primary education, Teacher Effectiveness, Teacher Professional Development

Presenting Author:Evridiki Kasapi, University of Cyprus, Cyprus; **Presenting Author:**Marina Kenti, University of Cyprus, Cyprus; **Presenting Author:**Kassandra Georgiou Foivou, University of Cyprus, Cyprus; **Co-Author:**Charalambos Charalambous, University of Cyprus, Cyprus

A plethora of research findings during the last four decades attests to the critical role that teachers have for student learning. Not coincidentally then, recent years have seen a rapidly growing number of observation frameworks and instruments, aiming to capture teaching quality and connect it to what students gain from instruction. Despite the systematic scholarly work in this area, it seems that scholars have often worked in silos, focusing on certain instructional aspects and leaving others out—thus, often producing partial delineations of teaching quality. To address this gap, in this study we simultaneously use three different frameworks and observation instruments: one tapping into generic teaching aspects, a second capturing content-specific teaching aspects in Mathematics—the subject matter of interest—and a third one focusing on cognitive demands and exploring the unfolding of tasks in teachers' lessons. Utilizing these three frameworks and instruments as lenses, we analyzed 15 videotaped lessons, given by a convenience sample of five elementary school

teachers (each giving three lessons). Each lesson was analyzed by two independent coders leading to three classifications of the teachers, one for each lens under consideration. By comparing and contrasting these classifications, we noted both notable convergences and divergences of the teaching quality in each teacher's lessons. This, in turn, suggested that the use of only one instrument could lead to a fragmented picture of teaching quality. In discussing our findings, we consider their implications for teacher summative and formative evaluation purposes.

Dealing with mistakes in class – (Interactive) effects on students' achievement and motivation

Keywords: Misconceptions, Secondary data analysis, Student learning, Teaching / instruction

Presenting Author: Julia Käfer, German Institute for International Educational Research, Germany; **Co-Author:** Susanne Kuger, The German Institute for International Educational Research (DIPF), Germany; **Co-Author:** Eckhard Klieme, German Institute for International Educational Research (DIPF), Germany; **Co-Author:** Mareike Kunter, Goethe-Universität Frankfurt, Germany

Making mistakes is a regular phenomenon in everyday classroom settings. Still, there is only little research about how teachers and students deal with mistakes and the consequences for students' cognitive and motivational development. According to social-constructivist learning theories, a supportive way of dealing with students' mistakes enhances learning processes by providing information about misconceptions and giving students the opportunity to learn from (their) mistakes (Hesketh, 1997; Vosniadou & Brewer, 1987). This study analyses how teachers' and students' attitudes and reactions towards mistakes affect two most relevant outcomes of education: student learning and motivation. A second aim is to explore whether the heterogeneity of the student body in the classroom a) influences the teachers and students dealing with mistakes and b) moderates the effects of dealing with mistakes on students' achievement and motivation. The study uses data from the representative German DESI study (DESI-Konsortium, 2008) that assessed student development in English as a foreign language with 4,688 ninth grade students in 426 classrooms in German secondary schools. Doubly latent multilevel structural equation modelling (ML-SEM) reveals that different aspects of students' and teachers' attitudes and reactions towards mistakes in class predict student achievement and motivation in English as a foreign language. Unexpectedly, first results show no interaction effects between the heterogeneity of students and different aspects of dealing with mistakes. These results are particularly important in light of the instructional effectiveness research and provide further empirical evidence on the topic of heterogeneity in classrooms.

Effectiveness of Feedback in a Repeated Spelling Training

Keywords: Instructional design, Learning and developmental difficulties, Primary education, Writing / Literacy

Presenting Author: Sophie Gruhn, Radboud University Nijmegen, Netherlands; **Co-Author:** Eliane Segers, Radboud University Nijmegen / University of Twente, Netherlands; **Co-Author:** Ludo Verhoeven, Radboud University Nijmegen, Netherlands

Effectiveness of feedback on strengthening lexical representations was investigated in a computerized spelling training by contrasting two different feedback conditions with a no feedback condition. Ninety-one Dutch fifth and sixth graders practiced spelling of 40 multisyllabic words with irregular grapheme-phoneme correspondence in five training sessions within maximally two weeks. In the two feedback conditions, participants were asked to write the word again, after they have received the correct word form. In the first condition *visual dictation* ($N = 29$), their next spelling attempt was required from memory, whereas participants in the second condition *typing over* ($N = 30$) were asked to copy the word. A control group ($N = 31$) did only receive information about the correctness of their writing attempt. With repeated measures ANOVA's, higher gains in spelling accuracy over time were observed for participants in both feedback conditions compared to participants in the no feedback condition. Already after one training session, feedback in form of visual dictation led to higher gains in spelling accuracy than feedback in form of typing over. Participants in the typing over condition caught up with the visual dictation condition only at the fourth training session. The repeated spelling training generally improved spelling speed of trained words. Transfer to spelling speed and accuracy of untrained words and transfer to reading speed of words trained and not trained in spelling was observed. Repeated spelling can be a relevant method to improve decoding skills and feedback seems to increase the efficiency of spelling instruction.

Session F 7

30 August 2017 15:45 - 17:15

Pinni B - B3107

Symposium

Teaching and Teacher Education

Analyzing teachers' pedagogical content knowledge in economic and business education

Keywords: Competencies, Mixed-method research, Pre-service teacher education, Teacher Professional Development, Vocational education

Interest group: SIG 11 - Teaching and Teacher Education

Chairperson: Juergen Seifried, University of Mannheim, Germany

Discussant: Fien Depaepe, KU LEUVEN, Belgium

Designing and implementing instruction is considered to be the "core business" of teachers and should be the main focus of research on teachers' professional competencies (Baumert et al., 2013, 3). Empirical evidence shows that teachers'

pedagogical content knowledge (PCK) significantly influences student learning (e.g. Ball, Hill & Bass, 2005; Baumert & Kunter, 2013). Despite the growing number of studies on (prospective) teachers' PCK, evidence for teachers in business and economics remains scarce. The symposium combines four papers that analyze PCK of prospective and experienced teachers in business and economic education. Each of the presented studies were implemented in the German-speaking parts of Europe (Germany, Switzerland and Austria), where vocational education and training is of great importance. These three countries provide specific study programs for teachers at vocational schools (e.g. economics and business education). The contributions provide insights into different facets of PCK. In essence, the papers cover (1) teachers' lesson planning activities, (2) explaining skills, (3) handling of students' errors and (4) cognitive activation. While the first two contributions focus on teacher training at university level, paper three and four deal with experienced teachers' PCK. Hence, the symposium provides information on the level of PCK of prospective and experienced business and economic teachers in German speaking countries and links teachers' PCK to various opportunities to learn (OTL). The symposium therefore aims (1) to contribute to closing the research gap concerning this particular domain and (2) to build upon existing findings on the influence of teacher education on PCK.

Development of lesson planning competency of prospective business teachers

Presenting Author: Elisabeth Riebenbauer, University of Graz, Austria; **Co-Author:** Michaela Stock, University of Graz, Austria

The repertoire of a teacher's methodological, content specific and pedagogical content knowledge and skills is expressed in planning and teaching activities. Designing lessons is a core task of teachers and plays a central role in teacher education programs. Empirical findings show that the approach and the quality of the planned lessons are influenced by teaching experience (for business teachers see e.g. Sageder, 1992; Seifried, 2009). While expert teachers are able to predict learners' problems and misconceptions more precisely, "novices' propositional structures for pedagogical content knowledge seem particularly limited" (Borko & Livingston, 1989, 490–491). As a result, novice teachers face problems to decide what kind of learning opportunities their students need and how to determine the method of instruction which will lead to the greatest cognitive activation. However little is known about how planning competencies are developed during the professionalization process and to what extent teacher education enhances lesson planning. Therefore a longitudinal study is conducted to learn more about teaching and learning processes of prospective business teachers (N = 186). The presentation shows results of selected aspects of pedagogical content knowledge (PCK) based on planning activities for accounting lessons of business education master students in Austria.

Prospective teachers' ability to design and provide instructional explanations

Presenting Author: Juergen Seifried, University of Mannheim, Germany; **Co-Author:** Stefanie Findeisen, University of Mannheim, Germany

Teacher education programs at universities play a key role in the development of (prospective) teachers' knowledge. This study examines one central facet of prospective business teachers' pedagogical content knowledge: the knowledge of and the ability to explain subject-matter to students. By combining data from a quantitative test instrument (paper-pencil-test; N = 1,152 teacher candidates) and a qualitative video study using an interactive simulation (N = 48 teacher candidates), we are able to offer multi-perspective insights into prospective teachers' knowledge base and abilities. We find significant correlations between prospective teachers' ability to explain business contents and their content knowledge (CK). Moreover, the results show that prospective teachers struggle with the task of adequately explaining subject-matter. They specifically experience difficulties when it comes to providing examples or graphical representations and their explanations often contain errors. Furthermore, university-based opportunities to learn (OTL) seem to have little effect on prospective teachers' ability to provide explanations. Implications for teacher education programs in business education are discussed.

Teachers' ability to handle students' errors – results from video analyses in accounting classes

Presenting Author: Patricia Köpfer, Goethe-Universität Frankfurt, Germany; **Co-Author:** Eveline Wuttke, Goethe-Universität Frankfurt, Germany; **Co-Author:** Juergen Seifried, University of Mannheim, Germany

Students' errors in the classroom are assumed to contain a high learning potential. However, to enable students to learn from their errors, they need support. Teachers have to be able to diagnose an error and give helpful feedback (*professional error competency*, PEC). Teachers' competency to adequately deal with errors is gaining increasing importance in research on teacher competency. Since errors and therefore PEC are domain-specific, empirical research for different domains is needed. In our field of interest—teacher training in business and economic education—empirical evidence is scarce. We contribute to filling this gap by focussing on PEC in accounting education. In the present study we address two facets of PEC and examine the learning potential of students' errors from teacher and learner perspectives. In order to do this, we videotaped classroom interaction in error situations in commercial vocational schools. In the present proposal, we report first results regarding the theoretical learning potential of students' errors. In further research, we will combine these findings with the results from student knowledge tests and the learners' point of view using interview data. Results will be presented at the conference.

Swiss commercial VET teachers' pedagogical content knowledge

Presenting Author: Doreen Holtsch, University of Zurich, Switzerland; **Co-Author:** Johannes Hartig, German Institute for International Educational Research (DIPF), Germany

Although teachers' pedagogical content knowledge (PCK) is considered crucial for instructional quality and students'

development, little is known about Swiss commercial VET teachers' PCK. In this respect, we were particularly interested in differences in PCK between *Economics and Society* (E&S) teachers with an academically oriented teacher training and those with a more practically oriented training. In order to model and measure teachers' PCK we developed a test covering the facets of 'explaining', 'student (mis-)conceptions' and 'cognitive activation'. During test development, we collected validity evidence from both criterion situations and cognitive interviews. A total of 157 teachers participated in the PCK test which consisted of open-ended and closed-ended items. An analysis of teachers' responses with the aid of a confirmatory factor analysis showed that PCK is a rather multifarious construct. However, there was no difference between the PCK of teachers having followed the academically oriented pathway and those having followed the practically oriented pathway.

Session F 8

30 August 2017 15:45 - 17:15

Virta - 112

Symposium

Teaching and Teacher Education

Teachers' epistemic cognition for professional practice: a focus on reflection and reflexivity

Keywords: Attitudes and beliefs, Pre-service teacher education, Reflection, Social aspects of learning and teaching, Teacher Professional Development, Teaching / instruction

Interest group: SIG 14 - Learning and Professional Development

Chairperson: Jo Lunn Brownlee, Queensland University of Technology, Australia

Discussant: Clark Chinn, Rutgers University, United States

Both reflection and reflexivity are important topics in the teacher belief change literature, particularly with regard to teachers' epistemic beliefs. Collectively, the fields of reflection and epistemic cognition require additional theoretical work to identify plausible conceptual frameworks and resolve measurement issues to explore change in epistemic cognition and to address how reflection and epistemic cognition affects teaching practices. The symposium will present scholarly outcomes from a four-day Advanced Study Colloquium (ASC) with 13 international scholars (from 6 countries) hosted by the European Association for Research in Learning and Instruction (EARLI) in 2015. The ASC included 13 international scholars from six countries with expertise in teachers' epistemic cognition and reflection/reflexivity. The ASC met to explore epistemic cognition for teaching and teacher education through an innovative focus on epistemic reflexivity. The papers in this symposium collectively explore international perspectives of teachers' reflexivity and epistemic cognition to (a) summarize the contributions of the literature, (b) identify directions for new theory and research, and (c) discuss ways that teacher's epistemic cognition and practices can be changed through a focus on epistemic reflexivity. The papers make a vibrant knowledge contribution, which will lead to knowledge translation that could promote change in teachers' epistemic cognition. With this symposium, it is also our intent to voice a compelling argument in the field of teaching and teacher education to recognize the relevance of epistemic cognition as a critical issue for teacher education and classroom education.

Changing teachers' epistemic cognition: A new framework for epistemic reflexivity

Presenting Author: Jo Lunn Brownlee, Queensland University of Technology, Australia; **Presenting Author:** Leila Eve Ferguson, University of Oslo / Kristiania University College, Norway; **Presenting Author:** Mary Ryan, Macquarie University, Australia

There is increasing evidence to show that teachers' epistemic cognition is related to how they conceive of and engage in teaching so it is important that teachers develop adaptive epistemic cognition. This presentation provides an overview of the different ways of theorizing and investigating changes in epistemic cognition in the context of teaching and learning. A growing body of research shows that explicit reflection on epistemic cognition may be a useful way to promote change. Drawing on the work of Lunn and colleagues, and the Advanced Study Colloquium (ASC) group funded by EARLI in 2015, we extend explicit reflection to encompass reflexive thinking. Reflexivity involves critical thinking that evaluates multiple perspectives in context and leads to specific action in the classroom. The 3R-EC Framework for theorising change in epistemic cognition is described and exemplified in the contexts of classroom practice and teachers' professional learning.

Informed reflexivity: Enacting epistemic virtue

Presenting Author: Mary Ryan, Macquarie University, Australia; **Co-Author:** Rainer Bromme, University of Münster, Germany; **Co-Author:** Florian Feucht, The University of Toledo, Germany; **Co-Author:** Dorothe Kienhues, University of Münster, Germany; **Co-Author:** Michael Weinstock, Ben-Gurion University of the Negev, Israel

In this paper we explore the usefulness of 'reflexivity' as a concept for describing and understanding the epistemic virtue of educational endeavors. 'Reflexivity' is sometimes implicitly, often explicitly a goal in the designing of learning environments and of curricula, for students as well as for teachers, in formal as well as informal learning settings. Reflexive thinking is the type of reasoning that the promotion of epistemic cognition should produce among students across domains. The paper will present analyses of how reflexive thinking appears in four domains with particular reference to educational efforts in these domains. The domains represent academic disciplines (science and history) and activities that cross disciplines (writing and critical thinking). Casting reflexive thinking as consideration of possible domain practices and their meaning in relation to domain-appropriate epistemic aims and reliable process is consistent with viewing epistemic

cognition as a process and sensitive toward domain. However, also finding reflexive thinking as an epistemic virtue across domains suggests the value of a teacher education focus on reflexivity. Student teachers should learn to develop their teaching through the steps of the reflexivity cycle with specific attention to their practices around epistemic cognition. They should also learn to foster reflexivity in their students. Following the analyses of the domains, the paper will consider how interventions might look in teacher education that both encourage teachers to engage in reflexivity and have them foster reflexive thinking as an epistemic virtue within each domain.

The social epistemology and reflexivity of teachers' learning groups

Presenting Author:Michael Weinstock, Ben-Gurion University of the Negev, Israel; **Co-Author:**Adam Lefstein, Ben-Gurion University of the Negev, Israel; **Co-Author:**Itay Pollak, Ben-Gurion University of the Negev, Israel

Much of what teachers learn about teaching takes place in their solitary practice of in the classroom. In classrooms, they gain experiential knowledge about teaching. In the current research, our interest is in how experiential knowledge, along with formal knowledge about teaching, is considered and expressed in organized groups of teachers talking about to improve their teaching. While how teachers justify and evaluate sources of knowledge involve individual epistemic cognition, our emphasis is on social epistemology. Social epistemology concerns (1) social evidence, (2) the epistemic quality of groups' beliefs and knowledge, and (3) epistemic implications of given institutional practices particularly in comparison with alternative practices. We look at teacher dialogues to assess how they use and offer testimony regarding teaching practices (social evidence), raise epistemic aims and use reliable processes for evaluating and justifying claims (epistemic quality of the group), and evince the formal knowledge and institutional aims that might inform practices and knowledge (epistemic implications of institutional practices). Analyses of teaching dialogues look at these characteristics and the reflexive practices of the group in identifying aims of practices, considering practices against alternatives, and deciding on courses of action based on reliable processes of knowing.

Professional Development in Dialogic Teaching: The Role of Epistemic Cognition

Presenting Author:Alina Reznitskaya, Montclair State University, United States; **Co-Author:**Ivar Bratton, University of Oslo, Norway; **Co-Author:**Krista Muis, McGill University, Canada

In this theoretical paper, we suggest that teachers' epistemic cognition, in particular their thinking about epistemic aims and reliable processes for achieving those aims, may enhance or restrict opportunities for students to acquire deep understanding of complex, controversial issues. This is because teachers' epistemic cognition may impact how well teachers learn to use dialogic practices that engage students in reasoned argumentation about such issues. Following 3R model of reflexivity (Brownlee, Schraw, Walker, & Ryan, 2016), we also argue that teachers need to reflect on their own epistemic cognition in the context of dialogic practice in order to calibrate it with the aim of deep understanding and the reliable process of reasoned argumentation. We discuss relevant scholarship on epistemic cognition, dialogic teaching, and professional development, to identify promising directions for future work in this area.

Session F 9

30 August 2017 15:45 - 17:15

Main Building A - A32

Symposium

The relevance of prior knowledge for knowledge acquisition in STEM

Keywords: Achievement, Educational Psychology, Higher education, Knowledge creation, Mathematics, Meta-analysis, Science education

Interest group:

Chairperson: Bianca Simonsmeier, University of Trier, Germany

Discussant: Jeroen Van Merriënboer, Maastricht University, Netherlands

Prior knowledge is a key variable for learning and achievement in school. However, despite the increasing amount of studies on prior knowledge and learning, insights into the detailed mechanisms and knowledge pathways are still limited. This symposium aims to provide insights on both. It includes three empirical studies and one meta-analysis focusing on the influence of prior knowledge on later learning. Two studies investigate the relation between prior knowledge and later academic achievement in mathematics and sciences. The other study is a controlled intervention study investigating whether early physics education (i.e. increasing prior knowledge) positively influences later learning. The meta-analysis integrates results from a wide range of studies, investigating the overall effect of prior knowledge on later knowledge and learning. The studies provide data for a variety of educational settings, ranging from preschool to university. Overall, the studies paint a detailed picture of the influence of prior knowledge on learning and its role in the broader context of academic achievement in science. The discussion will identify common themes, integrate the findings, and reflect on challenges for future research and practical educational settings. Especially characteristics of knowledge (i.e. quality and quantity) as well as teaching and instruction will be highlighted.

E-assessment as a tool for activating prior knowledge and supporting learning

Presenting Author:Henna Asikainen, University of Helsinki, Finland; **Co-Author:**Viivi Virtanen, University of Helsinki, Finland; **Co-Author:**Jaana Blomster, University of Helsinki, Finland

This study concerns the purpose, practices, and experiences of using online pre-exam in introductory class of Biosciences in B.Sc. studies at university. The aim of the study is to evaluate how the achievement in the electronical prior-knowledge test relates to the achievement on the course. In addition, this study aims to examine how the prior knowledge and the feedback given by the e-assessment tool helps the students in their studies on the course, and how do students experience the help they get. 170 students participating in a large introductory bioscience class participated in this study comprising 52 students who did the pre-exam. Students' scores on the pre-exam, midtest and final exam, as well as their experiences of the pre-exam, were included in the analyses. The analyses were conducted both by using statistic and qualitative methods. Preliminary results show that students who took the pre-exam before the course were more successful in the midtest, which suggests that the pre-exam helped the students in their learning.

Patterning Knowledge is Foundational to Mathematics Achievement

Presenting Author:Bethany Rittle-Johnson, Vanderbilt University, United States; **Co-Author:**Emily Fyfe, Indiana University, United States; **Co-Author:**Erica Zippert, Vanderbilt University, United States

Children's prior knowledge influences their future mathematics learning. For example, prior knowledge of math measured before formal schooling is predictive of later mathematics achievement over and above many other factors. Thus, the *amount* of prior math knowledge matters. However, we know much less about how particular *types* of prior mathematics knowledge influence later math learning. We focus on one understudied, yet potentially critical type of prior math knowledge: *patterning knowledge* (identifying and extending predictable sequences in objects or numbers). In the first study, we verified that patterning knowledge was uniquely and concurrently associated with early math achievement. We assessed 74 children's patterning knowledge, mathematics achievement, and other cognitive skills before entry into formal schooling (ages 4-5). Patterning knowledge was a unique predictor of math achievement over and above spatial skills, working memory, and verbal IQ. In the second study, we focused on *prior* patterning knowledge and later mathematics achievement. We assessed 513 children's patterning and numeracy knowledge before formal schooling (age 5) and after two years of schooling (age 7). We then measured their formal math achievement after seven years of schooling (age 12). Patterning knowledge at both earlier time points was a unique predictor of mathematics achievement at age 12, over and above numeracy knowledge and a variety of cognitive and behavioral characteristics. These studies provide strong evidence for the importance of patterning knowledge for mathematics achievement. We conclude with potential ways that patterning knowledge may support math learning.

Prior Knowledge from Elementary School Curricula on Physics Prepares for Future Learning

Presenting Author:Ralph Schumacher, ETH Zurich, Switzerland; **Co-Author:**Brigitte Hänggi-Surer, University of Applied Sciences and Arts Northwestern Switzerland, Switzerland; **Co-Author:**Lennart Schalk, ETH Zurich, Switzerland; **Co-Author:**Elsbeth Stern, ETH Zurich, Switzerland

The acquisition of appropriate conceptual knowledge in physics is often impeded by inappropriate prior knowledge constructed on everyday experience. For example, believing that a ship made of iron floats because the air in the ship's body pulls it upwards is incompatible with the concept of buoyancy force. In a controlled intervention study, we investigated whether early physics curricula implemented in 3rd and 4th grade will prepare students for learning from a more advanced curriculum on hydrostatic pressure in water. Importantly, the hydrostatic pressure in water curriculum was designed as a stand-alone curriculum that did not directly reference the earlier curricula. We prepared 153 children with the early physics curricula for the hydrostatic pressure curriculum, while 173 children did not receive this preparation. Both groups strongly improved their understanding of hydrostatic pressure in water as a consequence of teaching, but children who received the preparatory physics curricula achieved even higher learning gains. Thus, our study revealed indirect effects of appropriate prior knowledge for subsequent learning. Supporting students already in elementary school in substituting inappropriate by appropriate explanations prepares them to better benefit from future physics education.

The Influence of Prior Knowledge on Learning and Transfer: A Meta-Analysis

Presenting Author:Bianca Simonsmeier, University of Trier, Germany; **Co-Author:**Maja Flaig, University of Trier, Germany; **Co-Author:**Lennart Schalk, ETH Zurich, Switzerland; **Co-Author:**Anne Deiglmayr, ETH Zurich, Switzerland; **Co-Author:**Michael Schneider, University of Trier, Germany

Many studies have investigated the association between prior knowledge and later learning. Most associations were positive but varied considerably in their strengths. Even though a positive relationship between prior knowledge and later learning is assumed, no systematic overview has investigated this assumption yet. Furthermore, it remains unclear whether and to what extent the strength of these associations differs systematically over different domains and types of knowledge, and what other factors such as educational level or method of instruction may moderate the association. We investigated these questions by means of a meta-analysis. The literature search yielded 197 articles reporting 3574 effect sizes found with 54439 participants. Effect sizes were combined by means of random effects model using the robust variance estimation method. The overall effect was $r^+ = .51$ (CI [.478, .546]). We furthermore found significant moderators for the prior knowledge-later knowledge relationship in methodological, contextual, instructional, learner related, knowledge related, and transfer related variables. The results demonstrate the importance and complexity of the effect of prior knowledge on later learning dependent on the characteristic of specific domains and subjects, contextual influences of the learning environment, and individual differences of the learner.

Session F 10

30 August 2017 15:45 - 17:15

Main Building E - E301

Symposium

Higher Education, Lifelong Learning

What do we know about post-PhD experience?

Keywords: Comparative studies, Doctoral education, Educational policy, Higher education, Lifelong learning, Mixed-method research, Qualitative methods, Researcher education, Workplace learning, Writing / Literacy

Interest group: SIG 24 - Researcher Education and Careers

Chairperson: Montserrat Castelló, Ramon Llull University, Spain

Discussant: David Boud, Australia

Post-PhD researchers in universities are generally seen as a highly accomplished group of early career researchers (ECRs) who contribute to national productivity and global competitiveness. We characterize these individuals as researchers who are not yet fully independent, in the second stage of their development as researchers (R2) using the European Commission European Framework for Research Careers. While over the past twenty years, there has been a growing international focus on research on doctoral education, the education of post-PhD researchers has been largely invisible and under examined. This symposium is designed to stimulate discussion on what do we know about post PhD experience and on theoretical and methodological challenges underlying this research, in order to track different researcher identity development paths and reflect on the type of developmental support they require. Different contributions reflect emergent studies emphasizing innovative and complementary methodological perspectives (mixed-methods, longitudinal, multimodal), developed in diverse geographical and cultural contexts. Through these perspectives and contexts, we intend dialogue to be stimulated in the symposium and in the future, we hope the development of international comparative research studies that lead us to gain a concrete understanding of the effects of global developments for researcher education and careers.

How do the career intentions of PhDs and post-PhDs reflect personal lives and career opportunities?

Presenting Author: Lynn McAlpine, University of Oxford, United Kingdom; **Co-Author:** Cheryl Amundsen, Simon Fraser University, Canada

Little is known about the career intentions of PhDs and post-PhDs, for instance, the extent to which individuals vary in the stability of their intentions over time, and what influences lead to changes in individuals' intentions. This paper addresses how individual career intentions are reflective of personal values, goals and responsibilities as well as career opportunity structures. The research uses an identity development perspective situated in a narrative approach to inquiry. It draws on data from our 10-year longitudinal qualitative research design in which 48 individuals were followed as they transitioned into a range of post-PhD careers. On an annual basis, we collected biographical information, weekly activity logs, a pre-interview questionnaire, and an interview. This cycle was repeated from 4 to 6 times with a final follow-up the year afterwards. The subsequent analysis showed six ways in which individuals' personal lives played a role in their career decision-making: a) life goals; b) personal values; c) work-life balance; d) (lack of) well-being; e) family responsibilities and priorities; and f) financial duress and insecurity. These personal themes interacted with perceived career opportunities in career decision-making related to careers in the academic, public, para-public and private sectors. The results begin to provide a much needed fuller explanation for distinct (different from other individuals) but real (evolving circumstances) career decision-making.

Reading the Map of Post-PhD Academic Networks

Presenting Author: Isabelle Skakni, University of Oxford / Université Laval, Canada; **Co-Author:** María del Carmen Calatrava Moreno, Technische Universität Wien, Austria; **Co-Author:** Mariona Corcelles, Universitat Ramon Llull, Spain; **Co-Author:** Lynn McAlpine, University of Oxford, United Kingdom

It is widely acknowledged that a fundamental aspect for the advancement of post-PhD careers is the development of own academic networks as well as research collaborations. Now, what are the actual academic relationships that post-PhD researchers are establishing in their trajectory? And what is the actual role of such relationships in their career? This study approaches these questions not only by analysing survey and interview data, but also by examining network plots that post-PhD researchers in the UK were asked to create in order to represent and explain their scientific networks. A total of 64 individuals completed the survey and 11 of them—from diverse fields and different stages of their post-PhD—agreed to be interviewed. In analysing these data six kinds of post-PhD relationships emerged. These relationships were mainly national and not extensive, with relatively few individuals and research groups other than their own colleagues and institutions. We examined their impact on the work and career of post-PhD researchers, and often found networks that offer limited opportunities for intellectual support and collaboration. Lastly, we analysed the influence of past experiences on the development of their networks. We observed that relationships between individuals are more likely to be maintained than relationships with research groups or institutions. However, a pattern of network growth in more experienced post-PhD researchers was not observed. This comprehensive view of post-PhD relationships, together with the understanding of their influence constitute a valuable contribution for the implementation of policies directed at supporting post-PhD career

progression.

Interest and function of social support among UK and Spanish post PhD researchers

Presenting Author:Kirsi Pyhältö, University of Oulu / University of Helsinki, Finland; **Co-Author:**Jouni Peltonen, University of Oulu, Finland; **Co-Author:**Montserrat Castelló, Ramon Llull University, Spain; **Co-Author:**Lynn McAlpine, University of Oxford, United Kingdom

Life after PhD is challenging. Post PhD researcher's motivation is a central determinant in remaining resilient in facing the challenges post PhD researcher's motivation. Yet we know surprisingly little on what motivates post-doctoral researchers, and variation in their interest across the individuals and different cultural contexts. This study explores the cross-cultural variation in post PhD. researchers' research interest by comparing UK and Spanish post PhD researchers' interest and to explored individual variation between the post PhD researchers' interest. Altogether, 282 Post PhD researchers in social sciences and sciences from research intensive universities the UK (n=98) and Spain (n=184) participated to the study. The data were collected with *Post PhD experience* – survey. Results showed that Spanish post PhD degree holders entertained higher levels of *research* and *professional interest* than UK ones. Two distinctive interest profiles were detected: *High Interest*- profile (67%) presenting the dominant profile, and the *Low Interest* –profile (33%). Those researchers employing *High Interest* -profiles reported higher levels of supervisory and researcher community support than their counter partners with *Low Interest* – profile. The results suggested that significant variation not only across the countries but also between the post PhD researchers occurred in terms of their interest, and that the interest profiles were associated with supervisory and researcher community support.

Post-PhD researchers' writer identity development: Relationship between conceptions and experiences

Presenting Author:Montserrat Castelló, Ramon Llull University, Spain; **Co-Author:**Anna Sala-Bubaré, Ramon Llull University, Spain; **Co-Author:**Nuria Sune-Soler, Ramon Llull University, Spain; **Co-Author:**Marta Pardo Estruch, Ramon Llull University, Spain

Post-PhD researchers are expected to contribute to a country's productivity and competitiveness mostly through writing, which represents a privileged means to become an independent researcher. However, little is known about how Post-PhD researchers experience writing and how, when and why these experiences influence or modify their previous writing conceptions and, ultimately, the development of their writer identity as researcher. We used a mixed-method approach to investigate the relationship between Post-PhD researchers' writing conceptions and experiences. 189 Spanish Post-PhD researchers answered a questionnaire on writing conceptions and participated in retrospective multimodal interviews, in which Journey Plots were applied. Results from the questionnaire showed two post-PhD profiles regarding writing conceptions. Qualitative results from interviews indicated that these profiles mediated the development of writing identity and were related to the position that Post-PhD researchers have in the community, and to some specific writing experiences, such as participating in different kind of co-authorship practices, feeling competent in writing a variety of genres and having specific training opportunities.

Session F 11

30 August 2017 15:45 - 17:15

Pinni B - B3116

Symposium

Learning and Instructional Technology, Lifelong Learning, Teaching and Teacher Education

Negative Knowledge at Work: Insights from Four Professions

Keywords: Cognitive development, Cognitive skills, Cooperative / collaborative learning, Higher education, In-service teacher education, Informal learning, Instructional design, Learning Technologies, Lifelong learning, Qualitative methods, Reflection, Teacher Professional Development, Teaching approaches, Vocational education, Workplace learning

Interest group: SIG 07 - Learning and Instruction with Computers, SIG 11 - Teaching and Teacher Education, SIG 14 - Learning and Professional Development

Chairperson: Martin Gartmeier, Germany

Discussant: Jaana Parviainen, University of Tampere, Finland

One plausible consequence of experiencing and learning from errors is knowledge about erroneous assumptions, about wrongful courses of action and about limitations of own skills or insight. Such knowledge has been labeled *negative knowledge* (NK) (Gartmeier, Bauer, Gruber & Heid, 2008; Minsky, 1997; Oser & Spychiger, 2005) in discourses on informal, workplace based learning and the development of professional expertise. From a pragmatic point of view, NK is a useful cognitive resource e.g. in order to not repeat errors which have been made earlier. Moreover, from a more holistic perspective, the theory of NK also relates to modern notions of professional competence which assume that competence development is not merely a cumulative, linear process. Instead, it also involves the capability to master paradigmatic changes which make existing knowledge obsolete and require abandoning established routines (Parviainen & Eriksson, 2006). The present symposium seeks to address and bring together both perspectives: The first question in focus is how professionals from different fields of work develop and/or use negative knowledge in their practice. Empirical studies from culinary and teacher education, from medicine and from educational counseling will investigate this question from different domain-specific angles. The fifth, discursive contribution will adopt the second perspective foreshadowed above: In drawing

upon the evidence at hand, the question will be raised in which ways the concept of NK allows to investigate aspects of professional competence which otherwise remain unrecognized.

Developing negative knowledge in contexts of time-competitive culinary training

Presenting Author:Charlotte Jonasson, Aarhus University, Denmark

Aims. This study explores how students' development of negative knowledge is influenced by their competition to deliver timely cooked meals in a Danish culinary school. The instructional potentials for developing student learning through constructive competition are investigated. **Methodology.** A one year fieldwork was conducted at a Danish vocational school for culinary students. Main methods were participant observations of school-based vocational training and semi-structured interviews (N=83). **Findings.** The empirical examples show that the instructional intentions of resembling the timely delivery of courses in the culinary vocations led to enhanced competition and opportunities of developing procedural and self-reflective negative knowledge. This was conditioned by the students' attention to more constructive competition of enhancing persons' ambitions through collaboration, help seeking and shared reflection on errors. Self-reflective negative knowledge was not developed in groups, where destructive competition striving for exclusive achievement outcomes and demonstration of self-sufficiency flourished. Other students engaged in collaborative practices developed timely procedural negative knowledge of 'knowing when not to fool around' through their competition to gain positive assessment of their work. **Significance.** Overall, self-reflective negative knowledge of own limitations and shared reflections on errors were important premises for student learning, which could easily be hindered by destructive competition, involving self-protective strategies and self-sufficiency. Yet, the time-competitive context also leveraged students' engagement, their attention to the task and development of procedural negative knowledge. In conclusion, there are opportunities for enhancing student learning through constructive competition, where students take the time to collaborate to develop own and others' knowledge and skills.

Effects of problem-solving procedures in error-based learning in the context of medical education

Presenting Author:Robin Stark, Saarland University, Germany; **Co-Author:**Martin Klein, Saarland University, Germany; **Co-Author:**Nicole Heitzmann, University Munich & Clinics of University Munich, Germany; **Co-Author:**Martin R. Fischer, University Hospital of LMU Munich, Germany

In medical practice, diagnostic errors often have dramatic consequences. Therefore, providing erroneous information to enhance learning seems counterintuitive. However, learning from errors can foster the acquisition of "negative knowledge" provides an important protection against erroneous decisions and procedures (Oser & Spychiger, 2005). In addition, the instructional use of errors can lead to a deeper understanding and can support the development of "illness scripts" (Boshuizen et al., 1995). In earlier studies, the diagnostic competence of medical students was enhanced by an error-based instructional approach implemented in a web-based learning environment with case-based examples (X1). In the present study, additional problem-solving procedures were integrated in a similar learning environment to support the effectiveness of the error-based approach. Students were either confronted with multiple-choice tasks or with reflection prompts during the learning process. Both problem-solving procedures did not pay off. In contrast to our hypotheses, the unsupported example condition was most effective with respect to fostering diagnostic competence. The effects of the learning conditions on diagnostic competence was *mediated* by cognitive load and *moderated* by the students' self-efficacy. Both problem-solving procedures increased extraneous cognitive load. For learners with low self-efficacy, the problem-solving procedures interfered with effective error-based learning. Our error-based instructional approach is an innovative measure to foster diagnostic competence in the context of medical education. However, with respect to additional instructional measures intended to support error-based learning processes, less seems to be more.

Negative Knowledge of Counselors: Relation to Professional Experience and Contextualization

Presenting Author:Martin Gartmeier, Technical University of Munich (TUM), Germany; **Co-Author:**Josef Strasser, University of Augsburg, Germany

This contribution investigates the significance of negative knowledge (NK) in the profession of educational counselling. NK has been defined as form of experiential knowledge and an outcome of learning from errors. It is conceptualized as knowledge about how something does not work, about what assumptions are untrue or about limitations of own knowledge or skills. The present study empirically investigates various forms of NK, their prevalence in different levels of professional experience and their embeddedness in different knowledge contexts and in episodic statements. Data were collected through using a structured interview technique with 31 educational counselors. Verbal protocols were content analyzed with very good reliability. Analyses revealed discriminative and self-reflective NK to be relevant for the respondents. Comparing differently tenured educational counselors revealed no significant differences. Large differences were found, however, regarding the various knowledge contexts investigated. Finally, about 20% of negative knowledge was embedded in episodes, whereby especially experts verbalized a significantly higher amount of episodically embedded NK.

The acquisition of negative knowledge during teacher education

Presenting Author:Tina Hascher, University of Bern, Switzerland; **Co-Author:**Christine Kaiser, University of Salzburg, Germany

Although learning processes of student teachers increasingly gain interest in research on learning and instruction, less is known about the factors that influence these learning processes and outcomes. The presented study is based on the assumption that student teachers' learning is, among other, triggered by mistakes they make during field experiences

(student teaching). Mistakes can be a source for developing what has been labelled negative knowledge, i.e. an individual's cognition about negative experiences, dysfunctional and maladaptive behaviour. Our presentation addresses the following questions:

- 1) What mistakes did student teachers experience?
- 2) How did student teachers realize their mistakes?

In order to answer these questions, we analysed student teachers' diaries ($n = 620$; Authors, 2015) by means of qualitative content analysis (Mayring, 2010; Cohen's Kappa of 40% of the reported mistake episodes between .70 and .83). Categories were: mistake types with regard to aspects of instructional quality, phases of instruction (planning instruction, teaching, reflection), and indicators of mistake. 55% of all episodes addressed mistake episodes, thereof 26.5% (most frequent category) a lack of student orientation. 21.9% of the mistake episodes were categorized as mistakes with regard to insufficient clarity and structure of instruction. Generally, mistakes were related mainly to planning instruction and teaching (49.3% of all mistake episodes each) with only very few episodes focusing the reflection on instruction. 46% of all episodes were attributed to learners' feedback or reaction as mistake indicators.

Session F 12

30 August 2017 15:45 - 17:15

Main Building E - E350

Symposium

Motivational, Social and Affective Processes

Interest, motivation and aspirations in STEM: How do these factors develop and influence each other?

Keywords: Attitudes and beliefs, Motivation, Physical Sciences, Science education, Secondary education, Social interaction

Interest group: SIG 08 - Motivation and Emotion

Chairperson: Adam Maltese, Indiana University, United States

Discussant: Adam Maltese, Indiana University, United States

Participants from three countries and differing research and/or methodological traditions will use data from current projects to discuss their understanding of how young people's interest, motivation and career aspirations in STEM develop over time and in different contexts, and how these factors influence each other. Specifically, each participant will draw on his or her study when addressing the following questions: 1. - What research questions are you asking concerning motivation and interest and students' continued pursuit of STEM? 2. - Who are your study participants and in what learning setting is your study conducted? 3. - How have you conceptualized and measured interest and motivation? 4. - What do your findings contribute to understanding (a) why many students have an interest in STEM but do not see it as "for them"? (b) students' sense of self, their interest and motivation, and (c) the role of classroom practices and classroom/culture in relation to students' STEM interest and motivation? - What are needed next steps for this line of research?

The pressure is on: Understanding changes in science motivation and interest from age 10 to 16

Presenting Author: Julie Moote, University College London, United Kingdom; **Co-Author:** Louise Archer, King's College London, United Kingdom; **Co-Author:** Jennifer DeWitt, King's College London, United Kingdom

There are widespread national and international concerns that not enough young people are continuing with science post-16. As attitudes towards science have been found to be a strong predictor of performance outcomes and STEM participation post-16 (e.g. Hattie, 2009), these trends are worrying for science educators. Further, in a meta-analysis of studies looking into student interest and attitudes towards science, Awan and colleagues (2011) found that students in developed countries showed lower interest and less positive attitudes in science than students in developing countries. Therefore these issues are extremely relevant for the Western world. This paper presents findings from ASPIRES, a ten-year project aiming to understand the processes through which students develop their science and career aspirations between the ages of 10 and 19. Through comparing the results from two large-scale surveys of a nationally representative sample of the cohort (Year 6 students aged 10/11, $n=9319$; Year 11 students aged 15/16, $n=13,463$), this research explores shifts in attitudes and aspirations in science and extends the unique dataset provided by the first ASPIRES study, which tracked the development of this cohort's science and career aspirations from age 10-14. Further multivariate analyses investigating possible predictors (i.e. parental attitudes to science, student attitudes towards school science, self-concept in science, engagement in science-related activities outside of school) of students' aspirations in science will also be presented.

Motivation and interest-development in traditional physics classrooms in Norway

Presenting Author: Maria Vetleseter Boe, University of Oslo, Norway

Traditional physics teaching, dominated by teacher-centered instruction and problem solving (Angell, Guttersrud, Henriksen, & Isnes, 2004; Duit, Schecker, Höttecke, & Niedderer, 2014), has been criticized for not being inclusive towards different motivations, interests and identities (Hazari, Sonnert, Sadler, & Shanahan, 2010). This study starts from previous survey results about Norwegian secondary students' motivation for choosing physics and uses data from 18 interviews with

$N=9$ secondary physics students to investigate how their interest-development and motivation were influenced by their experiences in traditional physics classrooms. The data were analyzed thematically (Braun & Clarke, 2006) and understood in the light of expectancy-value theory of motivation (Eccles & Wigfield, 2002) and the four-phase model of interest-development (Hidi & Renninger, 2006). The analysis reveals how similar classroom experiences can have very different impact on students' interest-development and demonstrates how nuances in students' initial motivation for choosing physics help us understand why. For example, traditional mathematical problem solving threatened to destroy the interest of a student initially motivated by experiments and qualitative discussions, while the same activity was a necessary tool for another student, who counted on such mastery experiences for developing her interest. The study adds to the understanding of how different expectancy-value factors of motivation influence how physics students react to classroom experiences, and in turn, how the interplay of initial motivation and classroom experiences influence students' ongoing interest-development and motivation.

What Makes the Difference for Highly Selective Undergraduates Who Continue to Pursue STEM?

Presenting Author:K. Ann Renninger, Swarthmore College, United States; **Co-Author:**Sarah Nielson, Swarthmore College, United States; **Co-Author:**Meg Nam, Swarthmore College, United States

This presentation reports on findings from an exploratory, mixed method, use-informed study of undergraduates who continued to pursue STEM majors in a highly selective institution. Students who continue to pursue STEM are typically not the subject of study, because they do continue. Data sources for the present study were institutional data, a survey, and an in-depth interview. The Four-Phase Model of Interest Development (Author, 2006; Author, 2016) provides the theoretical framework for studying interest in relation to other motivational variables (e.g., goals, self-concept of ability, future time perspective) and background information (e.g., high school experiences, family involvement in science). Findings indicate that having a more developed interest is central. The students' were all identified as having a well-developed interest in their STEM major. The students describe themselves as interested in mastering the material, and describe the discipline in which they are working as challenging, rather than difficult. Many students described themselves as believing on beginning their undergraduate classes that competent students complete their work independently. They described the importance of transitioning to being able to work with others, to ask questions of professors, and to learn to put work down and return to it rather than expecting to get it correct the first time. Study findings suggest that future studies of students' understanding of their approach to and use of supports to work with challenging STEM content.

Research Microcultures as Socialization Contexts for Underrepresented Science Students

Presenting Author:Dustin Thoman, San Diego State University, United States; **Co-Author:**Gregg Muragishi, Stanford University, United States; **Co-Author:**Jessi L. Smith, Montana State University, United States

Is the process of engaging in scientific research an effective context for supporting and socializing undergraduate students for work in STEM fields? We tested this question in the context of a research experience for undergraduates working in faculty-led laboratories, with a focus on underrepresented minority (URM) students, who were primarily Latino and Native Americans. Beyond skills development, working in a research lab provides a critical peer group socialization context, where students often experience their first glimpse of what it means to "become a scientist" through day-to-day experiences and interactions with labmates. Of course, not all labs are the same. Outcomes of this socialization process should therefore differ across labs. Longitudinal survey data were collected from 522 research assistants in 42 labs at 6 institutions in the United States. Using multilevel modeling, results supported a socialization effect for URMs. That is, over and above the student's own initial beliefs, the aggregate prosocial affordance beliefs of one's labmates predicted students' own beliefs, as well as students' subsequent experiences of interest in their research and science career interest. Findings were unique to prosocial affordance beliefs, as subsequent analyses ruled out key alternative explanations related to other beliefs about science and cross-lab differences in labmates' sense of belonging. Results demonstrate that research labs serve as microcultures of information about science norms and values that influence motivation, which URM students are particularly sensitive to, and efforts to broaden participation should include understanding group processes that convey such values.

Session F 13

30 August 2017 15:45 - 17:15

Main Building A - A08

Symposium

Learning and Social Interaction

Co- and Self-Regulation in Early Childhood – Assessment, Development and Influencing Factors

Keywords: Cognitive development, Developmental processes, E-learning / Online learning, Early childhood education, Parental involvement in learning, Self-efficacy, Self-regulation, Social interaction, Video analysis

Interest group: SIG 16 - Metacognition

Chairperson: Kim Gärtner, Heidelberg University, Germany

Discussant: Franziska Cohen, Freie Universität Berlin, Germany

Self-regulatory and metacognitive skills are developmental hallmarks in early childhood and important prerequisites for successful learning and academic success (McClelland & Cameron, 2012). Individual differences in children's self-regulation are consistently associated with a range of parental co-regulation behaviors, which help young children progress

from being externally (co-) regulated to more internally self-regulated (Bernier, Carlson, & Whipple, 2010; Fay-Stammbach, Hawes, & Meredith, 2014). Although research regarding co- and self-regulation in early childhood has extended over the last decade, questions remain open regarding theoretical and conceptual as well as methodological issues (e.g. McClelland & Cameron, 2012). The symposium focuses on the following questions regarding the development and interplay of co- and self-regulation across different age-groups (from infancy to preschool): How can self-regulatory behaviour be measured and observed across age groups and in different situations? How do parents support the development of self-regulation from infancy to preschool? How do contextual factors (e.g. home environment, parental stress, etc.) influence children's self-regulation as well as parental co-regulation in early childhood? The symposium gives new insights into the development, assessment and interplay of co- and self-regulation in early childhood, as well as influencing factors. Theoretical and practical implications can be derived (e.g. parent training) to support children's self-regulation at an early stage.

Maternal scaffolding with infants: stability and relations with cognitive and inhibitory development

Presenting Author: David Whitebread, University of Cambridge, United Kingdom; **Co-Author:** Dave Neale, University of Cambridge, United Kingdom

There is debate about the extent to which parents influence the early development of executive function through play-based scaffolding, and how consistent parents are in their scaffolding style with infants. This study assessed the consistency of scaffolding over time and with different toys, and whether parental scaffolding related to concurrent measures or predicted future measures of child inhibitory control and cognitive development. Thirty-six British mother-child dyads were assessed when children were 12, 18 and 24 months old. At each time point dyads were video-recorded engaged in natural play behaviour with their child with a ring toy and, at 12 months, with stacking cups. The following tests of the child's inhibitory control were administered: The 'Grasping Task', An object-retrieval task using a spoon laden with food at 12 months; two delay of gratification tasks at 24 months; and The BRIEF-P parent-report inhibition scale at 24 months. The Bayley Scales of Infant Development III Cognitive Scale was also administered at 18 months. The results suggest that mothers who either a) demonstrate high levels of contingency during scaffolding when infants are 12 months old, or b) consistently demonstrate a moderate to high level of contingency and reduce their level of directiveness across their infant's second year of life, have children who develop higher inhibitory control and perform at higher levels on standardised tests of cognitive development. The relationship between contingency and inhibitory control suggests that maternal behaviour during play could lay the foundations for the strategic regulation of cognition and behaviour.

Co- and self-regulation in early childhood – the role of parental self-efficacy beliefs

Presenting Author: Kim Gärtner, Heidelberg University, Germany; **Co-Author:** Verena Clara Vetter, Heidelberg University Hospital, Centre for Child and Adolescent Medicine, Germany; **Co-Author:** Gitta Reuner, Heidelberg University Hospital, Centre for Child and Adolescent Medicine, Germany; **Co-Author:** Silke Hertel, Ruprecht-Karls-Universität Heidelberg, Germany

The development of self-regulation (SR) is one of the hallmarks in early childhood. Individual differences are consistently associated with a range of parental co-regulation (CR) behaviors, among them parental scaffolding (Fay-Stammbach, Hawes, & Meredith, 2014). Parental self-efficacy beliefs, i.e. parents' perceived ability to positively influence their child's behavior and development, have been identified as key correlates of such parenting practices (Coleman & Karraker, 2003; Sanders & Woolley, 2005) as well as associated with child outcomes (Jones & Prinz, 2005). However, there is a lack of research regarding the relation of parental self-efficacy, parental CR and children's SR in early childhood. The present study aims to analyze the influence of parents' self-efficacy beliefs (domain-general and -specific) and parental co-regulation on children's SR in early childhood. Preliminary results are based on a sample of 55 parent-child dyads (children's age: 24 – 36 months). A multi-method approach (questionnaires, standardized tasks, video-observation of parent-child interactions) is applied to assess children's SR, parental CR and parents' self-efficacy beliefs. First results point towards significant relations between children's SR at two years of age and parents' CR behavior. Parents' self-efficacy beliefs (domain-general and -specific) explain a unique portion of variance, over and above parents' CR. Behavioral data regarding children's SR as well as parents' CR will be included in further analyses to strengthen these findings.

Executive functions and parent-child interaction during technology-enhanced storytelling

Presenting Author: Anne Horvers, Radboud University Nijmegen, Netherlands; **Co-Author:** Inge Molenaar, Radboud University Nijmegen, Netherlands; **Co-Author:** Rosa Teepe, Radboud University Nijmegen, Netherlands; **Co-Author:** Ludo Verhoeven, Radboud University Nijmegen, Netherlands

This study explores how children's executive functions influence the way parent and child engage in a technology-enhanced story telling activity (TES). Research has indicated that children's executive functions (inhibitory control, memory and cognitive flexibility) are related to how they engage in reading activities, computer learning activities and explain instructional effects thereof. Also parent-child interaction is influenced by the child's executive functions. The app Jeffy's Journey supports shared verbal storytelling of parent and child with real time support through a story structure and visual, auditory and textual prompts. 44 Parent-child dyads played this a newly developed app. The results indicate that although the time spent on the TES activities was not associated with the child's EF and that the usage of prompts was positively related to the child's cognitive flexibility. Additionally cognitive flexibility was also positively associated with interactive parent-child interaction and highly yet not significantly correlated with story related utterances. These findings indicate the

importance of cognitive flexibility for active storytelling activities. No relation between memory and inhibitory control were found neither for TES characteristics (time spend or prompts used) nor parent-child interaction.

Associations between parenting and children's executive functions: Contingent on assessment methods?

Presenting Author: Debora Valcan, Murdoch University, Australia; **Co-Author:** Deborah Pino-Pasternak, Murdoch University, Australia; **Co-Author:** Helen Davis, Murdoch University, Australia; **Co-Author:** Anabela Malpique, Murdoch University, Australia

This paper investigates whether associations between parenting and young children's executive functions (EF) vary contingent on the parenting measures used (self-report vs. observed). It was hypothesized that, regardless of measurement, positive parenting would be associated with higher performance in EF tasks, whereas negative parenting would be associated with lower EF performance, both concurrently and longitudinally. Associations between discrete dimensions of parenting and measurement are to be explored. The study reports on Time 1 (T1) and Time 2 (T2) of a longitudinal study exploring contextual predictors of EF in preschool children in Australia. At T1, 176 children (159 retained at T2) and 134 of their caregivers participated in the study. At T1, caregivers completed a battery of questionnaires investigating different dimensions of parenting. They also participated in two video-recorded play activities with their children. Concurrently and six months later, children were assessed using a battery of EF involving separate assessments of inhibition, shifting, and updating. A two-factor model of EF was found where attention shifting was separable yet related to an inhibition/updating factor, both at Times 1 and 2. Analysis of the self-reported data indicated that, parental control was the only parental behaviour associated with EF, showing negative correlations with shifting at both time points. The next step in our analysis is to code video-recorded parenting behaviors at T1 to explore the extent to which the above-mentioned associations vary when using a different measure of parenting. Results on this latter analysis will be reported at the time of the conference.

Session F 14

30 August 2017 15:45 - 17:15

Pinni B - B3109

Symposium

Motivational, Social and Affective Processes

Insights on student engagement: the roles of motivation, emotion, and well-being

Keywords: Developmental processes, Educational Psychology, Emotion and affect, Motivation, Motivation and emotion, Primary education, Qualitative methods, Quantitative methods, Quasi-experimental research, Secondary education, Self-regulation, Social interaction

Interest group: SIG 08 - Motivation and Emotion

Chairperson: Jennifer Symonds, University College Dublin, Ireland

Discussant: Janne Pietarinen, University of Eastern Finland, Finland

This symposium presents a lively collection of papers from Ireland, the United States and Finland with the aim of explicating how student engagement links to motivation, emotion and well-being. First, we launch a novel model of student engagement: focusing on how situational engagement operates within individuals in real time and drawing on the research from neuroscience, cognitive psychology and social developmental psychology. We then present new evidence on the role that anxiety plays when students are in a state of optimal engagement, referring to data gathered using experience sampling. We also discuss the types of emotions that students perceive in classroom and school recess settings, when they are given pictorial vignettes of ambiguous behaviours. Finally, we examine how enhancing emotional regulation and attachment impacts students' social, emotional, and academic development, in a quasi-experimental setting. Together these papers provide fresh insights into how educators can prospectively enhance student engagement by attending to students' motivation, positive emotion and well-being.

A new model of student engagement as a dynamic biopsychosocial process

Presenting Author: Jennifer Symonds, University College Dublin, Ireland; **Co-Author:** Katja Upadyaya, University of Helsinki, Finland; **Co-Author:** Katariina Salmela-Aro, University of Jyväskylä and University of Helsinki, Finland

Sustaining involvement in an academic task such as learning at school, college or university, is a deeply complex activity. There, learners consciously and unconsciously manage aspects of their minds, bodies and the social environment to stay engaged. In this theoretical paper, we present a new model of student engagement as the situational self-regulation of psychological, emotional, physiological and social, resources and demands. We illustrate this with a real-world example where we explore how those resources and demands interact within real time. In the example we focus on latent psychological investment and its role in motivating engagement, as well as explore how psychological investment and other resources and demands can be altered through the process of engaging. We discuss how this model of situational engagement plays out across the life-span and within developmental stages, drawing on key theories from social developmental psychology. Next we consider the implications of the model for measurement, reviewing established methods and considering new ones. Finally, we discuss how the model can be used in intervention research, drawing on a study of young adults and linking the model to social and emotional learning in schools.

States of flow and situational engagement: not beyond anxiety, but right at the heart of it

Presenting Author: Julia Moeller, Yale University, United States; **Co-Author:** Zorana Ivcevic, Yale Center for Emotional Intelligence, United States; **Co-Author:** Marc Brackett, Yale Center for Emotional Intelligence, United States; **Co-Author:** Arielle White, Yale Center for Emotional Intelligence, United States

In this paper, flow or situational engagement is defined as situations that issue high challenges and require high skills and considered optimal motivation, in which learners experience absorption, strong concentration, and positive emotions. While the flow theory states that anxiety is low in flow states, the theory of challenge and threat states in athletes (TCTSA) predicts that all challenging situations, including flow, elicit anxiety, and that the skill level determines whether this anxiety is motivating and beneficial, or inhibiting and harmful. We tested both theories and found that flow states come with high anxiety and stress, as predicted by the TCTSA.

Sixth and eighth graders' socially embedded emotions in formal and informal school situations

Presenting Author: Henriika Anttila, University of Helsinki, Finland; **Co-Author:** Kirsi Pyhältö, University of Oulu / University of Helsinki, Finland; **Co-Author:** Tiina Soini-Ikonen, University of Tampere, Finland; **Co-Author:** Janne Pietarinen, University of Eastern Finland, Finland

There is evidence that emotions play an important role in learning, social relationships and school attendance (Pekrun, Goetz, Titz, & Perry 2002). However we know surprisingly little about emotions embedded in teacher-pupil interaction and in peer interaction in school. Moreover emotions embedded in recess situations have not, as far as we know, been studied in research literature. Altogether 148 6th and 8th graders participated in the study. The data was collected with a picture task instrument and were qualitatively content analysed. Preliminary results showed that students reported a wide variety of emotionally loaded social embedded episodes related to both teacher-pupil and peer interactions. Pupils often described experiences of joy and anger towards the teacher in teacher-pupil interactions where as belonging and being left outside of a group were emphasized in peer interactions. Moreover, pupils emphasized peer interactions in recess settings and the teacher-pupil interactions in classroom settings. Preliminary results provide new insights into the emotion literature about pupils' socially embedded emotions in formal and informal school settings, particularly regarding peer and teacher-pupil interactions.

Early intervention for pupils at risk of underachievement and educational disengagement

Presenting Author: Seaneen Sloan, University College Dublin, Ireland; **Co-Author:** Karen Winter, Queen's University Belfast, United Kingdom; **Co-Author:** Fiona Lynn, Queen's University Belfast, United Kingdom; **Co-Author:** Aideen Gildea, Queen's University Belfast, United Kingdom; **Co-Author:** Paul Connolly, Queen's University Belfast, United Kingdom

Nurture groups offer a short term, early intervention for vulnerable pupils at risk of underachieving and disengaging from school, aiming to address barriers to learning arising from unmet attachment needs. This presentation discusses findings from an evaluation of nurture groups which used a quasi-experimental approach and compared the progress of pupils (in terms of social, emotional and behavioural functioning, enjoyment of school and academic attainment) attending a nurture group to similar pupils not attending nurture groups. Findings suggest that nurture groups have a consistent, significant and large effect in improving social, emotional and behavioural outcomes and pupil enjoyment of school.

Session F 15

30 August 2017 15:45 - 17:15

Pinni B - B4115

Symposium

Assessment and Evaluation

Transparency in assessment – Exploring the influence of explicit assessment criteria

Keywords: Achievement, Assessment methods and tools, Communities of practice, Higher education, Literacy, Motivation, Science education, Student learning, Teacher Professional Development

Interest group: SIG 01 - Assessment and Evaluation

Chairperson: Anders Jonsson, Kristianstad University, Sweden

Organiser: Anders Jonsson, Kristianstad University, Sweden

Discussant: Frans Prins, Utrecht University, Netherlands

Whether explicit assessment criteria should be shared with students is a controversial issue. On the one hand, research has shown that explicit criteria may positively affect student performance, reduce their anxiety, as well as support students' use of self-regulated learning strategies. On the other hand, there are fears that explicit criteria may have a restraining influence on students' learning, as well as limiting their autonomy and creativity. There are also indications of students becoming more performance oriented, as opposed to learning oriented, when being provided with explicit assessment criteria. Taken together, it is not fully understood under which circumstances it is productive for student learning to share explicit assessment criteria, and under which circumstances it is not. The aim of this symposium is therefore to bring different perspectives on transparency in assessment together, in order to further our understanding of how students are influenced by the use of explicit assessment criteria. A deeper understanding of the influence of explicit assessment criteria on students' understanding of criteria, motivation, and learning is equally imperative for future research and educational

practice, both of which need to go beyond individual opinions and convictions. The papers in this symposium are of both conceptual and empirical nature, and represent a range from students' and teachers' understanding and use of assessment criteria, to the conceptualization of standards and the influence on students' motivation and performance.

Can rubrics make assessment standards and criteria transparent?

Presenting Author:Berry O'Donovan, Oxford Brookes University, United Kingdom

This presentation explores the limitations of rubrics and the role of tacit knowledge in rendering assessment criteria and standards transparent to students. It is based in over a decade of published research into assessment standards undertaken by members of the ASKe (Assessment Standards Knowledge exchange) Centre of Excellence in the UK. Students hunger for transparency in assessment expectations, criteria and standards (Jonsson, 2014) and a well-designed rubric can go some way to assuage this desire. However, perhaps provocatively, the argument presented is that a single-minded focus on the explicit articulation of assessment standards and criteria, whilst currently the dominant logic of higher education, will inevitably fall short of providing students with meaningful knowledge of standards and criteria (Rust et al., 2003; O'Donovan et al, 2004). Initially the presentation, drawing on previously published research, briefly reviews the obstacles involved in articulating marking criteria and standards clearly and accurately, and in synchronising the interpretation of such understandings held by students and staff both within and across disciplines (O'Donovan et al., 2004, 2008; Sadler, 2009; O'Donovan, 2016). However, the main focus is on the role that tacit knowledge transfer processes play in the effective sharing of meaningful knowledge on assessment standards and criteria. Ultimately, based on empirical research undertaken with 300 business and management students at Oxford Brookes University over 3 years it is posited that a spectrum of both explicit and tacit knowledge transfer methods is needed to develop student understanding of assessment criteria and standards and thereby their assessment literacy.

Effects on student motivation and performance by increased transparency in assessment

Presenting Author:Andreia Balan, SFF Helsingborg, Sweden; **Co-Author:**Anders Jonsson, Kristianstad University, Sweden

Sharing criteria with students may improve performance, reduce anxiety, and support students' self-regulation. But students may also become more performance oriented. Overall, there is a lack of studies systematically investigating how students are influenced by the use of explicit criteria. The aim of this study is therefore to investigate the influence of increased transparency in assessment on student motivation and performance. The study is an intervention, where transparency in assessment is increased successively over four teaching sequences for a total of eight groups of students from four different schools (students 12-13 years; n = 145). During the first sequence, all students are taught the same (science) content and experience the same level of transparency. For each successive sequence, two groups remain at the previous level of transparency, while the transparency is increased for the rest. For all groups, performance tests and motivation questionnaires are distributed before the intervention and after each sequence. Initial findings show that students rate their self-efficacy and perception of self-regulation strategies as relatively high (4.72 and 4.53 respectively, on a 6 point scale). Furthermore, students' ratings on the achievement goals scale is substantially higher (5.38) as compared to the performance goals scale (3.14). If the use of explicit criteria makes students more performance oriented, this relationship is expected to change. Ratings on the self-efficacy and self-regulation scales should also be expected to increase. The study is expected to have great significance for both future research and educational practice.

Problematising representative perspectives of standards in the assessment discourse

Presenting Author:Rola Ajjawi, Deakin University, Australia; **Co-Author:**Margaret Bearman, Deakin University, Australia

Assessment practices such as rubrics, self-assessment, scoring and feedback all require judgements in relation to assessment criteria or 'standards'. Bowker and Star (1999) define standards as any set of agreed-upon rules for the production of textual or material objects. In assessment, there is a general sense that standards are necessarily the same across contexts. Standards are typically viewed as representative, that is, stable materials that describe particular realities of practice often expressed as prescribed lists of competencies or learning outcomes. A sociomaterial framing of standards has an alternative perspective. In addition to being a representation, standards can also be viewed as an activity in which people might participate. In other words, standards, and by extension, checklists and rubrics, are performative. In performing a standard there is a necessary translation or 'strategic juggling of representational ambiguity' that settles the problem of difference at the local level. Implications for assessment design include recognising the complexity of articulations of standards and the need for multiple enactments of them. Students can then be attuned to the educational processes that promote shared understanding of quality, recognising the layers of complexity in the standards. Such a view forces a rethink about what 'transparency' means and how we can best achieve it.

Assessment criteria and standards, social moderation and professional conversations about quality

Presenting Author:Claire Wyatt-Smith, Australian Catholic University, Australia

This presentation explores an inquiry approach to school-based assessment that takes account of both teachers' and learner's perspectives. It takes up three related concepts: evaluative expertise; the source of criteria; and social moderation. The latter involves groups of teachers engaging in professional conversations about student work using assessment criteria and standards. In taking a specific focus on social moderation the presentation draws on Wenger (1998) and his notion that meaning is continually negotiated through participation in "communities of practice". Three dimensions that bring coherence to a community of practice are central to the presentation: mutual engagement, joint

enterprise and a shared repertoire of concepts, tools, and terminology. The presentation offers key insights into teacher and student use of criteria and standards as a collective process of negotiation in the context of social moderation and in classrooms. It also shares insights from three studies undertaken by the author that show how teachers negotiated responses to one another in moderation event. Data will be presented to show how, as middle years teachers and senior teachers participated in moderation, they achieved mutual accountability that was valued as an integral part of their professional practice. A related focus is on how, through developing teachers' evaluative expertise, students can be supported to move from being a 'good' students to developing understandings of 'quality'/good work in a range of curriculum areas.

Session F 16

30 August 2017 15:45 - 17:15

Virta - 114

Symposium

Assessment and Evaluation, Culture, Morality, Religion and Education, Motivational, Social and Affective Processes

Citizenship Competence and Citizenship Identity: National Additions to ICCS 2016

Keywords: Achievement, Attitudes and beliefs, Citizenship education, Cultural diversity in school, E-learning / Online learning, Educational Psychology, Quantitative methods, Secondary education, Social development

Interest group: SIG 13 - Moral and Democratic Education

Chairperson: Eveline Gutzwiller-Helfenfinger, University of Teacher Education of Lucerne, Switzerland

Discussant: Maria Magdalena Isac, University of Groningen, Netherlands

The International Civic and Citizenship Education Study (ICCS 2016) provides insights into political socialization of 14-year olds in the context of national school systems. In particular, the study focuses on students' civic knowledge, identity, attitudes and participation, and examines how school and learning environments outside of school contribute to relevant learning processes and outcomes. In addition to the international core of the study, individual countries may address specific research questions. The symposium will provide inside into four national add-ons. While the first part of the symposium is closely related to the concept of active citizenship and participation, the second part of the symposium focuses on the development of cultural and civic identities: First, to what extent do school and personal characteristics such as academic achievement of 9th graders predict online political participation in Norway? Second, how do 8th and 12th grade students in Belgium differ with regard to civic competences and how is civic competence related to the perception of active citizenship? Third, how does students' openness for identity exploration predict tolerance towards refugees in Germany? Fourth, do German adolescents with and without migration background differ in their perception of educational inequality and how do acculturation strategies influence this perception among immigrant students?

Association between Online Political Discussion and Academic Achievement of Norwegian adolescents

Presenting Author: Lihong Huang, Høgskolen i Oslo og Akershus, Norway; **Co-Author:** Kristinn Hegna, NOVA – Norwegian Social Research, Oslo and Akershus University College of Applied Sciences, Norway; **Co-Author:** Guro Odegard, NOVA – Norwegian Social Research, Oslo and Akershus University College of Applied Sciences, Norway

Using data obtained a set of country specific questions included in the International Civic and Citizenship Education Study (ICCS) 2016 (N=6235), this paper reports our analyses on the association between adolescents' participation in online political discussions and their academic achievement in civic related subjects in Norwegian lower secondary schools. There is generally a lack of both knowledge and understanding on the actual political participation of youth and particularly that of adolescents (as becoming-citizens between the ages of 13-18). So far, there is little research evidence that young people's internet use has any effect on their political participation (Quintelier and Vissers 2008) and we know little as about what factors actually affect political participation on the internet. This study aims to contribute research evidence to current knowledge and understanding in 1) the scope and reasons of adolescents' political participation on the internet, and 2) the association between political participation on the internet and learning achievement in the school.

Social development in school: A comparison of civic competences between 8th and 12th grade students

Presenting Author: Dorien Sampermans, KU Leuven, Belgium; **Co-Author:** Ellen Claes, KU LEUVEN, Belgium

The civic engagement of future generations is a crucial element in democratic societies. Therefore democratic countries attach much importance to the civic education of young adolescents in school. This paper aims to measure school influences on the social development of young adolescents. To create civic consciousness and engage secondary school students, teachers not only transfer civic knowledge. We increasingly assume schools to be a mini-polity, in which students can learn to interact with the society and where they learn to value their participation. It is by reaching these civic competences that students can become engaged citizens. To measure social school influences, this paper compares the results of the Flemish ICCS 2016 data with the Flemish educational effectiveness and evaluation survey. Both surveys measure civic knowledge and attitudes and are administered parallel in Flemish schools. The first study is administered among eight grade students, the latter among twelfth graders. Comparing the results of these studies reveals a growth of civic competences (civic knowledge, reported participation levels and students' self-efficacy) over age. And parallel to this higher critical consciousness, older students seem to perceive good citizenship more often as engaged citizenship. The relationship between students' engagement and their civic competences can be confirmed by a regression analysis and

visualized in two structural equation models. Both path models then illustrate the dependency between students' perceptions of good citizenship and students' civic competences.

Identity Formation as Catalyst of Tolerance

Presenting Author:Johanna Fee Ziemes, University of Duisburg-Essen, Germany; **Co-Author:**Hermann J. Abs, University of Duisburg-Essen, Germany

Even though identity formation (IF) is primary development task of the adolescence and important for the cohesion of a democratic and diverse society, it is a neglected topic of citizenship education. In the recent cycle of the International Civic and Citizenship Education Study (ICCS 2016) IF was assessed with indicators of exploration and commitment, while tolerance was measured with items on rights of refugees. Preliminary results indicate that identity exploration enhances tolerance, while commitment reduces tolerance. These results augment our understanding of the contact hypothesis: Identity exploration may increase the readiness to make contact with minorities, while commitment may increase the desire for distance.

Acculturation as an indicator of educational inequality

Presenting Author:Janina Jasper, University of Duisburg-Essen, Germany; **Co-Author:**Hermann J. Abs, University of Duisburg-Essen, Germany

Globalization and migration require a complex negotiation of cultural identity to ensure social and political participation. In particular, adolescents with migration background are challenged in their identity development during acculturation. Often they suffer discrimination due to intolerance, which leads to educational inequality. For this paper it will be examined whether students with and without migration background differ in their perception of inequality, and how acculturation strategies influence this perception among immigrant students. Preliminary results show that students with migration background have a more negative perception of educational inequality than their peers. In particular, marginalized students perceive more educational inequality in Germany, while their integrated peers tend to perceive chances for education in Germany rather more equal.

Session F 17

30 August 2017 15:45 - 17:15

Virta - 120

Symposium

Teaching and Teacher Education

Investigating in-service and pre-service teachers' promotion of SRL through classroom observation

Keywords: Assessment methods and tools, Attitudes and beliefs, Educational Psychology, Metacognition, Pre-service teacher education, Self-regulation

Interest group: SIG 16 - Metacognition

Chairperson: Zemira Mevarech, Bar-Ilan University, Israel

Discussant: Erik De Corte, KU LEUVEN, Belgium

Teachers play a key role in supporting and enhancing their students' self-regulated learning (SRL). However, from meta-analyses it is known that teachers are relatively ineffective in training SRL among their students. This leads to two implications for research: (1) In order to find out what makes teachers less effective in promoting SRL, we need assessment methods to capture teachers' promotion in a valid and reliable way. Classroom observations offer the opportunity to assess teachers' instructional behavior independent of self-report bias. (2) With regard to teacher development, we need training methods to help prospective teachers promote SRL. In this symposium we integrate four studies that use observation methods to assess (prospective) teachers' promotion of SRL. The first two studies report results from classroom observations with in-service teachers and compare the observed promotion of SRL with teachers' own perception of promoting SRL and with teacher beliefs on SRL. The last two studies focus on teacher training and compare different methods to teach preservice teachers how to promote SRL with the help of classroom video. They systematically vary the direction of reflection onto different types of SRL strategies, as well as the degree of direction towards a certain SRL strategy. This symposium contributes to the field of SRL by applying innovative methods (systematic analyses of video-based classroom observation data) that allows for quantitative analyses in order to further investigate how in-service teachers support their students in SRL, and how preservice teachers can be trained in delivering such a support for SRL.

Insights into teachers' promotion of SRL in primary and secondary mathematics classrooms

Presenting Author:Charlotte Dignath, Goethe-University Frankfurt, Germany; **Co-Author:**Gerhard Buettner, University of Frankfurt, Germany

Two video-based observation studies were conducted using a highly structured observation instrument to assess primary and secondary school teachers' promotion of self-regulated learning (SRL) by rating teachers' implicit and explicit instruction of strategies and their arrangement of a learning environment that enhances students' self-regulation. Additionally, secondary school teachers participated in a semi-structured interview to confront objective classroom

observations with teachers' subjective views.

Classroom observations revealed that teachers spend only very little time on explicit strategy instruction. Moreover, they rather instruct cognitive strategies, but very few metacognitive strategies. These results are more pronounced in primary than in secondary school classrooms. By contrast, primary school teachers provide students more often with learning environments that require student-regulation than secondary school teachers do. Teacher interviews revealed that teachers are rather reluctant towards the promotion of SRL.

The results show that there is still a strong need for teacher training on enhancing SRL directly and indirectly. In particular teachers lack explicit strategy instruction and addressing of metacognitive strategies during their teaching.

Exploring diversity in teachers' implementation of self-regulated learning in primary schools

Presenting Author: Mona De Smul, University of Ghent, Belgium; **Co-Author:** Hilde Van Keer, Ghent University, Belgium;

Co-Author: Sofie Heirweg, Ghent University, Belgium; **Co-Author:** Geert Devos, Ghent University, Belgium

Although the importance of promoting self-regulated learning (SRL) in primary education is often stressed, mixed-method research investigating the role of the teacher in this respect is scarce. Therefore, the present study investigates primary school teachers' promotion of SRL combining and comparing both quantitative (i.e., self-report questionnaires) and qualitative data (i.e., semi-structured interviews and classroom observations). Moreover the study aims at studying differences between schools reporting a comprehensive versus a limited implementation of SRL in daily practice. Based on survey data of 331 teachers from 44 schools in Flanders, six schools were selected for further qualitative research.

Preliminary results are discussed and based on the results, implications for teacher professional development by means of an innovative school improvement program are presented.

Effects of Scaffolding Level on Preservice Teachers' Professional Vision & Capacity to Teach SRL

Presenting Author: Tova Michalsky, Bar-Ilan University, Israel

A major concern of teacher educators is how teachers acquire expertise to positively develop students' self-regulated learning (SRL). Accordingly, teachers are asked to understand the role of SRL in their pedagogical content knowledge, to plan materials and strategies for infusing SRL into lessons, and finally to reflect on their actions and decisions in order to evaluate goals, processes, and efforts (Putnam & Borko, 2000). However, research findings suggest that SRL is difficult to attain by preservice teachers (e.g., Perry, et al., 2007; Kramarski & Michalsky, 2010), who lack experience in producing knowledge in new situations and who lack skills as analytical competency practitioners (Schön, 1995). Methods of digital video case-based learning are considered to have great potential for promoting reflective and problem-solving abilities as well as other higher level cognitive competencies related to analytical competency (e.g. Lundeborg, 1999). To meet the growing challenges for SRL-promoting teacher preparation, the current study aimed to explore preservice teachers' capacity to analyse video-cases of complex SRL-teaching events by developing their professional vision (PV) and aimed to compare the training effects of different scaffolding paths (the autonomous path; the hint path, and the guided path) on the depend variables PV for SRL and direct and indirect SRL-teaching to their students. Findings demonstrated that the *Hinted* approach led to better performance on teachers' use of SRL in their PV for SRL and actual SRL teaching as measured directly (implicit/explicit SRL-promoting strategy instruction), and indirectly (construction of SRL-promoting environments).

The Effects of Using Video Clip Analyses on Teachers' Explicit vs Implicit Implementations of SRL

Presenting Author: Zemira Mevarech, Bar-ilan University, Israel; **Co-Author:** Tova Michalsky, Bar-Ilan University, Israel;

Co-Author: Galit Shabtai, Bar-Ilan University, Israel

The use of video clip analyses that focus on teachers' behaviors has become a quite common practice in professional development courses. Usually, a lesson is recoded, segments or clips of the films are shown to teachers, and those clips are analyzed by the participants. The present study took another approach. Rooted in the SRL research, the study addresses the following questions: To what extent teachers' who are exposed to different types of video-clip analyses would develop different levels of pedagogical content knowledge, and would also implement different SRL strategies in their teaching? About 50 mathematics teachers participated in the present study. They all watched the same video-clips that recoded 'good' mathematics teaching. Teachers were randomly assigned into four research groups, as follows: Group A (control group) analyzed the clips as the teachers suggested; Group B analyzed the clips by focusing on the motivational aspects; Group C analyzed the cognitive-metacognitive aspects of the teaching; and Group D focused on all three components of SRL: cognition, metacognition, and motivation. Results showed significant differences between the four groups on all dependent variables. In particular, Group D developed a higher level of pedagogical content knowledge and also implemented significant higher levels of explicit SRL skills than group C, which in turn were significantly higher than those of Group B; the control group scored significantly lower than all other three groups. The theoretical and practical implications will be discussed in the conference.

Session F 18

30 August 2017 15:45 - 17:15

Main Building A - A05

The role of theory in research

Keywords: Action research, Argumentation, Communities of practice, Conversation / Discourse analysis, Emotion and affect, Peer interaction, Philosophy, Reflection, Reflective society, Social aspects of learning and teaching, Social interaction, Synergies between learning - teaching and research, Teacher Professional Development, Values education

Interest group: SIG 25 - Educational Theory

Chairperson: Giuseppe Ritella, University of Helsinki, Finland

Organiser: Rupert Wegerif, University of Exeter, United Kingdom

Discussant: Baruch Schwarz, Hebrew University of Jerusalem, Israel

What is the relationship between theories of education and empirical research in the field of learning and instruction? Research studies are supposed to test theory and develop theory. But is this possible if theoretical assumptions have already determined what sort of thing is going to count as a finding? What is said to be found out about learning, motivation or cognition etc. only ever makes sense if we assume a theoretical framework including specific definitions of learning, motivation, cognition etc but any such theoretical framework, if ever made explicit, always turns out to be contestable. Empirical research cannot help but be intimately connected to theory since it is informed on the inside by theory. On the other hand perhaps some empirical researchers avoid engaging with theory because it seems futile to do so, discussions about the big picture – what is learning, what is thinking, what should we teach, what does it mean to be human etc - can appear unconnected to empirical evidence and so not part of the progress of scientific knowledge. The papers in this symposium all explore this difficult conundrum, each offering different approaches to relating theory and empirical research. We hope that this will stimulate discussion and progress in understanding how we can constructively integrate more engagement with theory into the business of EARLI.

The generality-concreteness antinomy, variance accounted for, and situation specificity

Presenting Author: Jean-Luc Patry, University of Salzburg, Austria

The aim of research is to develop and test theories. One function of theories is explanation of (educational) phenomena. But theories can never fully explain the phenomena under investigation. The degree of explanation can be expressed as "variance accounted for". In social behavior research it is very low (typically 10%) unless artificially increased through severe biases, such as using questionnaires. This low explanation power is due, among others, to the generality-concreteness antinomy: The more general a theory is, the less concrete it can be. Since theories are supposed to be very general, they cannot be concrete. This antinomy is particularly accentuated in social behavior research because of situation specificity (Patry, 1991). In research on personality and situation specificity, two different questions can be asked: (1) about differences between people, and (2) about differences in behavior within people, e.g., due to situational variance. Most research in education focus on (1), where within-person variance is treated as error in the measurement theoretical sense. This error is usually regarded as random, but typically it is systematic. To reduce this error, which deals with behavior changing from moment to moment and from context to context, we need to address within-person variance (according to question 2 above) in addition to the between-person variance (question 1). We hence need to integrate concepts of within-person variance in our theories: We need a theory of situation specificity that is compatible with the original theory in which we are interested. Principles for this integration are discussed.

Conceptualizing one's own teaching activity: An account of a teacher's expansive learning journey

Presenting Author: Antti Rajala, University of Helsinki, Finland; **Co-Author:** Annalisa Sannino, University of Helsinki, Italy

This paper discusses a study that aims to better understand the process of concept formation in research conducted by teacher researchers. We analyze such a process in the context of a teacher researcher's journey to develop an agency-centered pedagogical model as part of his PhD dissertation study. Our study explores how the theory of expansive learning (Engeström, 2014) can account for a dialectical and mutually transformative relationship between theory and practice in teacher research. The primary data comprise documents (research plans, diaries, published articles) and transcribed recordings of supervisory meetings. In the analysis, we identify expansive learning actions in the data and trace how the object of the teacher researcher's activity was reconceptualized in and through the expansive learning actions. Our initial analysis shows that the teacher researcher's journey into research can be characterized as a part of an expansive learning cycle. The analysis shows how he increasingly began to question aspects of his teaching activity. The pedagogical model that he constructed served for him as a tool that remediated his relations to students and helped him to reconceptualize students and pedagogy. In our presentation, we will illuminate the expansive dynamics of concept formation that accounts for these reconceptualizations. The study makes a methodological contribution to the discussions around teacher research by unpacking the concept formation involved in successful interaction between theory and practice.

Collaboration, creativity, embodiment and affect – a methodological journey

Presenting Author: Eva Vass, Western Sydney University, Australia; **Co-Author:** Gabriella Deszpot, Liszt Ferenc Academy of Music, Hungary

My research is situated in the *collaborative learning* literature, which aims to conceptualise and promote effective ways of thinking and learning together. Much of this literature places an emphasis on collective argumentation or joint reasoning

(Littleton, & Mercer, 2013). My earlier research on children's collaborative creative writing (Vass et al, 2014) found it paramount to combine such explanations with explorations of the affective and embodied dimensions of shared meaning creation. Such an expansion of focus is central in cognitive science (Johnson, 2007), and in research on artistic collaborations in music and theatre (Clayton, 2007; Sawyer, 2007), but less so in socio-cultural research. My work so far has developed in response to this challenge. This paper reflects on the current 'empirical juncture', which brings together a dialogic orientation towards meaning creation with a focus on the embodied dimensions of creative ideation or creative togetherness. In collaboration with the Liszt Academy of Music, I explore the Kokas pedagogy: an experiential extension of the Kodaly method of music education combining improvised movement and collective reflection. Based on observational data (video-recordings of 14 sessions in a Year 1 classroom) we have analysed children's embodied dialogues, capturing the nature and evolution of creative intersubjectivities. The data highlight how the physical dimensions of this pedagogy cultivated new modes of creative ideation, presenting unique challenges and opportunities in the observed educational context. Importantly, the data reconfirm my earlier positioning about the need to re-envision creative interthinking to encompass the affectively-constituted and embodied dimensions of thought.

Double-loop reflection and educational research

Presenting Author:Rupert Higham, University of Cambridge, United Kingdom; **Co-Author:**Rupert Wegerif, University of Exeter, United Kingdom

We answer the question as to the relationship between theory and empirical research by extending the double loop reflection model of learning widely used in practitioner education. The first loop is applying methods to find answers to research questions. The second loop is reflection on the often initially implicit assumptions that lie behind the empirical research design. In this way theory is linked to empirical research in a broad conception of science. Although progress in underlying philosophical frameworks is slow and often only quite indirectly related to empirical research, it is nonetheless real and ultimately grounded on evidence and argument just like any other area of science. Our aim is to show how we can avoid the false dichotomy of irrationally choosing cultural 'paradigms' or 'stances' on the one hand and a rejection of the relevance for research of philosophical debates about ontology and values on the other. We link our double loop reflection model of research both to the two phase psychological model of thinking outlined by Kahnemann of fast thinking and the less frequent and more costly slow thinking and also to the two types of science model of Kuhn who distinguished between normal science and revolutionary science. We illustrate our dialogic model with an example from recent empirical research on classroom talk in which initial assumptions were challenged by experience leading to a need to re-think those assumption by bringing in new high level theory.

Session F 19

30 August 2017 15:45 - 17:15

Pinni B - B4113

Invited Symposium

Learning and Special Education

Classroom composition research on social-emotional outcomes

Keywords: Achievement, Emotion and affect, Primary education, Secondary education, Self-efficacy, Social aspects of learning and teaching, Social development, Social interaction, Special education

Interest group: SIG 15 - Special Educational Needs

Chairperson: Carmen Zurbriggen, University of Fribourg, Switzerland

Chairperson: Christoph Müller, University of Fribourg, Germany

Discussant: Dieter Baeyens, KU LEUVEN, Belgium

Social-emotional problems of students are an important risk factor for both behavioral and learning difficulties. It is thus crucial to understand how individual and contextual factors influence students' social-emotional development. Classroom composition research on social-emotional outcomes (CCRSO) contributes to this understanding by investigating the effects of classmates' characteristics on individual social-emotional development. Bringing together peer influence and school effectiveness research, this line of inquiry provides new perspectives on how classroom-level processes affect individual students. Four presenters and a discussant from three different countries will provide key insights on this topic.

Paper 1 provides a conceptual framework and research overview on CCRSO. Moreover, current methodological challenges and future directions of CCRSO are discussed.

Paper 2 examines the effects of sociocultural classroom composition on social integration of students with special educational needs in primary school. In particular, the paper aims to shed light on students' school satisfaction in inclusive classroom.

Paper 3 investigates how prosocial behavior among the classmates is related to future individual antisocial behavior among lower secondary school students. Results of longitudinal multi-level analyses provide evidence that classmates' higher levels of prosocial behavior are associated with a decrease in students' individual antisocial behavior.

Paper 4 examines the effect of social comparison with classmates on students' academic self-concept and teachers' frame of reference as moderating variable. For this purpose, two methods for the analysis of group composition effects are used and compared. Teachers' individualized frame of reference appears to influence the effect of academic classroom

composition on students' self-concept.

An overview of classroom composition research on social-emotional outcomes

Presenting Author:Christoph Müller, University of Fribourg, Germany; **Co-Author:**Carmen Zurbriggen, University of Fribourg, Switzerland

Classroom composition research on social-emotional outcomes (CCRSO) aims to systematically explore how characteristics of classmates are related to the social-emotional outcomes of children and adolescents. In this conceptual introduction to CCRSO it is first provided an insight into the scientific roots of CCRSO, namely peer influence research and school effectiveness research. It is then developed a conceptualization of research areas typically of interest in CCRSO, which comprises four different fields of inquiry. A brief review on exemplary studies in these areas of research is given. Finally, current challenges of CCRSO are presented. The contribution ends with a brief outlook on potential future research directions.

Does classroom composition affect school satisfaction of students with special educational needs?

Presenting Author:Katja Scharenberg, University of Education Freiburg, Germany; **Co-Author:**Wolfram Rollett, University of Education Freiburg, Germany; **Co-Author:**Wilfried Bos, TU Dortmund University, Germany

Analysing effects of the classroom learning environment is of special importance in inclusive education as mainstream classes are more heterogeneous regarding students' academic achievement and sociocultural origin, but benefits are assumed for all children (Ainscow & César, 2006). Studies examining effects of individual, peer and classroom variables for SEN students are rare (de Boer et al., 2013). Previous research found neutral or positive effects of inclusive education on achievement (Cole et al., 2004; Kocaj et al., 2014; Ruijs & Peetsma, 2009). There is, however, a lack of evidence regarding effects of inclusive education on non-achievement related, socioemotional outcomes (e.g. school satisfaction). Thus, our study examined whether 1.) classroom composition affects school satisfaction, 2.) such effects differ between sub-groups of at-risk students, and 3.) whether classroom composition mediates the hypothesised effect of SEN at individual level. Analyses based on a sample of 1,025 students in inclusive primary schools (Grade 4). SEN students (15.1%) were disadvantaged regarding socioemotional outcomes, but school satisfaction did not interact with sociocultural background. However, SEN students did not seem to benefit from attending classes with more privileged peers. The results indicate that process indicators might be more relevant for socioemotional outcomes in inclusive classrooms than contextual characteristics.

Antisocial behavior among adolescents: The influence of classmates' prosocial behavior

Presenting Author:Verena Hofmann, University of Fribourg, Switzerland; **Co-Author:**Christoph Müller, University of Fribourg, Germany

Prior research has revealed that the behavior within a classroom serves as a descriptive norm for individuals to behave in a certain way. While research often focused on negative peer influence, peers' prosocial behavior might in turn be associated with positive individual development. It was therefore presumed that classroom-level prosocial behavior would predict a decrease in antisocial behavior of individual students. Data were obtained from a longitudinal study of lower secondary school students in Switzerland ($N = 864$), from which data collection points at the end of Grade 7 and at the end of Grade 9 were used. Students completed self-reports on prosocial behavior, antisocial behavior, and antisocial attitudes, which were analyzed using multilevel models to control for clustering within classrooms. Results indicated that a higher level of prosocial behavior within a classroom significantly predicted a decrease in individual students' future antisocial behavior.

Comparison of the group actor-partner interdependence model and a latent-manifest contextual model

Presenting Author:Carmen Zurbriggen, University of Fribourg, Switzerland; **Co-Author:**Rob Gommans, Utrecht University, Netherlands; **Co-Author:**Martin Venetz, University of Applied Sciences of Special Needs Education Zurich, Switzerland

According to the big-fish-little-pond effect (BFLPE), students compare their own academic abilities with those of their classmates, and the information obtained then forms a reference that shapes students' academic self-concept. To counteract negative social comparison effects (e.g., a student with low achievement compares himself with higher-achieving classmates and develops a low academic self-concept), it is often proposed that teachers should adopt an individualized frame of reference when giving feedback to students.

We thus investigated whether the BFLPE on students' academic self-concept is moderated by teachers' frame of reference. For this purpose, two different methods for the analysis of group composition effects were used and compared.

Participants were 598 students from 40 Grade 6 classes. Data were analyzed using a latent-manifest contextual model within a multilevel structural equation modeling framework and the Group Actor-Partner Interdependence Model (GAPIM). Both methods supported the BFLPE. Class-average achievement was negatively associated with individual academic self-concept, even after controlling for individual achievement. Furthermore, teachers' individualized frame of reference had a small positive effect on students' academic self-concept, and diminished to some extent the BFLPE.

The results suggest that teachers' individualized feedback may be associated with an improvement of students' self-concept, and may contribute to less negative social comparison effects among classmates. Benefits and drawbacks of both methods of analysis used will be discussed.

Session F 20

30 August 2017 15:45 - 17:15

Pinni B - B4116

Invited Symposium

Assessment and Evaluation, Educational Policy and Systems

Challenges in school improvement research in a multilevel context

Keywords: Assessment methods and tools, Communities of learners, Comparative studies, Cooperative / collaborative learning, Meta-analysis, Mixed-method research, Qualitative methods, Quantitative methods, Quasi-experimental research

Interest group: SIG 23 - Educational Evaluation, Accountability and School Improvement

Chairperson: Katharina Maag Merki, University of Zurich, Switzerland

Organiser: Katharina Maag Merki, University of Zurich, Switzerland

Organiser: Tobias Feldhoff, Johannes Gutenberg University of Mainz, Germany

Organiser: Arnoud Oude Groote Beverborg, Johannes Gutenberg University of Mainz, Germany

Organiser: Falk Radisch, Germany

Discussant: Melanie Ehren, United Kingdom

Research on school improvement is complex, emerging from the interplay between its (loosely coupled) parts, the complex interrelationship between the several actors and the multilevel structure of educational systems which is even more important if accountability and evaluation systems differ between countries. Accordingly, analysis of this process places high demands on a study's design and method. However, current research seems relatively limited and serious research gaps can be identified. Particularly, these research gaps are owed to severe methodological shortcomings: For instance, researchers have mostly used self-reports. Further, as only very few longitudinal studies are available, school improvement changes are not studied in-depth. Therefore, this symposium seeks to host discussion of challenges in school improvement research and of different methodological approaches that have the potential to foster school improvement research. Tobias Feldhoff and Falk Radisch will discuss challenges and requirements in school improvement research based on a systematic review of quantitative longitudinal studies. Focusing on professional communities (PC) in 36 countries, Catalina Lomos will analyze different methods to test for measurement invariance and their impact on relationships of PC with other school processes. The mixed methods case study of Bénédicte Vanblaere and Geert Devos aim at analyzing the impact of a school-specific innovation on teachers' collaboration and learning outcomes, depending on the professional learning community level. And finally, Arnoud Oude Groote Beverborg and colleagues use log data from teachers to understand how teachers learn professionally in the workplace and how their development interplays with the change capacity of schools.

Challenges and requirements in school improvement research

Presenting Author: Tobias Feldhoff, Johannes Gutenberg University of Mainz, Germany; **Co-Author:** Falk Radisch, Universität Rostock, Germany

To reach a better understanding of the relation between school improvement capacity, teaching and student outcomes and to broaden our knowledge base, we need studies that appropriately model the complexity of school improvement, which use complex designs and methods of analyses. The choice of designs and methods has an influence on the insights that are possible. Therefore, this paper is elaborating methodological challenges and requirements in school improvement research based on a systematic review of quantitative longitudinal studies in current school improvement research (Feldhoff, Radisch & Bischof 2016). We developed a framework of the complex nature of school improvement processes described by six characteristics that guided our analysis. Taken together, across all 13 studies we found that none addressed all the characteristics of complexity outlined as standard. We especially need further research on the dynamic interaction of the factors in building school' capacity to change and on the reciprocal interactions between schools' capacity to change, teaching quality and student outcomes as well as their change. All in all the paper shows the necessity and the potential of longitudinal studies for further school improvement research.

Exploring processes and outcomes through a mixed methods design

Presenting Author: Geert Devos, Ghent University, Belgium; **Co-Author:** Benedicte Vanblaere, Ghent University, Belgium

Developing professional learning communities (PLCs) appears to be a promising avenue for building capacity for sustainable improvement. This mixed methods study first classifies Flemish primary schools into clusters, based on the strength of three interpersonal PLC characteristics. This reveals that four clusters can be distinguished. The case study method is then used to contrast the collaboration and resulting learning outcomes about a school-specific innovation in four schools belonging to two extreme clusters. Experienced teachers in these schools completed four logs that reveal differences in type and content of the collaboration throughout the school year between the high and low PLC schools. Results nurture optimism about the learning potential in high PLC schools as their learning outcomes are diverse. The content of the outcomes shows both differences and similarities compared to the low PLC schools.

Diversity in learning trajectories. Towards a tangible conceptualization of dynamic processes

Presenting Author: Arnoud Oude Groote Beverborg, Johannes Gutenberg University of Mainz, Germany; **Co-Author:** John Geerlings, Utrecht University, Netherlands; **Co-Author:** Peter Slegers, BMC Advies, Netherlands; **Co-Author:** Tobias

Feldhoff, Johannes Gutenberg University of Mainz, Germany; **Co-Author:**Klaas van Veen, University of Groningen, Netherlands; **Co-Author:**Maarten Wijnants, Radboud University Nijmegen, Netherlands

Knowledge of which information teachers use in their sensemaking processes and how these culminate in competences is limited, but necessary to understand how teachers learn professionally in the workplace and how their development interplays with the change capacity of schools. This study aims at enriching the dynamic conceptualisation of these ongoing and situated processes, which in a previous study using a dynamic systems analysis were characterized by effort, intentionality, and sensitivity. For that purpose, log data have been coded along competence categories and subsequently learning sequences were constructed. Measures thereof were compared between two teams. The results point to the diversity in paths to develop knowledge and skills, but also to the restraints that types of tasks (of teams) bring with them. The hypothesis that can be distilled from this study, is that the contribution of teachers to the change capacity of their schools is accordingly divers and modest. The application of this type of study for future school improvement research will be discussed.

The importance of measurement equivalence for predictor models across countries

Presenting Author:Catalina Lomos, LISER - Luxembourg Institute for Socio Economic Research, Luxembourg

This presentation will consider the latent concept of teacher Professional Community (PC) using the large-scale assessment data of International Civic and Citizenship Study (ICCS 2009) and perceived teacher participation in professional communities within schools of more than 58,000 teachers from 36 countries around the world. Using this latent concept measured through five observed items, we will reflect on the importance of comparable measurements across countries, we will empirically test for measurement invariance, and show how much the countries' PC scores and score differences are impacted by the different methods of measurement equivalence testing. In addition, the presentation will also show what is the relationship of PC with other school processes, such as distributed leadership, across the 36 countries, and most importantly how and how much are these relationships impacted by the level of measurement equivalence established across countries and the method through which equivalence is established. The topic of measurement equivalence needs to receive more attention within comparative school effectiveness and school improvement research, especially when we aim to establish valid models of predictors and relationships across more groups or countries.

Session F 21

30 August 2017 15:45 - 17:15

Main Building A - A4

Invited Symposium

Factors Fostering Metacognitive Monitoring and Control

Keywords: Educational Psychology, Experimental studies, Informal learning, Metacognition, Reading comprehension, Science education, Self-regulation

Interest group: SIG 16 - Metacognition

Chairperson: Elisabeth Pieger, Germany

Organiser: Elisabeth Pieger, Germany

Organiser: Mariette van Loon, University of Bern, Switzerland

Discussant: Philip Winne, Simon Fraser University, Canada

In this symposium, we present and discuss research on factors that foster metacognitive monitoring and control. Research shows that monitoring is often inaccurate, and this is disadvantageous for control and performance. To foster metacognition and performance in educational settings, it is important to know which factors affect monitoring and control. The four papers of this symposium examine different factors affecting monitoring and control: Factors that can be implemented into learning materials (disfluency and conceptual difficulty) as well as factors that can assist learning processes (internet access, feedback, and reward). The research investigated metacognition in kindergartners, adolescents, and adults. Metacognitive processes were investigated at different learning stages: The papers address ease of learning judgments at early learning stages, performance predictions during the learning tasks, and postdictions and self-reward judgments after completing task items. These judgments were considered in different learning contexts (learning with or without digital media) and for different learning materials (texts, word-pairs, explanatory questions, and analogical reasoning tasks). The first three studies focused on monitoring; findings show that judgments may benefit from disfluency manipulations and performance feedback. Furthermore, internet access can affect judgments. The last study focused on control of learning and shows that learners are sensitive to item difficulty and reward, but that it is difficult for them to combine these two factors when controlling learning. These insights can give input to the discussion how to develop instructions that can be applied to educational practice.

Analytic monitoring and disfluency: The role of fluency-contrasts

Presenting Author:Elisabeth Pieger, Technical University of Munich (TUM), Germany; **Co-Author:**Christoph Mengelkamp, University of Würzburg, Germany; **Co-Author:**Maria Bannert, Technical University of Munich (TUM), Germany

Monitoring is essential in educational contexts: If students monitor learning in an analytic way, they can initiate adequate

control and thus improve performance. The aim of this study is to investigate if disfluency activates analytic monitoring and if fluency-contrasts moderate the effects of disfluency on monitoring and performance. Based on prior research, we expected fluency-effects (differences between fluent and disfluent material) when a fluent text is presented before a disfluent text (contrast fluent-disfluent). Inversely, when a disfluent text is presented before a fluent text (contrast disfluent-fluent), no fluency-effects on monitoring and performance are expected. To test these hypotheses, students learned first with a disfluent and afterwards a fluent text or inversely (type of contrast as a between manipulation). In Experiment 1, fluency was manipulated by letter deletion, and in Experiment 2, fluency was manipulated by font type (fluency as a within manipulation). In order to capture monitoring, students made different types of judgments during learning. Results from both Experiments show that students made equal judgments for the fluent and the disfluent text when they experienced contrast disfluent-fluent. Inversely, students who experienced contrast fluent-disfluent made lower judgments for the disfluent than for the fluent text in both Experiments. Similarly, lower performance for the disfluent than for the fluent text was found only for contrast fluent-disfluent but not for contrast disfluent-fluent. Thus, students' monitoring as well as their performance is moderated by the type of contrast in fluency. To foster monitoring in educational settings further moderators of metacognitive processes should be investigated.

Feedback Improves Kindergartners' Self-Monitoring and Self-Rewarding

Presenting Author: Mariette van Loon, University of Bern, Switzerland; **Co-Author:** Claudia Roebers, University of Bern, Switzerland, Switzerland

Young children have problems accurately monitoring their performance; they are typically overconfident and not aware of errors. This is disadvantageous for their learning. The present study aimed to investigate whether two types of feedback, performance feedback and metacognitive feedback, may be suitable to improve kindergartners' monitoring accuracy and self-rewards. Kindergartners ($n = 105$, mean age 5.8 years) completed six analogical reasoning tasks, made monitoring judgments (indicating for each item whether they thought their response was correct or incorrect), and then gave themselves reward points for each completed task (indicating how many gold coins they deserved for their performance). Children were randomly assigned to performance feedback (PF), metacognitive feedback (MF), and no-feedback (NF) groups. Results show that kindergartners were overconfident, and did not recognize most of their errors. Importantly, feedback improved self-monitoring and self-reward judgments in comparison to the NF control group. The children who received PF or MF were better able to recognize their errors, and PF was most effective to improve kindergartners' self-rewarding. Findings indicate that feedback, and especially PF can improve monitoring accuracy, error detection, and realism of self-rewarding in the pre-school context.

Does access to the Internet foster or bias metacognitive judgments?

Presenting Author: Stephanie Pieschl, University of Newcastle, Australia

It is an open question if access to the Internet fosters or biases (meta-) cognitive functioning. For example, Fischer, Goddu, and Keil (2015) showed that Internet access in one task caused higher knowledge estimates regarding a second unrelated task. This experiment replicates and extends this research. In a 2×2 between-subject experiment participants ($n = 184$) were assigned Internet or no Internet conditions in each of two phases. In phase 1, they metacognitively judged their ability to answer four explanatory questions. In phase 2, they metacognitively judged their ability to answer questions regarding six unrelated themes, predicted their ability to answer eighteen questions within these themes, answered two of these questions, and postdicted their performance. Contrary to previous finding, the results show that Internet access hardly affected metacognitive judgments on subsequent unrelated tasks. Phase 1 Internet participants only judged their ability to answer explanatory questions higher than no Internet participants in phase 1; phase 2 Internet participants only gave higher metacognitive judgments regarding phase 2; there was only one significant interaction. Participants' open answers have not yet been fully analyzed. Thus, results regarding performance and accuracy of metacognitive judgments are still pending. This experiment will contribute to the discussion regarding the (positive or negative) effects of digitalization on metacognition. For example, the results may be relevant for Internet users' motivation to participate in formal learning opportunities provided by schools and universities.

Self-Regulated Learning and Agenda-Setting: How Difficulty and Reward Affect Study Decisions

Presenting Author: Anique de Bruin, Maastricht University, Netherlands; **Co-Author:** Luciana Falbo, Maastricht University, Netherlands; **Co-Author:** Peter Stiers, Maastricht University, The Netherlands, Netherlands; **Co-Author:** Tamara Van Gog, Utrecht University, Netherlands

How do students select what information to study and what to skip? Self-regulated learning requires continuous decision making, including being able to selectively pay attention to the most important information to learn (Bjorn, Dunlosky, & Kornell, 2013; Pintrich, 2004). Most research and theory development in this field has looked at the effect of difficulty of to be learned information (e.g., Dunlosky & Hertzog, 1998; Metcalfe, 2002). More recently, research has shown that students develop an agenda when deciding how to allocate study time, with the goal to maximize results with the adequate effort. Besides task difficulty, this agenda takes into account other factors, such as the reward structure of the task. How students balance these factors when making decisions on what to learn versus what to skip is a question for empirical research. In the present study, we investigated how adolescents (12-13 years and 16-17 years) take into account task difficulty and reward when making study decisions. After deciding to be tested or not on easy or hard word pairs, given either low or high reward, students actually studied the word pairs and were later tested on all of them. Our results show that both age groups

took into account difficulty and reward separately, but could not combine the two. The lower error rate on word pairs labelled difficult but in fact easy shows that students translated their agenda setting effectively into studying.

Session F 22

30 August 2017 15:45 - 17:15

Main Building E - E222

Invited Symposium

Interaction-based interventions that transform learning: engaging in research with social impact

Keywords: Argumentation, Cognitive development, Cognitive skills, Collaborative Learning, Conversation / Discourse analysis, Design based research, E-learning / Online learning, Emotion and affect, Interdisciplinary, Literacy, Peer interaction, Reading comprehension, Reasoning, Social aspects of learning and teaching, Social interaction, Teacher Professional Development

Interest group:

Chairperson: Sandra Racionero Plaza, Spain

Chairperson: Ester Miquel, Autonomous University of Barcelona, Spain

Organiser: Rocio Garcia-Carrion, University of Deusto, Spain

Discussant: Auli Toom, University of Helsinki, Finland

This symposium presents multidisciplinary work on the use of language, dialogue and interaction to create effective and transformative learning environments across educational contexts. Organised by the Multidisciplinary Educational Research Association (AMIE), it brings together scholars who engage in research with social impact. Currently, social impact of research has emerged as one of the most pressing demands to all scientific fields; consequently, this symposium aims at addressing that challenge by discussing interactions-based interventions that provide effective solutions for learning and development. Particularly, the four papers aim at improving students learning and fostering social and emotional development from primary to higher education by (1) promoting a dialogic space with primary-aged students who worked in pairs in face-to-face and in groups through wiki technology to learn in a science project; (2) fostering a Peer Learning Network among in-service teachers who implement *Reading in Pairs*, a peer-tutoring educational programme to improve reading comprehension; (3) analysing the impact of two dialogic learning environments, named Interactive Groups and Dialogic Literary Gatherings, on learning gains and prosocial behaviour (4) examining how specially-designed dialogue and reading, might affect or change autobiographical memory, particularly emotional memories. This symposium acknowledges the research conducted in the last decades on language, dialogue and social interaction and, through the analysis of three classroom-based interventions and one experimental condition, it presents evidence on how language, reflection, and dialogic interaction can be fostered to transform learning and memory for better development.

Characterizing learning to learn together skills with web 2.0 technology

Presenting Author: Manoli Pifarré Turmo, University of Lleida, Spain; **Co-Author:** Li Li, University of Exeter, China

This article develops our understanding of "Learning to Learn together (L2L2) skills" with technology and their role to promote learning and development in primary education. To this end, our paper is grounded on literature review of previous research to identify distributed leadership, group reflection, group assessment and mutual engagement as valuable L2L2 skills to learn in the digital age. To situate this discussion and examine how L2L2 skills emerge in practice, our work continues by reporting on an empirical study with primary-aged students. They worked in pairs through face-to-face interaction using wiki and besides they interact through wiki with two other pairs to write a joint science text. In order to align pedagogy and technology affordances to promote L2L2, our wiki project used "Thinking Together" approach to support students to create a 'dialogic space' to develop L2L2 skills and co-construct new understanding in the wiki science project. Our results illustrate how the interaction around wiki can afford students to be engaged in dialogues that promote the emergence of the four L2L2 skills. Main features of each L2L2 are exemplified. Educational implications about how teaching can support the developing of L2L2 skills using web 2.0 technologies are presented and discussed.

Teacher collaboration as a central axis of the staff-development model Peer Learning Network

Presenting Author: Ester Miquel, Autonomous University of Barcelona, Spain; **Co-Author:** David Duran Gisbert, Universitat Autònoma de Barcelona, Spain; **Co-Author:** Marta Flores, UAB Universitat Autònoma de Barcelona, Spain

This paper presents research that describes an in-service teachers' staff-development model, *Peer Learning Network (PLN)* and shows results on its efficiency. *PLN* is a three-year cycle of training, aimed at helping schools involved in the network to incorporate *Reading in Pairs*, a peer-tutoring educational programme to improve reading comprehension. Results from twenty schools from one network in Spain show the effects on the achievement of students' learning, on teacher learning in both concepts and attitudes, on the decisions that teachers make to adjust the programme to their particular context, and on the supports needed for success. This staff-development model has been shown to be an effective and efficient way to help teachers introduce and use, in a sustained way, a method of cooperative learning in their classrooms. *PLN* promotes three levels of peer learning simultaneously (among students, teachers, and schools), however, teacher collaboration is the central axis to make it work

Exploring the impact of Reading and Sharing upon Autobiographical and Emotional Memory

Presenting Author:Sandra Racionero Plaza, Loyola University Andalucia, Spain; **Co-Author:**Leire Ugalde, UPV/EHU, Spain; **Co-Author:**Lidia Puigvert, University of Cambridge, UK, Spain; **Co-Author:**Carmen Martín-Gómez, Universidad Loyola Andalucía, Spain

Among the causes for gender violence among youth, research has shown a link between attraction and violence that is learned through socialization. Once violent intimate relationships have been experienced, memories of those –with their associated emotions- become the ground to perceive next intimate experiences, and make decisions accordingly. Nonetheless, the fact that autobiographical memories are malleable opens up a window into a new area of scientific inquiry and intervention from where to prevent gender violence among youth. Starting from the relevance of social experience in the reconstruction of memories, we examined in a sample of Spanish female college students ($n = 32$, age range 17-30) whether reading a scientific text on love (Gómez, 2015), which empties violence of attractiveness, modified the autobiographical memories of violent sexual-affective relationships, towards rejection. This was compared with a control group ($n = 31$, age range 17-30) upon which none intervention was applied. Memory reports were collected before and after the reading and coded to analyze their emotional content. Memory quality features were assessed with a memory quality questionnaire (Alea & Bluck, 2007). Compared to controls, the experimental group experimented a significant increase in critical memories after the reading, as well as average decrease in positive emotions and average increase in negative emotions, together with higher memory sharing. This did not occur in the controls. The results are discussed in terms of the role of certain language and interaction experiences upon autobiographical memory reconstruction, and the power of this for preventing gender violence in secondary schools.

Impact of Interactive Groups & Dialogic Literary Gatherings on learning gains & prosocial behaviour

Presenting Author:Rocio Garcia-Carrion, University of Deusto, Spain; **Co-Author:**M. Lourdes Villardón, Universidad de Deusto, Spain; **Co-Author:**Zoe Martínez-de-la-Hidalga, University of Deusto, Spain

European research under the 6th and 7th Framework Programmes (INCLUD-ED, 2006-2011; ChiPE, 2013-2015) identified a number of 'Successful Educational Actions' (SEAs) which have resulted in school success in many diverse contexts, and may contain universal and transferable components. Two SEAs, Dialogic Literary Gatherings (DLG) and Interactive Groups (IG), typically create dialogic learning environments –in a whole-class setting or in small groups- and bring family and community members into classrooms to support children's learning. This paper aims at analysing the mechanisms – promoted by DLG and IG- in teaching and learning that can achieve simultaneous success both in linguistic and mathematical competence, exploring the impact that each of these actions, have upon each other. Besides, we seek to unveil the extent to what these improvements are achieved while increasing prosocial behaviour. A quasi-experimental process-product study with training and implementation phases has been conducted in three schools in Spain. Quantitative and qualitative data, including pre- and post- testing of students' mathematical and reading comprehension, and prosocial behavior, have been collected. Initial and final interviews with intervention teachers and children have been carried out. Preliminary analysis of the pre-post assessments on reading comprehension revealed an improvement on children's level after 10 sessions of DLG.

Session F 23

30 August 2017 15:45 - 17:15

Main Building C - C5

Invited Symposium

Assessment and Evaluation, Higher Education, Learning and Instructional Technology, Learning and Social Interaction, Lifelong Learning

The Learning Sciences: Topics and Trends in Theory, Research and Methods

Keywords: Computer-supported collaborative learning, Content analysis, Design based research, Inquiry learning, Interdisciplinary, Knowledge creation, Learning approaches, Motivation and emotion, Psychometrics, Qualitative methods, Quantitative methods, Social aspects of learning and teaching, Social interaction, Teaching / instruction, Teaching approaches, Technology, Video analysis

Interest group: SIG 04 - Higher Education, SIG 10 - Social Interaction in Learning and Instruction, SIG 14 - Learning and Professional Development, SIG 17 - Methods in Learning Research, SIG 25 - Educational Theory

Chairperson: Susan Goldman, University of Illinois at Chicago, United States

Discussant: Kimberley Gomez, University of California, Los Angeles, United States

The session serves to introduce the EARLI audience to recent advances and trends in the field of the Learning Sciences. The Learning Sciences (LS) has rapidly established itself in higher education with currently more than 50 post graduate degree programs dedicated to LS worldwide and more than 700 individual scholars who are members of the International Society of the Learning Sciences (ISLS). Many more programs in education and psychology include specializations or modules in Learning Sciences.

The presentations focus on advances in research in the learning sciences drawing on the structure and content of the new *International Handbook of the Learning Sciences*, edited by Frank Fischer, Cindy Hmelo-Silver, Susan R Goldman, and Peter Reimann. The handbook offers an internationally oriented up-to-date resource for research and teaching in the interdisciplinary field of the Learning Sciences. The content is organized according to three dimensions: Processes and

mechanism of learning and interaction; The design of learning environments for complex learning; and Methods and analytical strategies for research in the Learning Sciences. A fourth presentation describes an initiative to link existing Learning Sciences programs on the master's and doctoral level worldwide, the Network of Academic Learning Sciences programs (NAPLeS). The presentation includes an analysis of what is taught in programs that claim to teach "the Learning Sciences". The discussion considers communication strategies for connecting advances and trends emanating from research in the learning sciences to the worlds of educational practitioners and policy makers.

Advances in research on processes and mechanisms of learning and interaction

Presenting Author:Susan Goldman, University of Illinois at Chicago, United States

As a field, the Learning Sciences draws on multiple disciplines and domains of research and scholarship. This presentation reflects advances in findings to date and directions for future research among the diverse perspectives and fields of work that are concerned with human learning in complex environments (i.e., authentic environments in contrast to laboratory situations), both formal and informal. Included in the discussion are cognitive, sociocultural and neurocognitive, embodied (grounded) cognition, and complex systems perspectives on learning. As well trends are reported for work on expertise and learning progressions for learning and problem solving with multiple and multimedia information resources, situated in different disciplines. Finally, attention is drawn to contemporary conceptions of metacognition and regulation of learning, epistemic cognition, motivation and engagement, and individual and collective knowledge building. Throughout, major emphasis is on the intersections of these trends with issues and concerns of the learning sciences.

Advances in research on the Design of learning environments for complex learning

Presenting Author:Frank Fischer, Ludwig-Maximilians-Universität (LMU), Germany

Learning Sciences research has been focusing on approaches to supporting learning through the design of complex learning environments in formal and informal settings for learners across the lifespan. Consistent with the emphasis in the Learning Sciences there is a focus on pedagogies for complex and robust learning and on ways to support these pedagogies with technology. This contribution will include an analysis of the recent concepts, approaches and findings in the field of Computer-Supported Collaborative Learning. Here, the phenomena addressed range from dyads that solve a physics problem together with the support of computer tools to mass collaboration in Wikipedia or in big online courses like MOOCs. Moreover, this contribution covers exemplary advances in approaches to supporting active learning, including apprenticeship learning, inquiry learning, example-based learning, scaffolding, learning in the workplace, mobile computer support for collaborative learning, learning from productive failure. As well, pedagogy for supporting simulation and modeling, and instructional design using the 4C/ID framework are discussed. Trends for the future are presented for several key areas.

Research Methods and Analytic Strategies

Presenting Author:Louis Gomez, University of California, Los Angeles, United States; **Co-Author:**James Pellegrino, University of Illinois at Chicago, United States; **Co-Author:**Peter Reimann, University of Sydney, Australia

Given the array of perspectives, contexts, and topics of research in the Learning Sciences, researchers rely on multiple methodologies and analytic strategies. This presentation covers both different types of qualitative research approaches as well as basic and more advanced quantitative methods for the measurement of learning and change. Included are mixed methods and approaches to design-based research and design-based implementation research, both of which are considered relatively unique methodological characteristics of the Learning Sciences. The presentation also discusses ways in which multiple perspectives and multivocality are considered in analyzing interactions, and how these intersect with more traditional conversation and ethnographic methods for interactional analyses. Increasingly, the Learning Sciences is calling on various physiological and behavioral measures as well as contemporary approaches to assessment for learning, statistical methods for multilevel and mixed model analyses, and learning analytics as situated in the technologies of the Learning Sciences.

Advances and trends in teaching the Learning Sciences

Presenting Author:Freydis Vogel, Technical University of Munich (TUM), Germany; **Co-Author:**Daniel Sommerhoff, Ludwig-Maximilians-Universität (LMU), Germany

The Network of Academic Programs in the Learning Sciences (NAPLeS) is an international network of PhD and Master's programs in the Learning Sciences. Founded in 2012 by members of the ISLS, a main goal is to support new and emerging Learning Sciences programs all over the world by making available syllabi and learning resources used in established programs. Currently, programs from over 30 universities are NAPLeS members. Over the past several years, NAPLeS sponsored a series of online webinars. The success of these spawned the creation of short videos and interviews with more than 50 leading Learning Scientists. Both the webinars and videos are available thru the NAPLeS website (<http://naples.isls.org>). This presentation describes the NAPLeS network and the available resources.

In the second part of the presentation, results from a recent study on the trends in teaching the Learning Sciences will be presented. The goal of the study was to identify the topics and methods that currently constitute Learning Sciences programs internationally and contrast them. Preliminary results of this analysis show a great diversity regarding methods, topics and disciplines involved in teaching the Learning Sciences programs. Yet, three topics consistently appear across the range of programs in the Learning Sciences: Technology Enhanced Learning, Designing Learning Environments, and

Cognition and Metacognition. Furthermore, design-based research emerges as the prevalent method. The most common disciplines reflected in Learning Sciences programs are Computer Science, Psychology and Engineering (in that order).

Session G 1

31 August 2017 08:30 - 10:00

Pinni B - B3107

Single Paper

Teaching and Teacher Education

Teaching and Teacher Education - G

Keywords: Attitudes and beliefs, Communities of practice, Competencies, Educational Psychology, Educational Technology, Game-based learning, Higher education, Pre-service teacher education, Primary education, Teacher Effectiveness, Teacher Professional Development, Teaching approaches, Vocational education

Interest group: SIG 11 - Teaching and Teacher Education

Chairperson: Lisbeth M Brevik, University of Oslo, Norway

Do teachers like to read? Profiles of pre-service teachers' reading attitudes

Keywords: Attitudes and beliefs, Competencies, Higher education, Pre-service teacher education

Presenting Author: Iris Vansteelandt, AP University College/Ghent University, Belgium; **Co-Author:** Suzanne E. Mol, Leiden University, Netherlands; **Co-Author:** Hilde Van Keer, Ghent University, Belgium

This study examined the evolution of the affective and conative reading attitudes, reading behaviour, and perceived reading competence of pre-service teachers from the time of enrollment in teacher education ($N=253$) until their graduation ($N=67$, who graduated within the three years of teacher education). Three attitude profiles were identified using cluster analysis; i.e. personally-oriented, socially-oriented, and low-affect readers. Preliminary analyses show that at time of enrollment personally-oriented readers (26.9%) appear to be the more solitary readers, whereas socially-oriented readers (33.6%) were most willing to interact with others about reading. Both profiles are comparable as to the pre-service teachers' reading frequency and self-competence beliefs. The low-affect readers (39.5%) seem the most reluctant and aliterate readers. At graduation, all profiles remained, however, low-affect readers show to have become less reluctant and aliterate, while personally-oriented readers show to have grown more socially-oriented. This study stresses the importance of acknowledging individual differences in reading attitude when designing teacher education courses aiming at providing all teachers with the tools and willingness to foster their students' reading proficiency and enthusiasm.

Teachers and Game-based Pedagogy: Meaningful Implementations and Necessary Competences

Keywords: Educational Technology, Game-based learning, Primary education, Teacher Professional Development

Presenting Author: Marjaana Kangas, University of Lapland, Finland; **Co-Author:** Tuula Nousiainen, University of Jyväskylä, Finland; **Co-Author:** Jenni Rikala, University of Jyväskylä, Finland; **Co-Author:** Mikko Vesisenaho, University of Jyväskylä, Finland

In this paper, we examine different types of game-based pedagogy in the context of basic education and the teacher competences necessary for the meaningful implementation of game-based learning processes. Our data comes from 15 schools participating in a development project focusing on game-based pedagogy between 2013 and 2016. Educational games was the most common type of game-based pedagogy but the use of gamification started to spread more broadly in the course of the project. In terms of teacher competences, we identified references to four main areas: pedagogical (planning and organization based on curriculum, tutoring, and assessment), technological (selecting and combining tools in meaningful ways, overcoming technology-related obstacles), collaborative (sharing and communication), and personal - including the teacher's engagement in game-related practices and improvisation (playfulness, willingness to experiment). The results are applicable for acknowledging competence areas needed in game-based pedagogy and for developing teacher education and in-service programs as teacher competencies on game-based learning will become a more integral part of the repertoire of teachers' professional knowledge and skills.

Promoting Primary School Teachers Assessment Competence via a Training Program Combined with Diaries

Keywords: Competencies, Educational Psychology, Primary education, Teacher Professional Development

Presenting Author: Julia Klug, University of Vienna, Austria

Assessment is one of teachers' key competences. So far, teachers' judgment accuracy has often been investigated (e.g., Spinath, 2005; Südkamp, Kaiser, & Möller, 2012). Since there is a call for further education programs to foster new facets of teachers' assessment competence, the aim of the present study was to adapt and test a training program including a diary for reflecting one's assessment behavior at school with primary school teachers. The program and diary have first been developed and evaluated with secondary school teachers (Klug, Gerich, & Schmitz, accepted for publication). The results should now be replicated and generalized for the group of Primary School teachers. Furthermore, the study was ameliorated by adding a follow-up test in order to see if effects are stable. $N=49$ primary school teachers participated in the study which combined pre-, post- and follow up test measures with time-series data. Results show that the training and diary in fact enhance primary school teachers' assessment competence as well as their knowledge and reflected experience compared to a waiting control group similar to the study with secondary school teachers. Effects are stable over

time. The additional standardized diary proved to be a useful tool to get insights into what teachers' implemented in their daily assessment business. It can be used as a measure to check for implementation fidelity as well as for stimulating reflection about assessment practices even if we cannot show an additional intervention effect above and beyond the effect of the training program.

DUAL VET in Spain: current situation and attitudes of VET teachers towards dual VET

Keywords: Communities of practice, Teacher Effectiveness, Teaching approaches, Vocational education

Presenting Author: Pilar Pineda, Universitat Autònoma de Barcelona, Spain; **Co-Author:** Laura Arnau-Sabatés, UAB Universitat Autònoma de Barcelona, Spain; **Co-Author:** Anna Ciraso, Universitat Autònoma de Barcelona, Italy

This paper aims to analyse the perspective of VET Spanish teachers concerning the barriers and facilitators of dual VET and its implementation in Spanish schools. The study also seeks to better understand the teacher's attitudes towards dual VET.

A validated questionnaire was used and applied to a representative sample of VET schools across 5 different regions in Spain. The source of information was the professionals who manage VET: VET coordinators and teachers. The sample consists of 322 centers.

At the moment the fieldwork is being done, which will end in December 2016. The study ends in April 2017. By this date we will have all the results for the presentation at the conference in August 2017.

Session G 2

31 August 2017 08:30 - 10:00

Main Building C - C8

Single Paper

Assessment and Evaluation

Assessment and Achievement

Keywords: Achievement, At-risk students, Competencies, Educational policy, Quantitative methods, School effectiveness, Social aspects of learning and teaching, Special education

Interest group: SIG 01 - Assessment and Evaluation

Chairperson: David Bergin, University of Missouri/Columbia, United States

Is truancy contagious? Context effects of schools with a high proportion of truant students

Keywords: Achievement, At-risk students, Educational policy, Quantitative methods

Presenting Author: Christine Saelzer, TUM School of Education, Germany; **Co-Author:** Andrea B. Erzinger, University of Teacher Education St.Gallen, Switzerland

This study uses data from a repeated measurement of the German PISA 2012 grade-based sample ($n = 4100$ students in 247 grade 10 classrooms) in order to investigate how the classroom context can affect adolescent truancy. Research questions were whether the proportion of truant students per class is related to the individual student's self-reported truancy and whether there are groups of students who start playing truant in the year after the PISA test. Measures include data on subject-specific and general truancy at the time of PISA 2012 and one year later as well as proficiency scores for reading, mathematics and science in both PISA 2012 and the repeated measurement one year after. Specific focus is set on identifying disadvantaged schools with regard to a high proportion of truant students. Given that in Germany, only 5 percent of students indicated to have skipped classes in PISA 2012, a school in our study is defined as disadvantaged when it has a truancy rate of more than 10 percent. Multilevel analyses indicate that there is indeed a positive relationship between the proportion of truant students in a classroom and the individual self-report on truant behavior. Furthermore, students who scored below average in PISA 2012 have a higher probability to start playing truant in the year after than students who scored at least an average level of competence. Students in disadvantaged schools according to our definition score significantly lower than students in other schools (between 10 and 25 points in Reading, Mathematics and Science).

The effects of grade retention

Keywords: Achievement, At-risk students, Quantitative methods, Social aspects of learning and teaching

Presenting Author: Barbara Drechsel, University of Bamberg, Germany; **Co-Author:** Christine Saelzer, TUM School of Education, Germany; **Co-Author:** Marcus Pietsch, Leuphana Universität Lüneburg, Germany; **Co-Author:** Katharina M. Müller, Leuphana Universität Lüneburg, Germany; **Co-Author:** Timo Ehmke, Leuphana Universität Lüneburg, Germany

This study investigates possible effects of grade retention on the development of students' mathematics competence and on their motivation and beliefs in the field of mathematics. Data stem from a representative German sample of 9th graders (PISA 2012 and a repeated measurement one year later). Same-age comparisons were applied between three groups: (a) the retained students ($N = 89$), (b) a matched comparison group of promoted students ($N = 89$), and (c) the entire group of promoted students ($N = 3181$). Results show that the retained students were not able to improve their mathematics competence to the same extent as the comparison group. Regarding motivation and beliefs in the mathematics domain, the retained students show predominantly positive trends. Summarizing these empirical findings concerning the pedagogical measure of grade retention, no clearly positive effects have been found.

Supporting struggling students in Finnish basic education: Multilevel predictors of science scores

Keywords: Achievement, At-risk students, School effectiveness, Special education

Presenting Author: Mari-Paullina Vainikainen, University of Helsinki, Finland; **Co-Author:** Ninja Hienonen, University of Helsinki, Finland; **Co-Author:** Helena Thuneberg, University of Helsinki, Finland; **Co-Author:** Jarkko Hautamaki, University of Helsinki, Finland

In Finland, the weakest performers have outperformed their comparison groups in other countries in earlier PISA assessments. However, there is little empirical evidence on how the extensive support model of Finnish schools work in enhancing performance. Therefore, we used the PISA2015 data for studying the effects of adapted instruction and continuous support from the teacher on performance of students who are struggling with their science studies based on their excessive time use despite of lower-than-average performance. We controlled the differences in students' background and included school composition effects in our multilevel regression models for controlling for the effects of context where support was provided. The results of this study are applicable on the development of support structures and practices in all European countries and they serve as a baseline for further empirical analyses on the effective features of the Finnish support model.

Do socioeconomic factors outperform immigration background regarding school achievements?

Keywords: Achievement, At-risk students, Competencies, Quantitative methods

Presenting Author: Andrea B. Erzinger, University of Teacher Education St.Gallen, Switzerland; **Co-Author:** Daniela Jäger-Biela, German Institute for International Educational Research, Germany

This study focused on factors that can account for the achievement gap between immigrant and non-immigrant students in Switzerland in math, science, and reading by analyzing PISA data from 2015. Family background characteristics, speaking a language at home that differs from the language used in school, school system characteristics, residential segregation, and characteristics of the educational system are the crucial factors in this context. We conducted multilevel analyses—separately for the three different language regions in Switzerland—to test different individual and school factors for whether they could explain achievements in reading, math, and science in 15-year-old students. A high concentration of immigrant students in schools tends to increase concerns about student achievements, especially for the non-immigrants attending these schools. Furthermore, the question of how educational systems are able to serve students who speak a language at home that differs from the instructional language is very important. Knowledge about the effect of the concentration of immigrants in the school as well as the effect of the different compositional characteristics on students' performance will support decisions on system level. Because Switzerland has been handling the challenge of a high and steadily increasing rate of immigrant students in schools for several decades, it represents a benchmark for other countries where immigration is of increasing importance.

Session G 3

31 August 2017 08:30 - 10:00

Virta - 120

Single Paper

Motivational, Social and Affective Processes, Teaching and Teacher Education

Motivation and Emotion - J

Keywords: Assessment methods and tools, Attitudes and beliefs, Educational Psychology, Mixed-method research, Motivation, Motivation and emotion, Primary education, Qualitative methods, Self-efficacy, Teacher Professional Development, Teaching / instruction

Interest group: SIG 08 - Motivation and Emotion

Chairperson: Barbara Gasteiger-Klicpera, University of Graz, Austria

Motivation for teacher professional development: The role of decision contexts and age

Keywords: Motivation, Primary education, Qualitative methods, Teacher Professional Development

Presenting Author: Folke Glastra, Leiden University, Netherlands; **Co-Author:** Cornelis de Brabander, Leiden University, Netherlands

Using semi-structured interviews with 95 primary teachers, this study investigates the impact of three decision contexts—teacher participation is decided by school boards, by teacher teams or by individual teachers – and age group (younger/older) on teacher motivations for continuing professional development (CPD). Its focus is on valences – feelings about CPD and thoughts about the value of its consequences - of CPD and the role of autonomy in these motivations. Research questions pertain to the overall pattern of valences and autonomy, differences and similarities in these patterns according to decision context and teacher age group, and the nature of arguments connected to valences and autonomy. Teachers are generally positive about CPD and prefer directly applicable CPD, by implication limiting its uses to short term, non-innovative purposes. Decision contexts matter: Individual decision contexts have positive, board decision contexts negative valences for most teachers. School boards are perceived too distant to school practice to warrant relevancy. Team decision contexts shield most against negative valences. Decision contexts impact feelings of autonomy, and these in turn impact CPD valences. Valence and autonomy patterns differ markedly between age groups. Theoretical meaning, and

implications of these findings for teacher CPD and for further research are discussed.

Measuring multiple dimensions of early literacy motivation through self-report at school entry

Keywords: Assessment methods and tools, Attitudes and beliefs, Motivation, Motivation and emotion

Presenting Author:Erin McTigue, University of Stavanger, Norway; **Co-Author:**Oddny Judith Solheim, The Norwegian Reading Centre, Norway; **Co-Author:**Bente Walgermo, University of Stavanger, Norway; **Co-Author:**Jan Frijters, Brock University, Canada

Literacy success in school is co-determined by skill and motivation with early success in literacy predicting long term achievement. Additionally, early literacy interventions for at-risk students are more effective than later interventions. However, despite availability of measures for early reading skills few reliable and valid measures exist to measure reading motivation. In order to assess the viability of measuring students' reading motivation, at the time of school entry, in a multidimensional and theoretically grounded manner, we developed and validated the Norwegian Early Literacy Motivation Survey (NELMs). The sample comprised 1,171 first grade Norwegian students, assessed within the first month of school. Through analysis of competing factor models and grounded within a hierarchical model of motivation, the 12 survey items measured two overall dimensions: Self-beliefs and Interest. Self-beliefs was comprised of two scales: self-concept and self-efficacy; Interest was a single dimension. The structure was found to be invariant across skill level (low and high skill) and gender. Correlations between the three subscales varied considerably, but relations were supported by theory. Correlations between latent constructs and validation variables provide evidence of convergent and discriminant validity. This work adds to the field particularly by addressing a lack of affective instruments appropriate for use at school entry, in this case by measuring reading motivation prior to formal instruction in reading. Implications for use as a screening tool are discussed.

Teacher's self-efficacy as predictors of their classroom behaviours

Keywords: Attitudes and beliefs, Motivation, Self-efficacy, Teaching / instruction

Presenting Author:Sindu George, Monash University, Australia

Researchers have been interested in teachers' self-efficacy and its influence on the teaching-learning process since early 1980s (e.g., Ashton, 1984). There is a quantum of literature available highlighting teachers' self-efficacy as a significant predictor of various teacher and student outcomes. Although the volume of teacher self-efficacy research has increased, researchers are concerned about the direction, quality, and influence resulting from the increased attention given to the construct (Klassen, Tze, Betts, & Gordon, 2011). The current paper addresses one of the main issues in self-efficacy research –assessment of self-efficacy using global measures– by adopting the multi-faceted model of teachers' self-efficacy (Tschannen-Moran, Woolfolk Hoy, & Hoy, 1998). The paper presents a structural model relating the three dimensions of teachers' self-efficacy and four selected dimensions of their classroom behaviors.

Students' Beliefs Concerning School Transition to Lower Secondary School in Finland

Keywords: Educational Psychology, Mixed-method research, Primary education, Motivation and emotion

Presenting Author:Sirpa Eskelä-Haapanen, University of Jyväskylä, Finland; **Co-Author:**Kati Vasalampi, University of Jyväskylä, Finland; **Co-Author:**Marja-Kristiina Lerkkanen, University of Jyväskylä, Finland; **Co-Author:**Anna-Maija Poikkeus, University of Jyväskylä, Finland

The present study examines primary school students' beliefs concerning their school transition to lower secondary school. In this study the concept belief refers to students' own understanding and ideas. It can be understood as positive expectations to look for or success as well as concerns to be afraid or tensed of. Furthermore, relations between students' concerns and well-being were examined. Data from 1037 Finnish students were obtained at the end of students' primary school. The study was conducted with mixed-method approach. The results of the qualitative problem driven content analysis showed that students' had positive expectations comprising: 1. Comfort, 2. Friendships, 3. Connected to Learning, 4. School, 5. Increasing Freedom, and 6. Teacher-child relationship. Concerns instead were mainly related to social relations in lower secondary school. Furthermore, results of the independent sample t-test indicated that girls, who mentioned concerns about social relations in lower secondary school, were more exhausted and had lower level of self-esteem than the other girls at the end of primary school. In contrast, boys who had concerns about future classroom had higher level of self-esteem and a lower level of cynicism in comparison with other boys at the end of primary school.

Session G 4

31 August 2017 08:30 - 10:00

Main Building A - A3

Single Paper

Assessment and Evaluation

Assessment Methods and Tools - C

Keywords: Assessment methods and tools, Competencies, Distributed cognition, Educational policy, Higher education, Instructional design, Language (L1/Standard Language), Meta-analysis, Misconceptions, Qualitative methods, Writing / Literacy

Interest group: SIG 01 - Assessment and Evaluation

Chairperson: Kyosuke Kakinuma, Doshisha University, Japan

Regulation on line during early-readers' writing: a situated model of teacher's assessment activity

Keywords: Assessment methods and tools, Distributed cognition, Qualitative methods, Writing / Literacy

Presenting Author: Lionel Dechamboux, University of Geneva, Switzerland

Interested by teacher's assessment activity during regulation on line (Mottier Lopez, 2012), we focused on his/her activity during writing tasks he/she gave to their students. This particular context led us to several problems. A conceptual one: from a situated and interpretative perspective, we'll plead the need of embracing the teacher's point of view within the situation. But how to define assessment activity in action? A methodological one: how to catch relevant data of this activity? In front of such questions, we tried to cross over assessment and activity theories through two major concepts of John Dewey's works: valuation and inquiry (Dewey, 1993 ; 2011). So we would like to answer these research questions: What is the teacher's assessment activity in the regulation on the fly process? What matters to him/her? What sorts of sign does he/she take care of? What kind of actions does it lead him/her to? To what extent a previous assessment activity shapes a next one? What sorts of framework are used by teachers to assess? To answer these questions, we'll focus on three teachers' work in three primary classrooms during writing sessions with three early-readers pupils with learning difficulties. We filmed teacher-students interactions and we made self-confrontation interview with teacher to model his/her assessment activity. Our study highlights the validity of our model of valuation and inquiry to describe teacher's assessment activity showing the building of frameworks during experience, his/her strategy used to support students learning.

Empowering teacher's assessment literacy: A study on the value of professionalization programs

Keywords: Assessment methods and tools, Competencies, Educational policy, Higher education

Presenting Author: Fer Boei, Windesheim University of Applied Sciences, Netherlands; **Co-Author:** Kitty Meijer, Utrecht University of Applied Sciences, Netherlands; **Co-Author:** Jeroen Van der Linde, Hogeschool van Arnhem en Nijmegen/HAN University, Netherlands; **Co-Author:** Fedor De Beer, Hogeschool van Arnhem en Nijmegen/HAN University, Netherlands; **Co-Author:** Dominique Sluijsmans, Zuyd University of Applied Sciences, Netherlands; **Co-Author:** Tamara Van Schild-Mol, Hogeschool van Arnhem en Nijmegen/HAN University, Netherlands

The Netherlands Association of Universities of Applied Sciences (NAUAS) agreed upon a set of demands regarding the assessment competence of higher education teachers related towards students' learning outcomes. This study evaluates the value and the alignment of these programs in relation to the intended goals after implementation. The study is characterized as a multiple case design using the model of Van den Akker (2013) as an analytic framework. The NAUAS adopted the set of demands and mainly added organizational issues in the implementation. The attained level was experienced in different ways, related with the entry levels of the teachers. Most teachers were positive about the content of the programs.

Best of two worlds in writing assessment: Integrating benchmarking and comparative judgement

Keywords: Assessment methods and tools, Competencies, Language (L1/Standard Language), Writing / Literacy

Presenting Author: Marije Lesterhuis, University of Antwerp, Belgium; **Co-Author:** Fien De Smedt, Ghent University, Belgium; **Co-Author:** Renske Bouwer, University of Antwerp, Belgium; **Co-Author:** Hilde Van Keer, Ghent University, Belgium; **Co-Author:** Sven De Maeyer, University of Antwerp, Belgium

As scores on writing performance provide students, teachers and even policy makers insights into students' writing ability, these scores should be reliable, valid and preferably also obtained in an efficient way. Although rubrics are often used in order to enhance reliability and efficiency, problems are often reported due that raters face difficulties in defining absolute scores for each text separately. Benchmark scoring and Comparative Judgement (CJ) are both based upon the idea that raters are better helped when they can compare between texts instead of compare a text with a rubric. For benchmark scoring, a scale of five benchmark texts is developed by a small number of experts. These five benchmark texts help raters in their scoring decision. Within CJ, raters decide on a high number of comparisons, each time only which texts is best. Based on these comparison decisions the texts can be scaled. Both methods have their drawbacks: developing benchmark texts requires time and expertise, while for CJ several raters are needed and this method is especially time-consuming when a high number of texts need to be scaled. The present study reports the (dis)similarities between both scoring methods by looking at the obtained reliabilities and if the texts are scaled in a similar way. Results show that both methods lead to similar reliabilities and scores. Therefore, the authors propose to do more research on how both methods can be combined.

Blind faith and unseen exams: What research has to say about the choice between seen vs unseen exams

Keywords: Assessment methods and tools, Instructional design, Meta-analysis, Misconceptions

Presenting Author: Cathal O'Siochru, Liverpool Hope University, United Kingdom; **Co-Author:** Melissa Ryan, Liverpool Hope University, United Kingdom

The significance of exams in determining both student satisfaction and success has prompted a widespread interest in the most effective way to employ exams as assessments. This has prompted several longstanding debates on the merits of different exam formats. However, it is interesting to note a relative absence of discussion on what could be argued is a major exam formatting choice, seen vs unseen exams. Many educators have reservations about seen exams based on anecdotal arguments about increased risk of plagiarism, rote memorization and other poor practices. But what evidence is

there to support or criticise either seen or unseen exam formats? In this paper we will present the findings of our review of the literature which explores the issues in and around the seen vs unseen debate. We will consider the perceptions of both staff and students on seen and unseen exams, seeking to understand the preferences on both sides and the origins of those preferences. We will also discuss research which has considered the impacts of the two exam formats, including impact on the approach used by students to prepare for their exams, impact on student self-confidence and impact on assessment outcomes such as performance. Additionally, we will discuss some of the methodological issues we've identified in our review of research methods in this area such as a potential lack of 'student voice' in the research. We hope to stimulate an informed debate among education researchers and practitioners on this somewhat overlooked issue in exam formatting.

Session G 5

31 August 2017 08:30 - 10:00

Linna - K110

Single Paper

Educational Policy and Systems, Learning and Social Interaction, Teaching and Teacher Education

Educational Theory - B

Keywords: Case studies, Citizenship education, Cultural psychology, Educational policy, Interdisciplinary, Knowledge creation, Learning approaches, Literacy, Philosophy, Reflective society, Science education, Social aspects of learning and teaching, Teaching / instruction

Interest group: SIG 25 - Educational Theory

Chairperson: Charles Max, University of Luxembourg, Luxembourg

Teaching Responsible Research and Innovation as a part of the Nature of Science

Keywords: Citizenship education, Educational policy, Reflective society, Science education

Presenting Author:Antti Laherto, University of Helsinki, Finland; **Co-Author:**Lorenz Kampschulte, Leibniz Institute for Science and Mathematics Education (IPN), Germany; **Co-Author:**Jan Apotheker, University of Groningen, Netherlands; **Co-Author:**Miikka de Vocht, University of Helsinki, Finland; **Co-Author:**Ron Blonder, Weizmann Institute of Science, Israel; **Co-Author:**Sevil Akaygun, Bogazici University, Turkey

The European Union encourages science education to orient towards the concept of Responsible Research and Innovation (RRI), i.e. socially and ethically sensitive and inclusive processes of science and technology. Recent views of Nature of Science (NOS) – one of the most important and debated topics in science education research – address the same concerns. To examine the socio-institutional nature of science in science education, in the present theoretical study we carried out a concept analysis of educational implications of the RRI policy in relation to a recent reconceptualization of NOS, the Extended Family Resemblance Approach (FRA) for Science Education. We discuss how the nature of science in that approach closely connects to the RRI, and thereby conclude that science education for RRI can utilize the approaches and applications developed with the Extended FRA. To illustrate the opportunities and challenges RRI may bring to NOS-focused science education, we discuss the results and experiences stemming from the EU-funded project IRRESISTIBLE. We show examples of the practical classroom approaches developed in the project, as well as some survey results on teachers' perspectives on RRI. The aim of this work is to better understand the potential implications of RRI to research and practice in science education.

This is not my life: Disrupting dominant cycles of knowing/being in educational research.

Keywords: Interdisciplinary, Philosophy, Social aspects of learning and teaching, Knowledge creation

Presenting Author:Tim Corcoran, Deakin University, Australia

Acknowledging the symbiotic inseparability of ontology and epistemology encourages researchers to sense how multiple ways of being and ways of knowing affect the conduct of our work. No wonder then the dilemmas facing researchers when, for example, seeking financial support, they are confronted with funding being available largely to maintain particular ways of knowing/being. Regrettably this is not uncommon in current practice where positivist-informed randomised control trials or causal-explanatory logics are considered gold standard. How is it then possible to maintain a preferred ethics of existence (St. Pierre, Jackson & Mazzei, 2016) when prevailing cycles of knowing/being dominate educational research? This presentation considers opportunities made available in post-positivist or post-qualitative work (Lather, 2007) and new empiricism and new materialism (St. Pierre, 2014) and how these support a revelatory turn in understanding life-enacted learning (Corcoran, 2005). It then engages Shotter's (2010) interest in anticipatory responses and how carriage of these in/to educational scholarship assists with aligning commitments to joint action. This interdisciplinary discussion brings together cutting edge theory from education and psychology to examine researcher orientations to learning and social interaction and how these can support or negate ethical commitments made in/through practice.

Ask What Your Country Can Do For You: Basic Education Policies in the Welfare State

Keywords: Case studies, Educational policy, Interdisciplinary, Literacy

Presenting Author:Carolyn Knauber, German Institute for Adult Education - Leibniz Centre for Lifelong Learning, Germany;

Co-Author:Alexandra Ioannidou, German Institute for Adult Education - Leibniz Centre for Lifelong Learning, Germany

Policies on basic education are gaining importance, especially since the results of the OECD Programme for the International Assessment of Adult Competencies (PIAAC) were published. They revealed that a sizeable proportion of adults in developed countries have low basic skills. In a contemporary perspective education policy can be considered as part of welfare state policy given that the lack of basic education diminishes chances to participate in society and the economy. The effectiveness of policies on literacy and basic education has both macro- and micro-economic dimensions and thus, it is important to ask which kinds of basic education policies countries implement to address the problems of adults with low literacy skills. This empirical paper explores the potential of basic education policies in the advancement of basic skills, particularly literacy, in three exemplary country cases (Austria, England and Denmark), representing Esping-Andersen's three welfare state regimes: the conservative, the liberal and the social-democratic welfare state. Findings are based upon qualitative data from the project "EU-Alpha" gained through comparative research in six countries. The paper identifies actors, resources/responsibilities, and implementation of basic education policies and places these findings into broader debates on adult skills and skills inequality.

Independence or interdependence? Dialogue-theoretical problems of 'independent' learning

Keywords: Cultural psychology, Learning approaches, Social aspects of learning and teaching, Teaching / instruction

Presenting Author:Tina Kullenberg, Kristianstad University, Sweden; **Co-Author:**Anders Eklöf, Kristianstad University, Sweden; **Co-Author:**Lars-Erik Nilsson, Kristianstad University, Sweden

In the light of our empirical study on 12 Swedish students in secondary school, this paper elaborates on the paradoxical issue of how to conceptually, and theoretically, approach an intended self-regulating working model within a dialogical framework. Our findings indicate that the participants' reasoning about the pursued project works is basically build on the ideal notion of being dependent on their teacher in several ways. It is argued that a sociocultural perspective generally problematize the ontology of individualistic independence while stressing the idea of interpersonal and contextual *interdependence*. However, drawing on Bakhtin-influenced educational scholars, we also provide a distinction between two types of interdependency in communicative other-orientation: orientation to alterity vs. orientation to agreement-based intersubjectivity. Furthermore, we discuss the educational implications of such a conceptualization in terms of socialization and personalization. Interdependency from an individualistic point of view is dismissed as an illusion but a radical notion of ontological interdependence may instead facilitate students' voices, that is, their personalization in terms of creative agency.

Session G 6

31 August 2017 08:30 - 10:00

Pinni B - B1097

Single Paper

Instructional Design, Teaching and Teacher Education

Writing and Literacy

Keywords: Arts, Cognitive development, Educational attainment, In-service teacher education, Language (L1/Standard Language), Literacy, Metacognition, Mixed-method research, Primary education, Secondary education, Teacher Professional Development, Teaching / instruction, Teaching approaches, Writing / Literacy

Interest group: SIG 12 - Writing

Chairperson: Janina Lehmann, Ulm University, Germany

Learning to mean: The transfer of grammar knowledge to the shaping of rhetorical intentions

Keywords: Mixed-method research, Primary education, Secondary education, Writing / Literacy

Presenting Author:Susan Jones, University of Exeter, United Kingdom; **Co-Author:**Debra Myhill, University of Exeter, United Kingdom; **Co-Author:**Helen Lines, University of Exeter, United Kingdom

With the re-introduction of formal grammar teaching into the UK curriculum has come a grammar test, largely testing decontextualized grammar knowledge. There is, however, little substantive research evidence demonstrating how grammar knowledge is transferred to the act of writing, nor the extent to which this transfer is explicitly understood by young writers. Within the context of a pedagogy that eschews the decontextualized 'labeling of parts' and rather, supports young writers in making a connection between grammatical choices and rhetorical effect, this paper will consider how young writers 'learn how to mean'. Drawing on case study data from a three year longitudinal study, funded by the Economic and Social Research Council, this paper will explore how four young writers developed an awareness of the role of grammar in shaping meaning, how this is reflected in what they write and how they explain their choices. The data will show that grammar knowledge and the crafting of text exists in a reciprocal relationship; such that an unconscious writing choice can become conscious grammar knowledge that can inform future writing choices.

Teachers' stories about writing: Exploring identities through autobiographical creative writing

Keywords: Arts, In-service teacher education, Teacher Professional Development, Writing / Literacy

Presenting Author:Anne Martin, University of Jyväskylä, Finland

Teachers' stories about writing: Exploring identities through autobiographical creative writing

This study examines autobiographical creative writing as a tool for promoting teachers' professional development and

identity from a narrative perspective. The purpose of the study is to explore teachers' relationship to writing and their goals regarding developing themselves in the writing group's meetings. Research questions are following: 1) 1) What kinds of stories do teachers tell about themselves as writers? 2) 2) What goals do the teachers set for their personal and professional development in the writing group? Writing is perceived to be a significant tool for professional development. According to narrative theory, we build our identities through stories we tell about ourselves. Research suggests that arts-based, autobiographical and literary methods can bring new perspectives to exploring ourselves. This qualitative study is based on a peer writing group for primary school teachers (N=11). In the group, teachers wrote autobiographical creative assignments to express and to explore themselves. They also discussed their writing experiences. The data were collected during the academic year 2016–2017, comprising of the teachers' writings, interviews and group discussions. Thematic and narrative analysis were used as research methods. According to preliminary results, the teachers perceived to have a positive relationship to writing. They perceived writing to be effective for personal and professional development, and emphasized therapeutic and pedagogical dimensions of creative writing. The findings of this study further support the idea that integrating arts-based, literary methods can broaden the narrative identity building process of teachers.

Voicing Grammatical Knowledge: Young Writers' Articulation of Grammatical Concepts

Keywords: Cognitive development, Educational attainment, Metacognition, Writing / Literacy

Presenting Author: Helen Lines, University of Exeter, United Kingdom; **Co-Author:** Debra Myhill, University of Exeter, United Kingdom; **Co-Author:** Susan Jones, University of Exeter, United Kingdom

Abstract: Changes to curriculum policy in several Anglophone countries, for example New Zealand, Australia and England, have focused attention on the explicit teaching of grammar as a tool for raising attainment in writing, with the use of linguistic terminology made prominent in both teaching and testing. Theoretically, metalinguistic understanding has been framed as the ability to talk explicitly about language, with or without the use of grammatical terminology. However, whilst acknowledging that talk is the key mechanism through which metalinguistic understanding in writing is made visible, more research attention has been paid to teachers' verbalisations of linguistic subject knowledge than to young writers' articulation of grammatical knowledge. Drawing on data from a three-year longitudinal study, funded by the Economic and Social Research Council, this paper will consider the ways in which children aged 8-14 voice their understanding of grammatical concepts, with particular reference to sentence grammar, given that achieving sentence control is a key marker of progression in writing. The paper will focus on how student talk reveals learning and can be used to assess conceptual development of grammatical knowledge.

The Inspiration Myth: how professional writers manage the planning process

Keywords: Language (L1/Standard Language), Literacy, Teaching / instruction, Teaching approaches

Presenting Author: Debra Myhill, University of Exeter, United Kingdom

Cognitive models of the writing process draw attention to three process which characterise the process of writing: planning, translating and reviewing, and these models emphasise that these processes are not chronological or linear but recursive and iterative. At the same time, many classrooms adopt process approaches to the teaching of writing, and in the UK, the curriculum advocates the teaching of planning, drafting, and evaluating. Yet there is evidence that teachers tend towards a narrow conceptualisation of planning as the formal outlining of the written text. This paper sets out to explore how professional writers, as expert writers, describe their own planning processes and how this understanding of highly competent management of writing might re-shape instructional practices in the teaching of writing to developing and less mature writers. The paper draws on data from two consecutive studies, which involved interviewing 21 professional writers about their own composing processes, including planning. The findings indicate that professional writers describe planning in ways which are consistent with cognitive models, with the planning being a fluid and varied process including a range of behaviours such as research, gestation of ideas, the adoption of personal writing routines as well as more formal outlining of text. The evidence from professional writers indicates that broadening the pedagogical conceptualisation of planning to allow more time for topic familiarisation, creative playfulness, and gestation of ideas, as well as the more formal outlining, might better support young writers in their development as writers.

Session G 7

31 August 2017 08:30 - 10:00

Pinni B - B4117

Single Paper

Higher Education

Doctoral and Researcher Education

Keywords: Doctoral education, Higher education, Knowledge creation, Qualitative methods, Quantitative methods, Reflection, Researcher education

Interest group: SIG 24 - Researcher Education and Careers

Chairperson: Katharina Loibl, University of Education Freiburg , Germany

What are ethics in doctoral supervision, and how do they matter?

Keywords: Doctoral education, Higher education, Quantitative methods, Researcher education

Presenting Author:Erika Löfström, University of Helsinki, Finland; **Co-Author:**Kirsi Pyhältö, University of Oulu / University of Helsinki, Finland

The purpose of this study is to provide a tool for analyzing ethical issues in doctoral supervision, to investigate whether ethical issues in doctoral supervision relate to doctoral experience, and if they do, how. More precisely, the study explored the relationships between ethical issues in doctoral supervision and attrition intentions, research engagement, satisfaction with supervision and with doctoral studies, and burnout. The respondents were 236 doctoral students in behavioral sciences in two research-intensive universities in Finland. The results show that how students are treated, supported, and respected are vital elements in how they experience their doctoral journey. Ethics in supervision as experienced by the students predicted both positive outcome variables (engagement, satisfaction with doctoral studies and supervision) and negative ones (burnout, attrition intentions). This result suggests that high standards of ethics are vital for a functional supervisory relationship.

Becoming a university teacher: doctoral students' conceptualizations of online teaching portfolios

Keywords: Doctoral education, Qualitative methods, Reflection, Researcher education

Presenting Author:Helga Dorner, Central European University, Hungary; **Co-Author:**Joanna Renc-Roe, Central European University, Hungary

This paper outlines findings from a research project on the reflective processes involved in the creation of online teaching portfolios by doctoral students of an international, graduate university in Europe. The study was conducted with the aim to identify emerging individual and shared conceptions of online teaching portfolios. Fifteen doctoral students who took part in an early-career faculty development program were interviewed. Interviews were transcribed and coded. The coding followed the protocol of qualitative interview analysis. Doctoral students were found to oscillate between performative and authentic repertoires of reflective work in their conceptions of portfolios. These findings provide a useful research insight into the way scholarly, reflective practice is experienced.

Doctoral students' engagement in knowledge creation practices

Keywords: Doctoral education, Qualitative methods, Researcher education, Knowledge creation

Presenting Author:Viivi Virtanen, University of Helsinki, Finland; **Co-Author:**Jenna Vekkalila, University of Helsinki, Finland; **Co-Author:**Jani Kukkola, University of Jyväskylä, Finland; **Co-Author:**Liezel Frick, Stellenbosch University, South Africa; **Co-Author:**Kirsi Pyhältö, University of Oulu / University of Helsinki, Finland

Knowledge creation is at the core of scientific endeavor. As early career researchers, doctoral students take part in the knowledge creation processes and through their original contribution to knowledge they are considered to become experts of their particular domain (Frick & Brodin, 2014). Yet we currently understand very little about what doctoral knowledge creation entails, and how doctoral students engage with this creative process. This study aims to gain a better understanding of the kinds of knowledge creation practices that doctoral students in the sciences engage in during their studies. For this purpose, altogether 34 doctoral students from STEM fields were interviewed. The data were collected with semi-structured interviews, and the data were qualitatively content analyzed. The preliminary results showed that the majority (63%) of the described practices were *established* everyday knowledge creation practices, whereas over a third (37%) of the practices were *innovative* entailing transformation of the current practices and developing new ones. Moreover, the practices were typically *collective* (66%) involving the students, their supervisors or other members from their researcher groups. Only about a third (34%) of the practices reported were *individual* in nature. Further investigation showed that the participants were typically *actively engaged* in knowledge creation practices (62%) rather than just *adapting* (24%) the existing ones. Perceiving oneself as *bystander* (14%) was even less typical. The significance of this study lies in exploring doctoral students' self-reported knowledge creation practices in STEM fields, and shows that they perceive themselves to be *actively* and *collaboratively* engaged in creating knowledge.

The doctorate as a quest: PhD students purposively navigating their doctoral paths

Keywords: Doctoral education, Higher education, Qualitative methods, Researcher education

Presenting Author:Isabelle Skakni, University of Oxford / Université Laval, Canada

In most Western countries, universities express concern about completion times and graduation rates at the doctorate level, especially in the social and human sciences. While intellectual abilities alone are not sufficient to successfully progress through a PhD program, current knowledge indicates that modalities of training and contexts and conditions in which this training takes place have also a major impact on the process. However, few studies examine how the interplay of individual and structural factors influence PhD students' paths. Drawing on Giddens' theory of structuration, this paper aims to address this gap by exploring how PhD students' primary 'reasons', 'motivations' and 'motives'—as defined by Giddens—for engaging in doctoral studies influence both which aspects of their training they perceive as facilitating/constraining their progress and the strategies they favoured to face the challenges encountered. Based on semi-structured interviews conducted with 36 Canadian PhD students in the social and human sciences, the findings reveal three distinct journeys regarding how these students navigate their doctoral paths: the quest of the self, the intellectual quest, and the professional quest. Depending on their quest type, the nature and intensity of PhD students' concerns and challenges as well as the support they expected during their training differed.

Session G 8

Achievement and Science Education

Keywords: Achievement, Competencies, Educational Psychology, Reasoning, Science education, Student learning, Teaching / instruction

Interest group:

Chairperson: José van der Hoeven, CED Groep, Netherlands

Enhanced Concept Learning in Kinematics by Means of Formative Assessment

Keywords: Achievement, Science education, Student learning, Teaching / instruction

Presenting Author: Andreas Lichtenberger, ETH Zurich, Switzerland; **Co-Author:** Clemens Wagner, Physics Department ETH Zurich, Switzerland; **Co-Author:** Andreas Vaterlaus, Physics department eth, Switzerland

We have developed and applied a model of formative assessment in order to foster concept knowledge in kinematics at Gymnasiums in the German speaking part of Switzerland. Our model consists of four elements: clicker sessions with peer instruction, a monitoring tool, a diagnostic tool and a reflective lesson. To investigate the effectiveness of our model we conducted a study with 29 teachers and 607 students (15 to 17 years old) from 24 Swiss Gymnasiums. Our experimental setting consisted of three groups: a control group using a traditional teaching style (TT-group), a frequent testing group (FT-group) where traditional teaching was endowed with concept questions as exercises, and the formative assessment group (FA-group) where teachers used the same set of concept questions in the formative assessment approach. In order to compare the three groups we used a validated kinematics concept test as pre-, post- and follow-up-test and a conventional kinematics test with standard numerical textbook problems as post-test. The results show that the students in the formative assessment courses achieved a significantly better conceptual understanding than the students who attended the traditional and the frequent testing courses. This indicates that the better performance was not a frequent testing effect but presumably resulted from the peer instruction and the reflective lesson. Moreover, the FA-group achieved the same results as the TT-group in the conventional test. This implies that the students in the formative assessment setting were able to outweigh the shorter exercise time with a better conceptual understanding.

Understanding Coulomb's law by means of inventing with contrasting cases

Keywords: Achievement, Science education, Student learning, Teaching / instruction

Presenting Author: Elsbeth Stern, ETH Zurich, Switzerland; **Co-Author:** Lennart Schalk, ETH Zurich, Switzerland; **Co-Author:** Ralph Schumacher, ETH Zurich, Switzerland

Learning a novel principle by inventing with contrasting cases is a promising means to support deeper understanding of abstract scientific concepts. It seems particularly worthwhile if a concept is based on a complex mathematical formula, which at the same time is not too challenging from a mathematical point of view. This is the case for Coulomb's law: the magnitude of the electrostatic force F of interaction between two point charges is directly proportional to the scalar multiplication of the magnitudes of charges ($q_1 \cdot q_2$) and inversely proportional to the square of the distance between them (r^2). In a study with 17 year old students ($N = 101$) from 5 advanced high-school classes (Gymnasium), we investigated whether students who had to invent the formula by comparing four pairs of contrasting cases would develop a deeper understanding of Coulomb's law than students who were presented with the formula and had to elaborate it by self-explanations. Two self-explanation conditions were set up as control; in both control conditions, Coulomb's law was directly introduced. In the overall condition, students subsequently saw four pairs of contrasting cases of Coulomb's law before they were prompted to generate self-explanations. In the stepwise condition, students were asked for self-explanations after every pair of contrasting cases. Contrary to our expectations, the inventing group did not outperform the other two groups neither on conceptual, nor procedural or transfer tasks.

Reflections from Research: considerations for the implementation of educational simulations

Keywords: Achievement, Science education, Student learning, Teaching / instruction

Presenting Author: Koen Veermans, University of Turku, Finland; **Co-Author:** Tomi Jaakkola, University of Turku, Finland

Educational simulations hold great potential for creating engaging and productive learning environments in STEM domains. This does, however, not mean that the implementation and outcomes of learning with educational simulations are straightforward. This paper presents and reflects on research findings in a series of studies with a computer simulation in the domain of electricity. These studies used the same simulation with varying instructional designs and over a range of grades. Interestingly, though the overall impact has been predominantly positive, each design has always had a unique influence on student performance and/or engagement. The paper will look at perceptual concreteness of simulation elements, instructional support and combining simulations with real equipment and will try to provide some interpretation for the findings. We hope the results and interpretations presented in the paper provide insights and considerations for educators utilizing simulations in practical settings.

Who speaks Physics? The importance of language competence for physics understanding

Keywords: Competencies, Educational Psychology, Reasoning, Science education

Presenting Author:Ursina Markwalder, ETH Zurich, Switzerland; **Co-Author:**Elsbeth Stern, ETH Zurich - Research on Learning and Instruction, Switzerland; **Co-Author:**Lennart Schalk, ETH Zurich - Research on Learning and Instruction, Switzerland

In natural sciences in general and in physics in particular, language competence is assumed to play a key role in learning and for conceptual understanding. Nevertheless, a strong empirical basis of this assumption is lacking. In our study, we tested 225 6th graders and assessed their cognitive ability, motivation, and language competence as predictors for physics understanding. Prior to our assessment, the elementary school students were trained on basic physic concepts. A hierarchical regression analysis shows that cognitive ability and language competence predict physics understanding. While a bivariate correlation indicates a significant relation between physics understanding and motivation, this relation diminishes when cognitive ability is simultaneously taken into account in the regression model. Language competence explained 15.5% of unique variance in physics understanding. Thus, language competence does indeed play an important role for physics understanding.

Session G 9

31 August 2017 08:30 - 10:00

Main Building E - E301

Single Paper

Assessment and Evaluation, Cognitive Science, Instructional Design

Conceptual Change - B

Keywords: Cognitive development, Conceptual change, Educational Psychology, Mathematics, Misconceptions, Model-based reasoning, Physical Sciences, Primary education, Problem solving, Quantitative methods, Science education, Student learning

Interest group: SIG 03 - Conceptual Change

Chairperson: Luce Claessens, Utrecht University, Netherlands

Erroneously solving multiplicative and additive word problems: A matter of preferences and abilities

Keywords: Educational Psychology, Mathematics, Primary education, Problem solving

Presenting Author:Tine Degrande, KU Leuven, Belgium; **Co-Author:**Lieven Verschaffel, KU Leuven, Belgium; **Co-Author:**Wim Van Dooren, KU Leuven, Belgium

Previous research has repeatedly shown that young children erroneously reason additively in multiplicative word problems, while older children erroneously reason multiplicatively in additive word problems. Whereas previous studies explained children's erroneous reasoning exclusively in terms of lacking multiplicative or additive reasoning abilities, the present study aimed to investigate to what extent this erroneous reasoning depends on children's *preference* for multiplicative or additive relations – in addition to lacking *abilities*. For this purpose, four test instruments (a preference test, word problem test, test measuring the procedural component of multiplicative and additive reasoning, and a test measuring the conceptual component of multiplicative and additive reasoning) were administered to 246 third, fourth, fifth and sixth graders. Results revealed that almost all children who erroneously over-used multiplicative or additive reasoning possessed the procedural skills needed to reason multiplicatively and additively, while this was not the case for the conceptual component. However, still a substantial percentage of those multiplicative and additive reasoners had acquired all necessary abilities, and almost all of them resp. had a preference for multiplicative or for additive relations. These results confirm that getting a view on children's preference is indispensable in order to fully understand the development of multiplicative and additive reasoning.

The Facilitating Role of Analogies in Understanding Scientific Texts

Keywords: Conceptual change, Misconceptions, Science education, Student learning

Presenting Author:Irini Skopeliti, University of Patras, Greece; **Co-Author:**Stella Vosniadou, National and Kapodistrian University of Athens / Flinders University of Australia, Greece

In two experiments we investigated the influence of instructional analogies in the comprehension of counter-intuitive scientific texts in elementary school children. The participants in both studies were randomly assigned to an experimental or a control group. The experimental group read a text presenting the scientific explanation of the day/night cycle (experiment 1) and of the seasons (experiment 2). The control group read the same text without the analogy. All participants gave pretest and posttest explanations of the phenomenon in question and all of them were asked to recall the information given in the text they read. The results showed that most of the explanations given at pretest were incongruous with the scientific explanation and interfered with the comprehension of texts causing invalid inferences. The children in the analogy condition showed better recall and created fewer invalid inferences compared to the children in the no-analogy condition. The children in the analogy condition also provided posttest explanations closer to the scientific explanation than the children in the no-analogy condition. The results from both studies supported the claim that analogies can facilitate the understanding of counter-intuitive information.

Models as relational categories in science education – insights from cognitive science

Keywords: Conceptual change, Physical Sciences, Science education, Model-based reasoning

Presenting Author:Tommi Kokkonen, University of Helsinki, Finland

Models and modelling have become an influential approach to science education — especially in physics. One reason for this is that models are seen as a way towards authenticity in science education. Another reason is that modelling based learning can lead to better learning outcomes with regard to conceptual knowledge as well as facilitate conceptual change. In this paper I will first look at the roles of models and modelling in science education arising from the literature. Specifically, I will argue that there are three main roles: 1) using models to convey an idea or concept, 2) constructing and revising models and 3) using models in theory development. However, despite ample research there are surprisingly few that look at the cognitive processes underlying model-based learning. However, it has been suggested that viewing models as relational categories could provide insight with regard to the learning processes. I will follow this suggestion and contrast it with the roles 2 and 3 of modelling. Most importantly, I will argue that this comparison highlights the learning of generic relational knowledge, which has been somewhat neglected in science education literature. I will also discuss the specific processes associated with learning of such knowledge. Lastly, I will discuss the implications for research.

A longitudinal study of the development of science knowledge among 4th to 8th grade students

Keywords: Cognitive development, Conceptual change, Quantitative methods, Science education

Presenting Author:Erzsébet Korom, University of Szeged, MTA-SZTE Science Education Research Group, Hungary; **Co-Author:**Erzsébet Antal, University of Szeged, Hungary; **Co-Author:**Zsófia Gabriella Szabó, University of Szeged, Hungary; **Co-Author:**Gyongyver Molnar, University of Szeged, Hungary; **Co-Author:**Benő Csapó, University of Szeged, Hungary

In this paper, we examined the development of a set of basic science concepts (e.g., matter, life forms, characteristics, classification and conditions of life, the properties of matter) among 10 to 14 year-old students. The objective of the study is to examine (1) the differences in students' science knowledge over the years; (2) the predicting power of the starting abilities on later achievement and (3) to compare developmental changes regarding the different subject areas. The sample was drawn from 4th, 6th and 8th grade students. Different versions with different item difficulty of science tests were used, which varied by grade. Versions contained anchor items, so achievement scores could be represented on a single scale. The contents of the tests were adjusted to the school curriculum. Rasch-model was used for scaling the data. Plausible values and weighted likelihood estimation were computed to compare the achievements of the age groups and to obtain individual level point estimates. The internal consistency of the instrument was high ($a_{\text{grade4}}=.93$; $a_{\text{grade6}}=.913$; $a_{\text{grade8}}=.925$). Across all grades, development of science knowledge is obvious. The fastest development happened from grade 4 to 6. Initial abilities had a lasting effect: relative abilities did not change significantly over time. The mean probability of correct solution of items belonging to the different subject areas increased with age. The differences at student level in the same grade were getting larger and varied by subject areas. Findings of the present paper identify factors having predicting power on the developmental level of students' scientific knowledge.

Session G 10

31 August 2017 08:30 - 10:00

Main Building A - A4

Single Paper

Motivational, Social and Affective Processes

Motivation and Emotion - L

Keywords: Educational Psychology, Emotion and affect, Goal orientation, Higher education, Informal learning, Mathematics, Motivation, Motivation and emotion, Neuroscience, Out-of-school learning, Quantitative methods, Quasi-experimental research

Interest group: SIG 08 - Motivation and Emotion

Chairperson: Irina Lokhtina, University of Central Lancashire, Cyprus

Diurnal Cortisol Patterns, Motivational and Socio-Emotional Regulation in University Students

Keywords: Emotion and affect, Higher education, Neuroscience, Motivation and emotion

Presenting Author:Katherine Cheng, University of Nebraska, Lincoln, United States; **Presenting Author:**Jenefer Husman, University of Oregon, United States; **Co-Author:**Reinhard Pekrun, Ludwig-Maximilians-Universität (LMU), Germany

Building upon Control Value Theory (CVT), the current study examines socio-emotional and motivation factors and their associations with diurnal cortisol patterns in post-secondary university students. University students provided survey and salivary cortisol data at the beginning of the semester, mid-semester during a stressful academic event, and near the end of the semester to gauge recovery. Diurnal cortisol slope near the end of the semester was found to be related to negative emotions earlier on in the semester, and social support throughout mid-semester the end of semester. Diurnal cortisol slope was also found to be predicted by an interaction between students' future time perspective (value subscale) and their emotion regulation (reappraisal). Results support the physiological aspect as an academic emotional facet as described in CVT; findings also call for the inclusion of future-oriented motivation to be incorporated into CVT.

Beneficial for all? Differential effects of an autonomy-supportive intervention in the classroom

Keywords: Motivation, Quantitative methods, Quasi-experimental research, Motivation and emotion

Presenting Author:Barbara Flunger, Utrecht University, Netherlands; **Co-Author:**Axel Mayer, RWTH Aachen University,

Germany; **Co-Author:**Nora Umbach, University Tuebingen, Germany

The present study investigated whether an autonomy-supportive intervention had differential effects on students' achievement emotions (state anger, boredom, joy, interest) and self-regulatory strategies (state effort, monitoring), depending on students' characteristics. The study was conducted with a sample of 345 ninth grade students in 17 physics classroom that were randomly assigned to an experimental or a control condition. Students in both conditions received a standardized teaching on heat transfer that either entailed autonomy support by the teacher (via provision of choices, provision of rationales, and informational language) or was taught with the regular teaching style. As potential moderators, a range of student characteristics was selected (i.e., prior physics grade, general physics-related effort, interest, extrinsic motivation, self-efficacy, and perceived autonomy). The differential effectiveness of the autonomy-supportive intervention was investigated with the EfficacyLiteR approach. Both the overall effects of the intervention and conditional effects (i.e., distinct interactions of the intervention with each of the student characteristics) were estimated. Regarding average treatment effects, the results showed that the autonomy-supportive intervention had a positive impact on all outcomes. Moreover, the results showed that students' prior grades moderated the effects of the intervention regarding four of the six considered outcomes (with the exception of anger and monitoring). In addition, conditional effects of the intervention with general physics-specific effort (concerning the outcome boredom) and with gender (concerning the outcome monitoring) were found. These findings point to the relevance of a detailed analysis of the differential effects of motivational interventions.

Interest profiles of Finnish 6th graders: Are they related to academic well-being and grades?

Keywords: Educational Psychology, Informal learning, Out-of-school learning, Motivation and emotion

Presenting Author:Maija Nuorteva, University of Helsinki, Finland; **Co-Author:**Lauri Hietajärvi, University of Helsinki, Finland; **Co-Author:**Kirsti Lonka, University of Helsinki, Finland

The new Finnish curriculum, calling for active and engaging learning that supports students' agency, emphasizes creating meaningful contexts which interrelate also with students' out-of-school interests. Research shows participating with organized out-of-school activities has a positive relation to school grades, but what role do topics of interest (TOI) and interest-driven participation (IDP) play in school engagement if the goal is to promote agency? This study explores the TOI and IDP and further the relation to school engagement, school burnout and grades (GPA) of 6th graders. The study was part of Mind the Gap project (Academy of Finland #265528) and the participants (n=735) were 6th graders from Helsinki. Content categorization showed a rich variation of interests, largest categories being sports (43,8%) and arts (27,9%). The quantitative analyses looked at the intensity and form of the activities. We identified three interest profiles with two-step CA: organized team participators, informal individualistics and intensive participators. The organized team participators were most engaged and reported least burnout and had highest GPA whereas informal individualistics had lowest school engagement. Intensive participators were engaged to school, but had highest levels of burnout and the lowest grades. The results indicate lack of IDP in schools: only intensive participators were almost as active inside as outside of school. It may be difficult for teachers to adopt new practices that call for supporting IDP. However, it would be important to use students' personal interest to promote student agency and support school engagement.

Factor Structure of a 3 x 2 Student Achievement Goal Orientation Inventory in Math

Keywords: Educational Psychology, Goal orientation, Mathematics, Motivation

Presenting Author:Hadley Solomon, University of New Hampshire, United States; **Co-Author:**Carla Evans, University of New Hampshire, United States; **Co-Author:**Suzanne Graham, University of New Hampshire, United States; **Co-Author:**Te-Hsin Chang, University of New Hampshire, United States

The 3 x 2 Student Achievement Goal Orientation Inventory in math was designed with a series of items adapted from Elliot, Murayama, & Pekrun (2011). These items were designed to assess the key dimensions of achievement goals (task, self, and other). The purpose of this study was to evaluate and compare four models: (a) 1 x 2 factor model, (b) 2 x 2 factor model, and (c) 3 x 2 factor model. Data from 261 high school students were used to conduct a confirmatory factor analysis. Modification and model fit indices were used to assess goodness-of-fit. Results indicate the 3 x 2 factor model was confirmed as the best fitting model. Modification and fit indices, limitations, and applications are discussed.

Session G 11

31 August 2017 08:30 - 10:00

Main Building D - D11

Single Paper

Learning and Instructional Technology, Learning and Social Interaction, Teaching and Teacher Education

Vocational Education and Workplace Learning

Keywords: Assessment methods and tools, Cognitive skills, Competencies, Computer-assisted learning, Developmental processes, Knowledge creation, Mixed-method research, Social interaction, Survey Research, Teaching / instruction, Video analysis, Vocational education, Workplace learning

Interest group: SIG 14 - Learning and Professional Development

Chairperson: Jennifer Mueller, University of Tübingen, Germany

Context factors and individual prerequisites fostering apprentices' intrapreneurship competence

Keywords: Cognitive skills, Competencies, Vocational education, Workplace learning

Presenting Author:Christine Kreuzer, Ludwig-Maximilians-Universität (LMU), Germany; **Co-Author:**Sandra Bley (geb. Trost), Ludwig-Maximilians-Universität, Germany; **Co-Author:**Susanne Weber, Ludwig-Maximilians-Universität (LMU), Germany

Intrapreneurship competence as entrepreneurship competence within a company is seen as one of the most important behavior of commercial clerks. Correspondingly it is goal of the curricula and examinations of different German apprenticeship programs in the fields of business and commerce. By a regional and a German-wide study prerequisites and effects of teaching and training intrapreneurship competence have been measured by using simulated authentic workplace tasks. As relevant impact factors individual and social context factors, institutional contexts and regional contexts were chosen. As instrument for securing a reliable and valid assessment the evidence-centered design approach as well as several validity studies were taken. By using item response theory the data are statistically analyzed. Results for the regional study (N=357) are given, for the German-wide study (N=906) under work. First results show that the data give important hints for designing efficient and effective environments to foster intrapreneurship competence.

Knowledge-creative context as mediator for determinants of innovative work behaviour

Keywords: Developmental processes, Social interaction, Survey Research, Knowledge creation

Presenting Author:Michael Hellwig, University of Regensburg, Germany; **Co-Author:**Gerhard Messmann, Department of Educational Science, University of Regensburg, Germany; **Co-Author:**Regina Mulder, University of Regensburg, Germany

This study addresses knowledge-creative context, psychological empowerment and transformational leadership as determinants of innovative work behaviour (IWB). For organizational as well as for political decision making, significant insights are necessary into how innovations as important precondition for sustainable success can be fostered in organizations. Because innovations base on individual ideas, IWB as work activities related to the development of innovations is pivotal for organizational innovation processes. Being individual behaviour, IWB might be facilitated or inhibited by team and work context-related factors, such as transformational leadership and a knowledge-creative context, as well as by individual factors, such as psychological empowerment. Based on these assumptions, we conducted a cross-sectional survey study with N=122 individuals working in different teams and organizations. Hierarchical regression analysis and Sobel tests were carried out to analyse direct and indirect effects of transformational leadership, knowledge-creative context and psychological empowerment on IWB. Results show that the knowledge-creative context mediates the positive effect of transformational leadership on IWB. An indirect effect of transformational leadership through psychological empowerment could not be verified. Results indicate the importance of further investigations on the relationship between knowledge creation and IWB as well as on the role of work context characteristics for individual contributions to innovations.

ePortfolio systems in Norwegian vocational education and training (VET); an exploratory study.

Keywords: Assessment methods and tools, Computer-assisted learning, Vocational education, Workplace learning

Presenting Author:Leif Christian Lahn, University of Oslo, Norway; **Co-Author:**HÆGE NORE, INSTITUTE OF VOCATIONAL TEACHER EDUCATION, HIOA, Norway

The present paper is based on a study of ePortfolios in Norwegian VET where fairly new intermediary institutions between school and work, the training offices, have been the site for the development of this technology with an overall ambition to bridge the work-based learning of apprentices and educational requirements. Datasets are generated from personal interviews with apprentices/instructors, documentary data of ePortfolio use and selected items on a survey to apprentices. The analysis of this material combine thematic analysis and a multiple case approach. Our results indicate that different constellations of dominant actors in Norwegian VET have a strong influence on the function, configuration and the learning potential of the ePortfolio systems. They seem to support a restrictive in contrast to an expansive learning mode (Fuller & Unwin, 2010) where the opportunities for "boundary crossing" have not be fully realized. The paper suggests that further processual studies are needed guided by Susan Lee Stars (2010) concept "boundary infrastructure".

Supportive behaviours in the VE classroom. How vocational education teachers scaffold learning.

Keywords: Mixed-method research, Teaching / instruction, Video analysis, Vocational education

Presenting Author:Antonia Scholkmann, University of Hamburg, Germany; **Co-Author:**Jens Siemon, University of Hamburg, Germany; **Co-Author:**Tekla Paulsen, University of Hamburg, Germany

Open learning phases are pivotal in many up-to-date instructional formats in vocational education, because they yield the potential to generate learning that enhances competences for future vocational success. However, little is known about how vocational educational teachers actually support the students' learning processes in these phases, and which patterns of supportive behaviour might or might not be beneficial for students' learning processes and group interactions. The proposed paper will set out to answer the question which types of supportive behaviours and behaviour patterns can be identified with respect to teachers teaching in different strands of the vocational educational school track in German postsecondary education. For that, in the present study, a total of 23 teachers from classes in three fields of vocational education were videotaped in naturalistic classroom situations whilst supporting open learning phases. The fields under survey were a) business education, b) education for industrial-technical occupations and c) education for person-related services. Supportive behaviours were inferred following the suggestion of Van de Pol, Volman, & Beishuizen, 2010 to distinct between various scaffolding means, however new descriptors were developed in an inductive process to match the

supportive behaviours prevalent in the setting of a naturalistic classroom. The overall results show that, within the vocational strands, the amount of teacher support does not vary between individual classes or teachers. However, a distinction can be noted in the patterns of supportive behaviour between teachers from business education and teachers from education for industrial-technical occupations and person-related services.

Session G 12

31 August 2017 08:30 - 10:00

Virta - 112

Single Paper

Cognitive Science, Learning and Instructional Technology

Learning and Instruction with Computers - C

Keywords: Attitudes and beliefs, Cognitive development, Collaborative Learning, Comprehension of text and graphics, Computer-assisted learning, Conceptual change, Educational Psychology, Educational Technology, Learning approaches, Learning Technologies, Motivation, Primary education, Science education, Secondary education, Student learning

Interest group: SIG 07 - Learning and Instruction with Computers

Chairperson: Viviana Sappa, Swiss Federal Institute for Vocational Education and Training, Switzerland

Embodied Metaphors and Computing Education

Keywords: Cognitive development, Conceptual change, Learning approaches, Primary education

Presenting Author: Peter McKenna, University of Edinburgh, United Kingdom; **Co-Author:** Andrew Manches, University of Nottingham, United Kingdom; **Co-Author:** Thusha Rajendran, Heriot-Watt University, United Kingdom; **Co-Author:** Judy Robertson, University of Edinburgh, United Kingdom

In many countries, primary age computing education is being driven forward to prepare children for the future global economy. This has created a need for learning science research to inform pedagogy. Research in other STEM subjects (e.g. Mathematics) has indicated the potential of embodied cognition theories to provide unique, body-based, perspectives on the learning process, suggesting that children's conceptual understanding can be supported by opportunities to reinforce particular sensorimotoric representations (e.g. through hand gestures). The work reported in this paper is an initial examination of evidence for sensorimotoric representations underpinning early computing concepts. This was addressed through examination of the gestures generated by domain experts (students studying computing in higher education (N=16; F: 9; M: 7)) when asked to explain elementary computing concepts, e.g. 'algorithm'. Interview sessions were video-recorded, and subsequent video analysis coded and quantified the use of representational gestures (gestures simulating the form or trajectory of a concrete object). This paper focuses on three concepts, where 368 representational gestures were used by participants, all of whom gestured at least once. Analysis of gestures identified two overarching body-based metaphors: Computing Constructs as Physical Objects and Computing Processes as Motion along a Pathway. These metaphors are highly comparable to those previously proposed as underpinning mathematical concepts, which is arguably predictable given commonalities between domains. Further work is clearly needed; however, the study findings elucidate the potential of an embodied cognition lens to further our understanding of the conceptual foundations of elementary computing concepts and inform pedagogy.

A model of immersion for learning in relation to learners' characteristics and cognitive load

Keywords: Learning Technologies, Motivation, Science education, Student learning

Presenting Author: Yiannis Georgiou, Cyprus University of Technology, Cyprus; **Co-Author:** Eleni Kyza, Cyprus University of Technology, Cyprus

Immersion, which can be defined as a multi-level continuum of cognitive and emotional involvement, has been argued to facilitate learning in technology-rich environments. Despite this claim, recent studies have found no relations between high levels of immersion and learning; a speculation is that this may be attributed to the mediation of cognitive load and learners' cognitive characteristics. However, there are no published studies investigating a possible model specifying relationships between mediating factors and immersion in relation to learning. In this study, we propose a cognitive model of immersion in relation to learning in Augmented Reality (AR) location-based settings; this model acknowledges potential mediation effects due to students' cognitive load, domain-specific motivation, and cognitive motivation. We investigated this model with 135 10th graders, who employed a location-aware AR app for learning science. Using a path analysis approach, we have found that, as in previous empirical studies, higher levels of immersion had no significant effect on students' conceptual understanding. However, extending previous research, this study contributes to understanding how cognitive load, domain-specific and cognitive motivation can mediate immersive experiences, and subsequent learning. According to our findings, domain-specific motivation and cognitive motivation have emerged as significant positive predictors of immersion. In contrast, we have found that cognitive load was a significant negative predictor of immersion. These mediating effects provide empirical evidence for explaining the lack of relationships between higher levels of immersion and students' learning. Implications of the results are discussed in combination with future research pathways.

Hava : Collaborative Learning of first aid gestures with a multi-touch table

Keywords: Collaborative Learning, Comprehension of text and graphics, Educational Psychology, Educational Technology

Presenting Author:Jonathan Groff, Telecom-ParisTech- I3 - CNRS, France

Collaborative learning is defined as “a situation in which two or more people learn or attempt to learn something together” (Dillenbourg, 1999). Since the late 1990s, researches on the collaborative learning mainly concern computer-supported collaborative learning with text material. Our studies focus on a rather different application: learning first aid gestures from a series of dynamic visual pictographs controlled by different learners with a multi-touch table. Previous works have shown that pictographic information displays have the potential to deliver procedural announcements in emergency contexts (Groff, Bassetti & Boucheix, 2015). In the present research, we analysed them in a learning situation. Forty participants (8-10 years old) were asked to assemble, in the correct order, the different episodes of first aid gestures on a sensory table including multi-touch option (with multi-touch option, several people can use the table at the same time). Three variables were analysed: (i) with/without multi-touch option, (ii) single/collaborative session, (iii) ‘animated pictographs’ presentation/‘classical verbal’ presentation. Statistical analysis revealed a significant effect of the modality “multi-touch+collaborative+pictographs” which leads to the better performances. Results demonstrated that “multi-touch” option promotes a more balanced participation by allowing all subjects to share their point of view. They demonstrated that the collaborative manipulation of pictographic “episodes” gives them the opportunity to present their approach, by basing on a set of common external representations, then to compare it with other and thus to adjust their own internal representations. In this way, it would support the construction of an analogue and effective mental model.

Teachers' and pupils' acceptance of tablet devices: A longitudinal study.

Keywords: Attitudes and beliefs, Computer-assisted learning, Educational Technology, Secondary education

Presenting Author:Hannelore Montrieux, Ghent University, Belgium; **Co-Author:**Tammy Schellens, Ghent University, Belgium

This paper reports on the introduction of the tablet as a personal, mobile learning tool in a secondary school in Belgium. In this longitudinal research project, drawing upon the Theory of Planned Behavior, we question the relative extent to which attitude, subjective norm, and self-efficacy explain the prospective uptake of the device for educational purposes. The results indicate that attitudes towards the rollout are generally positive. Teachers are dominantly intrinsically motivated, welcoming it as a useful and easy-to-use aid. Pupils do report feelings of social influence, albeit mostly by parents and peers. The role of attitude is much stronger. The pupils also consider the tablet as instrumental, although their positive attitude is strongly linked to the expectation of having a more enjoyable learning experience. These results challenge teaching practices and invite manifold areas for further research. Moreover, during November 2016, a remeasurement is planned and a comparison of the results will be available at the conference.

Session G 13

31 August 2017 08:30 - 10:00

Pinni B - B4113

Single Paper

Teaching and Teacher Education

Teacher Education and Communities of Practice

Keywords: Communities of practice, Culture, Primary education, Teacher Professional Development, Teaching / instruction, Video analysis

Interest group: SIG 11 - Teaching and Teacher Education

Chairperson: Jekaterina Rogaten, Open University, United Kingdom

The International Lexicon Project: Project Methodology with Illustrations from Japan and Australia.

Keywords: Communities of practice, Culture, Teacher Professional Development, Teaching / instruction

Presenting Author:Yoshinori Shimizu, University of Tsukuba, Japan; **Presenting Author:**Carmel Mesiti, University of Melbourne, Australia; **Co-Author:**Yuka Funahashi, Nara University of Education, Japan

The Japanese team sought to identify shared terms used by teachers for describing and discussing teaching and learning in the classroom. The practical goal was to inform the practice of teachers, teacher educators and researchers by using the lexicons from other countries as a mirror on one's own practice and also as a window into cultural differences. The Japanese tradition of Lesson Study has created a teaching community in which discussion of mathematics lessons is an integral part of professional practice. The Japanese Lexicon team members took part in a video viewing process to identify the terms used by Japanese middle school mathematics teachers. Following identification of a local lexicon by the research team, steps were taken to obtain national validation of the identified lexicon. One of the most distinctive features of the Japanese Lexicon was the value-laden nature of many of the terms and phrases. It is significant that other lexicons were less explicit.

Chilean Lexicon of middle-school mathematics teaching: insights from a developing educational system

Keywords: Communities of practice, Culture, Teacher Professional Development, Teaching / instruction

Presenting Author:Elisa Calcagni, University of Cambridge, United Kingdom; **Co-Author:**Valeska Grau, Pontificia Universidad Católica de Chile, Chile

The aim of this paper is to describe the generation and validation of the Chilean national lexicon of middle-school

mathematics teachers, part of the Lexicon project, in which another 8 countries from four continents take part. This paper aims to make visible local practitioner vocabulary that is often inaccessible to English-written educational research. Initially, four researchers and two practitioners discussed video stimuli to generate a list of terms and descriptions. These terms represent actions and events that mathematics teachers can name. The result was a list of 78 terms, of which only 18% were mathematics-specific, the rest being general pedagogical terms. The second phase aimed to address the local validity of the lexical terms through engagement with members of the Chilean mathematics education community. The original terms were revised, resulting in 71 terms that were assigned to five forms of an online survey, featuring 14 to 15 terms each. The survey was sent to mathematics teachers and educators, obtaining 29 answers (24,9% response rate). Of the 71 terms, 45 were known to 100% of respondents, another 13 were known by 77 to 88% of respondents. Therefore, 58 of the lexical items seem to be well known to participants, and could be thought of as part of the Chilean mathematics teachers' lexicon. Thirteen terms were known by 66% of participants or less, and thus their pertinence within the Lexicon must be further assessed. These less familiar terms will be examined by experts as part of the future validation process.

The Finnish Lexicon: Prioritising the organising and shaping of practice over mathematical content

Keywords: Communities of practice, Culture, Teacher Professional Development, Teaching / instruction

Presenting Author:Fritjof Sahlström, Åbo Akademi University, Finland; **Co-Author:**Markku Hannula, University of Helsinki, Finland

This paper addresses the question: What are the terms that Finnish teachers use to describe the phenomena of grade eight mathematics classroom? Data generation was undertaken simultaneously in Finland and other countries, where each participating team contributed to a stimulus package. This material was viewed by team members in each country. The national lexicon involves the assembly of local terms reflecting pedagogical traditions of participating communities. A total of 103 terms have been identified for inclusion in the Finnish National Lexicon: Education/Upbringing (15 terms), Organizing (23 terms), Evaluation/Assessment (17 terms), Teaching methods (38 terms), and Mathematical content (12 terms). The distribution reflects a distinctive prioritization of practice, with teaching methods and organizing accounting for 59 percent of the lexical terms. The Finnish lexicon seems to prioritize lexical terms for structural features of the lesson rather than terms that describe action, and there are a number of lexical terms that identify the purpose of something rather than its form. In common for almost the entire lexicon is a highly generic way of naming and identifying classroom practices, with few items being specific to Mathematics. Further, there does not seem to be a defined and generally explicated and acknowledged hierarchy of terms. The Finnish lexicon seems to illustrate an educational emphasis on practices and methods, rather than on subject-specific instruction. The results presented contribute to classroom practice-based international comparative discussion in new ways, opening up for new insights into cultures of teaching in classrooms around the world.

Using video clubs to developing teachers' thinking and practice in feedback and dialogic teaching

Keywords: Primary education, Teacher Professional Development, Teaching / instruction, Video analysis

Presenting Author:Peter Davies, University of Birmingham, United Kingdom; **Co-Author:**Tom Perry, University of Birmingham, United Kingdom; **Co-Author:**Josephine Brady, University of Birmingham, United Kingdom

We report the outcomes of an evaluation of a 'video club' intervention to improve the thinking and practice of teachers in giving feedback and engaging in dialogic teaching. The intervention involved 92 teachers from 11 primary schools in England. Participating teachers worked collaboratively in a sequence of six video clubs over a six month period. A range of data were collected through: recording of individual use of the online platform; videos of film club meetings; a before and after survey; shared videos of classroom lessons; two focus groups with school co-ordinators; end of project telephone interviews with participating teachers. We gathered survey responses from non-participating as well as participating teachers. Analysis of change over the period of the intervention found that participating teachers became more likely than non-participating teachers to report that, in their feedback, they posed serious challenges to pupils, helped pupils to review the steps they had taken in solving problems and helped pupils to work out problems with their answers (effect sizes .3 to .5). These results were corroborated by the other data. Our study provides a new instrument for gathering evidence of change in teachers' thinking and practice in feedback and provides evidence of change in teachers' thinking and practice through corroboration of comparative survey data with analysis of lesson videos.

Session G 14

31 August 2017 08:30 - 10:00

Linna - K103

Single Paper

Motivational, Social and Affective Processes

Emotion and Affect

Keywords: Achievement, Emotion and affect, Higher education, Mathematics, Mixed-method research, Motivation and emotion, Primary education, Quantitative methods, Quasi-experimental research

Interest group: SIG 08 - Motivation and Emotion

Chairperson: Marianne Schuepbach, University of Bamberg, Germany

How children with different levels of mathematics anxiety perceive and approach mathematical tasks.

Keywords: Emotion and affect, Mathematics, Mixed-method research, Primary education

Presenting Author: Sonia White, Queensland University of Technology, Australia; **Co-Author:** Kate Williams, Queensland University of Technology (QUT), Australia; **Co-Author:** Maria Viviani, Queensland University of Technology (QUT), Australia; **Co-Author:** Lyn English, Queensland University of Technology (QUT), Australia

Mathematics anxiety can have negative effects on children's mathematics education and contributing the development of negative attitudes towards tasks involving mathematics. Grade 4 and Grade 5 children ($n = 158$) completed general, test and mathematics anxiety scales and latent profile analysis determined five distinct anxiety profiles. A subsample of children ($n = 13$) were interviewed to investigate differences in how children with different anxiety profiles perceive mathematics and how they would approach a specific mathematics problem. The findings will be discussed in relation to the ways in which group work with peers, individual work, and support by teachers attenuates or exacerbates children's sense of anxiety in the face of particular mathematics tasks.

How 1st year study engagement predicts later situational task value and daily emotional experiences?

Keywords: Emotion and affect, Higher education, Quantitative methods, Motivation and emotion

Presenting Author: Elina E. Ketonen, University of Helsinki, Finland; **Co-Author:** Lars-Erik Malmberg, University of Oxford, United Kingdom; **Co-Author:** Hanni Muukkonen, University of Oulu, Finland; **Co-Author:** Katariina Salmela-Aro, Helsinki Collegium for Advanced Studies, Finland; **Co-Author:** Kirsti Lonka, University of Helsinki, Finland

The present study examines individual differences in relation between situation-specific task value and academic emotions using intraindividual assessment. Our aim was to investigate how study engagement and study burnout in the beginning of university would moderate situational experiences during the first two years of study. Study engagement, study burnout and control variables (i.e., life satisfaction and depressive symptoms), were measured with questionnaires in the beginning of the first academic year. Intraindividual state assessments were conducted via mobile phone-based experience sampling (ESM) during participants' first ($N=50$) and second ($N=36$) academic year. Five times during 14 consecutive days, we asked about students' current activity, how important they perceived this activity and their positive and negative emotions. The ESM-data represented a hierarchical three-level structure, with situations (Level 1) nested within years (Level 2) nested within students (Level 3). The results of multilevel models indicated that perceived value of the activity either decreases or increases negative emotions, depending on the individual. Furthermore, positive emotional responses to perceived value varied significantly in magnitude between students. The findings suggest that high study engagement in the beginning of university could further increase positive emotions in activities that are perceived personally important in everyday situations, even beyond the first year. Furthermore, while depressive symptoms and life satisfaction strongly predicted negative emotions in everyday situations, the dimensions of study burnout also had an influence. Cynicism in particular predicted negative emotions even beyond the first year, and could therefore indicate a deeper, more enduring problem hindering academic well-being.

The effect of study skills courses on learning-related emotions

Keywords: Achievement, Emotion and affect, Higher education, Quasi-experimental research

Presenting Author: Verena Schmied, University of Kassel, Germany; **Co-Author:** Martin Haenze, University of Kassel, Germany

The present study examines the effect of study skills courses on general study competences and learning-related emotions. Further, the study shows whether positive changes in learning-related emotions are mediated by increased general study competences. An online questionnaire measured general study competences on three scales (motivation and organization of the learning process, planning and work posture, stress management). Items of the Achievement Emotions Questionnaire (AEQ) by Pekrun, Goetz and Perry (2005) were used to measure achievement emotions. The treatment group consists of 185 students from seven different universities in Germany who voluntarily attended a study skills course to improve their general study competences. This group answered the questionnaire before and two months after having attended a course. Students of a control group ($n = 147$) did not participate in such a course but also answered the questionnaire in a time interval of two months. Analyses show that students who attended a study skills course rate their general study competences and positive learning-related emotions significantly higher (or lower concerning negative emotions) two months after having attended such a course compared to the students of the control group. Latent change models suggest that positive changes in specifically learning-related emotions are affected by positive changes in general study competences. These findings have significant implications for the understanding of how study skills courses influence the study process and thereby study success. The evidence from this research suggests that study skills courses are one possibility to support especially first-year students when entering university.

Implications of emotional experience and perceived competence on achievement in mathematics

Keywords: Achievement, Emotion and affect, Mathematics, Motivation and emotion

Presenting Author: Natacha Boissicat, Université Grenoble Alpes, France; **Co-Author:** Michael Fartoukh, Université de Nice Sophia-Antipolis, France; **Co-Author:** Jérémy Pouille, Université Grenoble Alpes, France

The main purpose of the study was to examine, among pupils in their fifth grade, the impact of emotion on cognition generated by a domain potentially stressful for them, mathematics. It is acknowledged that when mathematics generate negative thoughts and worries among children (Reschly et al., 2008 ; Fartoukh et al., 2014), it may impact the resources

allocation (Ashcraft, 2002), that in turn may impair performance in maths. We hypothesized that emotions generated after the teacher announced a mathematics task would impact pupils' achievement in that task, especially when they hold a low perceived competence in maths. When they experienced negative emotions after the announcement of the maths task, we predicted that pupils with a low perceived competence would succeed lower compared to their peers who experienced positive emotions. This study took place in two parts. *Part 1.* We measured anxiety, perceived competence and achievement in mathematics (controlled variables). *Part 2.* At first, we measured verbal and non-verbal positive and negative emotions (T1). Then, pupils were told they were going to complete a maths task and before to complete it, we measured a second time verbal and non-verbal positive and negative emotions (T2). Finally, they had to complete a maths task. Results confirmed our predictions and revealed that emotions at T2 were negatively related to pupils' achievement at the maths task only among children who had low perceived competence in maths: the more pupils experienced negative emotions, the less they succeed the task.

Session G 15

31 August 2017 08:30 - 10:00

Pinni B - B3116

Single Paper

Higher Education

Higher Education - N

Keywords: Cognitive development, Communities of learners, Competencies, Educational Psychology, Higher education, Lifelong learning, Peer interaction, Quantitative methods, Self-regulation, Survey Research, Teacher Professional Development

Interest group: SIG 04 - Higher Education

Chairperson: Maja Flaig, University of Trier, Germany

What does research evidence say about peer review of teaching? The As, Bs, and Cs

Keywords: Cognitive development, Educational Psychology, Higher education, Teacher Professional Development

Presenting Author: Lily Min Zeng, The University of Hong Kong, Hong Kong

Peer Review of Teaching (PRT) has been one of the most common professional development practices in higher education. Though it is believed to be an effective tool for teachers to improve their teaching practices, there are concerns among university teachers and those who are in managerial roles about using PRT in higher education. Some of these concerns were correlated with the ways that PRT were conducted. This paper takes the teaching development of university teacher as a learning process. It looks at the impact of PRT in the three domains of learning in teachers' teaching development and how these three aspects are related to the ways the PRT is carried out. A systematic review of the demonstrated evidence on PRT published in peer-reviewed publications was conducted based on a solid theoretical and educational framework. This study is important as there hasn't been such a review on PRT using a solid theoretical framework so that the analysis can investigate the areas that has a proven record of importance to teachers' learning and development. The review provides theoretically sound and practicable implications for PRT practices in higher education.

Predictors of Faculty Occupational Well-being in Canadian Universities: A Survey Study

Keywords: Educational Psychology, Higher education, Quantitative methods, Survey Research

Presenting Author: Alenoush Saroyan, McGill University, Canada; **Co-Author:** Nathan Hall, McGill University, Canada;

Co-Author: Zaynab Sabagh, McGill University, Canada

Changes imposed on higher education institutions have led to a challenging employment climate that sometimes adversely affects faculty occupational well-being and productivity. Despite potentially serious consequences, research on faculty occupational well-being is still in its infancy and scattered. This paper present findings of a survey study examining predictors of occupational well-being among 380 faculty members in seven Canadian research universities. Burnout and engagement were chosen as two indicators of occupational well-being in the present study. Workload, work-home conflict, and control was the examined predictors. The results of the study showed that high workload and work-home conflict can lead to the experience of burnout, whereas control in the workplace can increase engagement and reduce burnout. These insights can inform the design of interventions and the provision of resources at both individual and institutional levels to help faculty offset burnout.

Professional Development of Teacher Educators - Doubts and confusion while teaching my colleagues

Keywords: Communities of learners, Higher education, Peer interaction, Lifelong learning

Presenting Author: Naomi Weiner-Levy, Mofet institute ; david Yellin Academic College, Israel

The Mofet Institute of Research, established a School of Professional Development, the only one of its kind in Israel and quite unique worldwide. It offers specialized programs for teacher educators, providing them with the professional knowledge and skills. The studies aim at updating teachers about rapidly changing knowledge and skills. The instructors are third-order practitioners[1] – teacher educators specializing in teaching their colleagues. Collegial guidance by teachers' college staff members is no simple task: Tutors must be expert in their field of specialization, as well as in instruction. Moreover, although colleagues, they have to position themselves within the group as authoritative figures in terms of

instruction and knowledge. To date, the role and professional identity of these third-order practitioners, has not been studied. To understand the nature and development of professional identity, a qualitative study was conducted in which 12 tutors of various subjects were interviewed. These were analyzed by categorical content analysis. The findings, assessed professional identity through a post-modern prism, while examining the interplay among events that tutors experienced, the knowledge they acquired and the structuring of their professional identity. The Tutors' identity transformed through negotiating with 'self' and 'other' in the class, and constructed by their mutual experiences as tutors and learners. Understanding the function and identity of tutors facilitates comprehension of this unique training process for teacher educators.

[1] Teacher educators are conceptualized (Murray, 2005) as shifting from first-order practitioners (school teachers) to second order practitioners. I refer to those who train teacher educators as third-order practitioners.

University Students & Self-Regulated Learning: Knowledge versus Action

Keywords: Competencies, Educational Psychology, Higher education, Self-regulation

Presenting Author:Nora Maria Foerst, University of Vienna, Austria; **Co-Author:**Julia Klug, University of Vienna, Austria;

Co-Author:Barbara Schober, Universität Wien, Austria; **Co-Author:**Christiane Spiel, University of Vienna, Austria

University students are supposed to be autonomous learners able to adapt to a less guided educational environment than students are used to at school. Hence, probably the most important skill students need to develop to be successful during higher education is self-regulated learning (SRL). Since there are many studies assessing SRL via classical self-report, we know a lot about how students self-assess their SRL strategies. However, we know little about students' knowledge as well as about their actual usage of these strategies. Thus, the aim of the present study is to get to know if there are discrepancies between students' knowledge and action concerning SRL strategies, if these are general across domains and which reasons students tell us if discrepancies occur. For this purpose, the "Self-regulated learning questionnaire for action and knowledge" (SRL-QuAK) was used in a sample of 408 students of the University of Vienna (Mage= 25.36 years, SD = 4.88). 175 (43%) studied psychology and 233 (57%) studied economic sciences. Results showed that despite students' knowledge about SRL strategies being quite advanced, this knowledge does not seem to be put into action. This discrepancy between SRL knowledge and action was found in both sub-samples, students of psychology and economic sciences, indicating generalizability across fields of study. The resulting evidence can be used to adapt study programs and to create training in order to ameliorate students' use of SRL strategies based on the reasons students report for not applying adaptive or for applying maladaptive strategies.

Session G 16

31 August 2017 08:30 - 10:00

Main Building A - A07

Single Paper

Assessment and Evaluation, Teaching and Teacher Education

Educational Effectiveness - C

Keywords: Achievement, At-risk students, Cognitive skills, Language (Foreign and second), Literacy, Motivation, Quantitative methods, Second language acquisition, Secondary education, Self-regulation, Special education, Student learning, Teacher Effectiveness, Teaching / instruction

Interest group: SIG 18 - Educational Effectiveness

Chairperson: Terhi Mäntylä, University of Tampere, Finland

Differential teacher effectiveness on student engagement and learning attitudes

Keywords: Quantitative methods, Self-regulation, Teacher Effectiveness, Teaching / instruction

Presenting Author:James Ko, The Education University of Hong Kong, Hong Kong; **Co-Author:**Pamela Sammons, University of Oxford, United Kingdom; **Co-Author:**Leonidas Kyriakides, University of Cyprus, Cyprus; **Co-Author:**Ridwan Maulana, GION - University of Groningen, Netherlands

Various theories concerning teacher effectiveness (e.g., Campbell, Kyriakides, Muijs & Robinson, 2003; Creemers & Kyriakides, 2008; Marzano, 2003) indicate that consistency and variation in teaching practices may affect individual teacher effectiveness and collective teacher effectiveness in a school, but have not received enough regard. The study reported here was based on the analyses of 400+ lessons of 240 teachers from Hong Kong, Shenzhen and Guangzhou and in-depth analyses that linked the teacher effectiveness results of six teachers in two-year observations with student surveys. A model of differential teaching effectiveness was first established based on the variation and consistency across teaching dimensions and across lesson contexts and then ANOVA was conducted to examine the effect of teacher effectiveness on students' self-regulated learning and attitudes to assessment. Findings suggest that studies relying on single measure in teacher evaluation and teaching research may yield biased results. Promoting inclusive education extensively might also have impeded teaching effectiveness and learner engagement. Impacts of modest teaching effectiveness on self-regulated learning was also evident. Interestingly, students showed less favorable attitudes toward assessments when they were taught by moderately effective teachers than students who were taught by highly effective or ineffective teachers. The theoretical and practical implications of these results suggest we should examine the impact of teacher effectiveness on student engagement and learning attitudes is not always linear.

Language learning strategies of EFL learners and their effects on learning outcomes

Keywords: Cognitive skills, Language (Foreign and second), Quantitative methods, Second language acquisition

Presenting Author:Katrin Saks, University of Tartu, Estonia; **Co-Author:**Äli Leijen, University of Tartu, Estonia

Foreign language acquisition can be supported through learners' language learning strategies. Researchers have compiled several strategy taxonomies but evidence on their validity is contradictory. The aim of this study was to find the most solid strategy classification based on empirical data, investigate the connections of language learning strategies and their effect on learning outcomes. The results of confirmatory factor analysis showed that the modified and re-specified 6-factor model had good model fit indices. The strategy groups that were formed expressed learners' metacognitive, social, compensation, memory, connecting and active language use strategies. The results of structural equation modelling confirmed that cognitive strategies had direct effects on learning outcomes, whereas metacognitive strategies affected learning outcomes indirectly through cognitive strategies. As a practical implication, the results of the study enable a fuller understanding of the relations of language learning strategies and learning outcomes, and implementing the knowledge in university pedagogy to facilitate language studies and in teacher education to prepare language teachers. However, the study was limited by considering the strategies applied in the learning situation only. Further research could usefully explore whether and how test-taking strategies, in addition to learning strategies, impact learning outcomes.

Explaining differences in reading competencies and motivation by instructional and school factors

Keywords: Literacy, Motivation, Secondary education, Teaching / instruction

Presenting Author:Brigitte Steinert, German Institute for International Educational Research (DIPF), Germany; **Co-Author:**Jan Hochweber, University of Teacher Education St. Gallen, Switzerland; **Co-Author:**Eckhard Klieme, German Institute for International Educational Research (DIPF), Germany

In line with the organization theory of school and models of educational quality, the aim of this contribution is a systematic investigation of the relationship between teacher collaboration and basic dimensions of instructional quality in the school subject German and their relationship to reading competencies and reading enjoyment of students at grade level nine. Data base of the analyses is the extended PISA 2009 sample in Germany including two complete grade nine classes and additional data from a teacher questionnaire from all German teachers in each school. The sample encompasses 9.246 students in 384 classrooms in 198 schools as well as 2076 German teachers in these schools. Teacher cooperation serves as indicator at school level. The three dimensions of instructional quality – cognitive stimulation, structured instruction, and support – serve as indicators at classroom level. The individual background of the students, their individual perceptions, and the social composition of the classrooms as well as the school type were controlled for in the analyses, to investigate the added value of school and classroom factors on student outcomes. According to the multi-level structure of the data in schools three level regression analyses were carried out using HLM. Summing up the findings of the analyses, student outcomes vary both at classroom and school level. Teacher practices can make a difference that is empirically significant and practically relevant. There are effects of instructional quality on student outcomes, but it may not be consistent over different school subjects. Subject specific teacher cooperation primarily affects instructional quality in a few school types.

Compositional effects on achievement and social outcomes of SEN students in inclusive classes

Keywords: Achievement, At-risk students, Special education, Student learning

Presenting Author:Katja Scharenberg, University of Education Freiburg, Germany; **Co-Author:**Wolfram Rollett, University of Education Freiburg, Germany; **Co-Author:**Wilfried Bos, Technical University of Dortmund, Germany

The ratification of the UN Convention on the Rights of Persons with Disabilities led to the development of inclusive education systems, teaching students with and without special educational needs (SEN) together in mainstream schools. Previous research showed neutral to positive effects of inclusive education regarding achievement, but indicated disadvantages for SEN students regarding social outcomes, e.g. less interactions with peers. There is, however, a lack of evidence regarding 1.) the importance of the classroom as students' proximal environment for learning and development and 2.) its interaction with individual characteristics. Our study aimed at examining such effects on students' achievement and social outcomes. The sample comprised 50 classes in German primary schools with 1,025 Grade 4 students of which 13.4 % had SEN. Multi-level analyses revealed overall beneficial effects of a more privileged socioeconomic classroom composition on students' achievement, but not on social outcomes. Negative interaction effects on social integration were found between SES and immigrant background. High-ability SEN students, in contrast, perceived a higher social integration than low-ability SEN students. The effect of SEN status on social integration was not mediated by classroom composition. Cross-level effects, however, indicated achievement benefits for SEN students in high-SES classes. Our study highlights that there seem to be relevant processes and mechanisms of social exclusion in inclusive classes that are associated with students' sociocultural origin and their SEN status. The results call for longitudinal analyses to further examine whether SEN students could benefit from inclusive classes regarding their development of achievement in secondary school.

Session G 17

31 August 2017 08:30 - 10:00

Pinni B - B1100

Single Paper

Higher Education

Higher Education and Student Learning

Keywords: Achievement, Argumentation, Cooperative / collaborative learning, Emotion and affect, Higher education, Mathematics, Quantitative methods, Self-regulation, Social aspects of learning and teaching, Student learning

Interest group: SIG 04 - Higher Education

Chairperson: Emine Erkin, Bogazici University, Turkey

University students' engagement construction in Finnish higher education

Keywords: Higher education, Quantitative methods, Social aspects of learning and teaching, Student learning

Presenting Author: Vesa Korhonen, University of Tampere, Finland; **Co-Author:** Markus Mattsson, University of Helsinki, Finland; **Co-Author:** Mikko Inkinen, Aalto University, Finland; **Co-Author:** Auli Toom, University of Helsinki, Finland

Student engagement throughout the university studies has been identified as one of the key aspects related to meaningful learning in higher education. Previous research on engagement has covered either internal factors or external factors related to student engagement. However, studies focusing simultaneously on both, and taking into account their complex interplay have been scarce. This study aims at gaining a better understanding of the interrelationships of the components of student engagement and its stability across different disciplines, especially the humanities and the educational sciences. Especially, we examined the interrelationships of the core areas of engagement in a representative sample of Finnish first-year university students ($n=2\,422$) using network analysis methods. The analysis showed how student engagement is structured, and demonstrated that the feelings of belongingness and alienation, and the sense of academic identity are the most central components of student engagement. The results also indicated that the networks describing the engagement phenomenon among the students in humanities and educational sciences were extremely similar.

Psychological flexibility - a key to success in university studies?

Keywords: Achievement, Emotion and affect, Higher education, Student learning

Presenting Author: Telle Hailikari, University of Helsinki, Finland; **Co-Author:** Henna Asikainen, University of Helsinki, Finland

In the context of working life, psychological flexibility has a central role in improving performances, well-being and results at the work place but its importance has not yet been explored in the university context widely. The purpose of this study is to explore qualitatively how students who score low and high on psychological flexibility experiences emotions and describe their key learning experiences at university. Participants were ten students with high psychological flexibility score and ten students with low score. Interviews concerning students key learning experiences were analysed with inductive content analysis. The preliminary results show that students who scored high on psychological flexibility reported more positive emotions, less stress and exhaustion than students who scored low on psychological flexibility. In addition, the high scoring students reported emotions such as hope and expectation of success related to their learning experiences which were not reported among the low scoring students. At the conference, we will elaborate the emotions more and present results based on more interviews.

The impact of cognitive resources on students' performance in mathematical proof construction

Keywords: Argumentation, Higher education, Mathematics, Quantitative methods

Presenting Author: Daniel Sommerhoff, Ludwig-Maximilians-Universität (LMU), Germany; **Co-Author:** Stefan Ufer, Ludwig-Maximilians-Universität (LMU), Germany; **Co-Author:** Ingo Kollar, University of Augsburg, Germany

Argumentation skills represent an important learning goal across domains. In mathematics, they are fixed in standards for secondary education worldwide. At the university level, argumentation is even more focal since mathematical proofs, i.e. deductive chains of argumentation that conform to specific socio-mathematical norms are introduced as a core method of mathematics as a scientific discipline and represent a major learning goal for students. Studies repeatedly show that even university mathematics students struggle to construct valid proofs. One reason for this and the large variation in students' proof construction skills may be explained by the availability of individual cognitive resources underlying students' proof construction skills. Although prior research has suggested multiple such resources, e.g. mathematical knowledge, problem solving skills or conditional reasoning skills, their relative importance is still mostly unclear. Furthermore, it is unknown, whether domain-general or domain-specific resources play a more important role. We report on a study with $N = 64$ university students, analyzing the relative influence of domain-specific (conceptual and procedural mathematical knowledge, mathematical-strategic knowledge) and domain-general (problem solving skills, conditional reasoning skills, metacognitive awareness) resources on students' proof construction skills. Results reveal that mathematical knowledge, mathematical-strategic knowledge, and conditional reasoning skills have an impact on students' proof construction skills. Comparing the regression coefficients shows that the overall impact of domain-specific resources is larger than those of domain-general ones. The implications of these results regarding the role of domain-specific vs. domain-general resources as well as on instruction on (mathematical) argumentation and proof in higher education will be discussed.

Cooperative learning in higher education: Effects of fostering group work on students' achievement

Keywords: Cooperative / collaborative learning, Higher education, Self-regulation, Student learning

Presenting Author: Anika Bürgermeister, University of Leipzig, Germany; **Co-Author:** Henrik Saalbach, University of

Leipzig, Germany; **Co-Author:**Robert Wilkens, University of Leipzig, Germany; **Co-Author:**Romy Schneider, University of Leipzig, Germany

Cooperative learning is well-known to foster students' learning and understanding (Gillies, 2016, Johnson & Johnson, 2002, Slavin, 1995). Cognitively oriented explanations for these benefits usually refer to students' higher active engagement in elaborative and reflexive learning processes. Motivationally oriented explanations refer to a higher degree of feeling socially related, supported and comfortable within their peer group. So far, empirical evidence is mainly based on primary or secondary school level, while little research has been conducted in higher education (Herrmann, 2013). The present study thus aims at systematically investigating the factors mediating the positive effect of cooperative learning on students' achievement in higher education. In particular, we aim to disentangle cognitive, that is students' engagement, and motivational factors, that is students' social relatedness, to explain the impact on students' learning. For this purpose, we conducted a quasi-experimental longitudinal study and systematically fostered cooperative learning during self-regulated learning activities in a group of teacher students (EG, $n = 237$). First descriptive results show that students in the EG reported to feel more socially related during the semester and achieve higher performance than their peers in the control group (CG, $n = 260$) at the end of the course. Further analysis indicate, that students' social relatedness positively predicts their achievement at the end of the semester, in the EG but not in the CG. The crucial role of feeling related to peers as well as the impact of cooperative learning contexts for learning development in higher education are discussed.

Session G 18

31 August 2017 08:30 - 10:00

Main Building C - C6

Single Paper

Higher Education

Higher Education - L

Keywords: Economics of education, Educational policy, Educational Psychology, Emotion and affect, Higher education, Learning approaches, Mixed-method research, Motivation, Quantitative methods, Teacher Professional Development, Teaching approaches, Technology

Interest group: SIG 04 - Higher Education

Chairperson: Marianna Vivitsou, University of Helsinki, Finland

Advancing Teaching and Learning Conceptions in Graduate Teaching Assistant Training

Keywords: Higher education, Learning approaches, Teacher Professional Development, Teaching approaches

Presenting Author:Alex Shum, The University of Hong Kong, Hong Kong; **Co-Author:**Ada Lee, The University of Hong Kong, Hong Kong; **Co-Author:**Suki Ekaratne, University of Colombo, Sri Lanka

Deep and surface approaches to learning in higher education contexts have been linked to student-focused and teacher-focused approaches to teaching. These connections should be taught and emphasized to improve the effectiveness of graduate teaching assistant (GTA) training courses. The current study investigated a short GTA training course at an Asian research-intensive university on impact of participants' conceptions of teaching and learning. It further explored predictive effects between latent variables in GTA approaches to learning and approaches to teaching. GTAs ($N=137$) completed the study process questionnaire and the approaches to teaching inventory at the beginning and end of the course. Student-focused teaching and deep learning scores increased with small-moderate effect. Past deep learning scores moderately predicted future student-focused teaching scores. Factor analysis of both questionnaires together revealed two factors, teacher-focused teaching with surface learning and student-focused teaching with deep learning. Implications for theory and practice are discussed.

Variables Explaining Learners' Emotions in Simulation-Based Learning Environments

Keywords: Emotion and affect, Higher education, Quantitative methods, Technology

Presenting Author:Tuulikki Keskitalo, University of Lapland, Finland; **Co-Author:**Heli Ruokamo, University of Lapland, Finland

Medical education can be emotionally charged for many reasons; simulation-based activities in particular are designed to generate emotional reactions. However, few studies have concentrated on learning and emotions despite widespread interest on the topic. The aim of this research is to study the emotional experiences of participants during simulation-based teaching and learning activities. The specific aim is to answer the following research questions: *What kinds of emotions do learners experience before and after simulation-based educational activities? Which variables explain learners' positive and negative emotions after simulations?* The data were collected using mixed methods, and pre and post questionnaires of 175 participants were analyzed using descriptive statistics as well as a paired-samples t -test, factor analysis, Cronbach's alpha, and a linear regression analysis. The results show that simulation-based learning invokes mainly positive emotions by creating challenges through goal-oriented studying, whereas negative emotions tend to remain constant during an educational course.

Performance profiling in higher education: A visualisation tool to inform strategy formulation

Keywords: Economics of education, Educational policy, Higher education, Mixed-method research

Presenting Author: Marian Mahat, The University of Melbourne, Australia

An effective visualisation tool of a university's performance can assist management to make strategic choices to locate themselves in niches where they can make use of their resources effectively and efficiently. Working within the case study context of medical education, this paper makes a contribution to higher education research by investigating the use of a performance profiling tool to support strategic positioning in Australian higher education. Drawing on data from qualitative semi-structured interviews and quantitative analysis of performance data, the study has provided insights into the ways the planning and monitoring of profiles can inform strategy formulation. Specifically, the empirical findings provide evidence that a performance profiling tool could be used by senior management to identify and understand institutional mission and strategy, setting a target or benchmark, and selectively choosing indicators for management and quality enhancement purposes. In doing so, it provides the link between research and the advancement of educational outcomes through providing evidence to support strategic decision making in areas such as learning and instruction.

Do college students spend more time studying when assignments are interesting?

Keywords: Educational Psychology, Higher education, Motivation, Quantitative methods

Presenting Author: Martijn Meeter, VU University Amsterdam, Netherlands

Over the last decades, many programs in higher education have moved away from a reliance on frontal lecturing, towards a system with small seminars in which assignments are handed out that structure self-study. Assignments are intended to motivate students to master the material programmed for that week, and are therefore constructed to be interesting. However, does an interesting assignment really result in more self-study? This question has up to now been tackled by for example comparing ratings at a course level where causality is difficult to establish - for one because such ratings confound true effects of interest in a course with individual differences between students in that course. To get at a more granular level, a study was conducted in which students in a large bachelor's psychology program rated their interest in assignments, and reported the subsequent self-study in the interval in between two face-to-face meetings. Although there was considerable variance in both the interest in the assignments and in reported hours of self-study, there was virtually no relationship between the two when assessed within students. Instead, self-study only increased nearer to the exams. Across participants, however, there was a correlation between the average interest in the assignments and self-study. This suggests that any relation between interest in assignments and self-study may result more from individual differences between students (e.g., differences in intrinsic motivation or in self-control) than from an any strong influence of interest on self-study.

Session G 19

31 August 2017 08:30 - 10:00

Pinni B - B3111

Single Paper

Teaching and Teacher Education

Educational Effectiveness and Instruction

Keywords: Mathematics, Peer interaction, Quantitative methods, Science education, Survey Research, Teacher Effectiveness, Teacher Professional Development, Teaching / instruction, Video analysis

Interest group: SIG 18 - Educational Effectiveness

Chairperson: Paullina Alenius, University of Tampere, Finland

A longitudinal study of reciprocal effects of participation and achievement in science classrooms

Keywords: Quantitative methods, Science education, Teaching / instruction, Video analysis

Presenting Author: Benjamin Caspar Fauth, University of Tübingen, Germany; **Co-Author:** Jasmin Decristan, Goethe-University Frankfurt; IDeA-Research Center, Germany; **Co-Author:** Mareike Kunter, Goethe-Universität Frankfurt, Germany; **Co-Author:** Gerhard Buettner, University of Frankfurt, Germany; **Co-Author:** Eckhard Klieme, German Institute for International Educational Research (DIPF), Germany; **Co-Author:** Ilonca Hardy, Goethe-Universität Frankfurt, Germany; **Co-Author:** Csaba Kurucz, Goethe-University Frankfurt, Institute of Psychology, Germany; **Co-Author:** Eva Lena Heide, Goethe-University Frankfurt, Institute of Psychology, Germany; **Co-Author:** Franziska Locher, University of Bamberg, Germany; **Co-Author:** Bianka Troll, Leuphana University of Lüneburg, Germany

Student participation in classroom discourse is considered a vital element of student learning. Students who participate in content-related discourse tend to be more engaged in learning, and teachers may provide better individual support by using on-the-fly assessment strategies to diagnose and scaffold student learning. However, we know little about the mechanisms of connection between participation in classroom discourse, student characteristics, and learning outcomes (e.g., Flieller, Jarlégan, & Tazouti, 2016). We used data from a longitudinal study in primary school with a standardized science curriculum and pre-and post-assessments of 681 students as well as video recordings in each of the 37 classes. We coded a ten-minute video sequence involving 893 verbal teacher-student interactions during a whole-class discussion on science content and matched the coding with student data. Logit regression analysis reveals that students' prior conceptual understanding in particular was connected with participation in classroom discourse on content. Furthermore, multi-level regression analyses indicated that students' participation within classes predicted conceptual understanding after the

science lesson. Moreover, students with relatively higher prior conceptual understanding when compared to their classmates benefited particularly from participation in classroom discourse. The results underline the benefits of students' participation in classroom discourse for science learning. Further analyses are needed to disentangle the underlying mechanisms (e.g., do particularly high-achieving students initiate participation and/or do teachers particularly address high-achieving students in classroom discourse), and further lesson sequences will have to be coded to examine the generalizability of our results.

Using classroom videos and student surveys to measure teaching practice

Keywords: Quantitative methods, Survey Research, Teaching / instruction, Video analysis

Presenting Author:Kirsti Klette, University of Oslo, Norway; **Co-Author:**Marte Blikstad-Balas, University of Oslo, Norway;

Co-Author:Astrid Roe, University of Oslo, Norway

Research suggests that multiple methods and sources of information are required when analyzing teaching practice, because teaching is too complex for any single measure of performance to capture accurately (BMGF, 2013; Klieme et al., 2009; Taut & Rakoczy). In the present study "Linking Instruction and Student Achievement" (LISA) we use video recordings from mathematics and language-arts classrooms together with student perception surveys and score gains on national tests to understand how instructional practices impact student learning and are able to differentiate between more and less effective instructional practices. In this paper we will report from the use of video recordings and student perception surveys as measures into teaching quality. Based on video recordings from 48 language arts classrooms and 48 mathematics classrooms (four lessons in each classroom, in total 396 lessons) and student perception surveys (n=1125 mathematics students and n=1100 language arts students) from the same grade 8 classrooms we discuss the validity and predictive power of the two measures. Analyses suggest that both student perception surveys and classroom observation can provide meaningful feedback on teaching quality when carefully designed student perception surveys provide valuable and reliable information on classroom teaching. The large and consistent variation between the survey items implies for example that Norwegian grade 8 students were able to discriminate between what they consider effective and less effective teacher actions. Video observations seem less fitted for differentiating between high quality and low quality teachers but seem to have a greater potential for diagnostic and developmental purposes.

Teacher Practices, Student Participation, and Learning: Variation across Classroom Structures

Keywords: Mathematics, Peer interaction, Teaching / instruction, Video analysis

Presenting Author:Noreen Webb, University of California, Los Angeles, United States; **Co-Author:**Marsha Ing, University of California, Riverside, United States; **Co-Author:**Megan Franke, University of California, Los Angeles, United States; **Co-Author:**Joy Zimmerman, University of California, Los Angeles, United States; **Co-Author:**Nicholas Johnson, Orange County Department of Education, United States

Researchers, policy makers, and practitioners increasingly recognize that engaging students as active participants in classroom conversations (explaining their thinking and engaging with others' ideas) is important for their mathematics learning. Emerging research also suggests that teachers can support student participation by pressing students to clarify and elaborate on their own ideas and to engage with others' ideas through questioning and challenging. Much of this research, however, is based on observations of teachers and students in only selected participation structures within classroom lessons, such as only whole-class discussion, or only small-group collaborative settings. This study examined teacher practices and student participation, and the relationship with student learning outcomes, in a wide range of classroom participation structures, including whole-class discussion, private student-student conversations during whole-class discussion, and student-led small-group work. The results showed wide variation across participation structures, suggesting that comprehensively observing student participation and teacher support practices in the multiple classroom structures that occur is necessary to draw valid conclusions about the links between teacher practices, student participation, and student learning outcomes. Focusing on only some of the classroom structures would provide an incomplete picture of both student participation and teacher practices.

Developing Stages of Tasks of Teaching Mathematics by Using a Content-Specific Instrument

Keywords: Mathematics, Teacher Effectiveness, Teacher Professional Development, Teaching / instruction

Presenting Author:Charalambos Charalambous, University of Cyprus, Cyprus; **Presenting Author:**Marina Kenti, University of Cyprus, Cyprus; **Presenting Author:**Evridiki Kasapi, University of Cyprus, Cyprus; **Presenting Author:**Kassandra Georgiou Foivou, University of Cyprus, Cyprus; **Co-Author:**Sofia Agathangelou, University of Cyprus, Cyprus; **Co-Author:**Maria Papacharalambous, University of Cyprus, Cyprus

While teacher observation instruments were initially conceived of as tools for teacher summative evaluation, recently they are considered as key levers for supporting teacher growth. To function in this formative way, different stages of tasks of teaching ought to be developed, so that areas for teacher improvement can be outlined. By capitalizing on the *Mathematical Quality of Instruction* (MQI) instrument, in this study we explore whether stages of tasks of teaching mathematics can be developed. Toward this end, we recruited 38 volunteer teachers (Grades 4-6) who had six of their mathematics lessons videotaped. All these lessons were coded independently by trained raters who then met to reconcile their work. Based on these reconciled codes and using a Rasch model, we first developed a scale with good psychometric properties that rank ordered the MQI items based on their difficulty level. These items were then clustered into five main stages employing a procedure for detecting pattern clustering. Based on this clustering, it appears that at the basic level

teachers are featured just ensuring that their teaching focuses on mathematics, is error-free, and engages students in procedural work. Teachers are then featured using more accurate mathematics language and engaging students in somewhat more demanding work. The third stage is characterized by richer and more challenging instruction as well as more productive interactions with students; in the latter two stages behaviors associated with the highest levels of the MQI are observed. We discuss how these findings can support teacher training and professional development.

Session G 20

31 August 2017 08:30 - 10:00

Virta - 109

Single Paper

Assessment and Evaluation, Cognitive Science, Teaching and Teacher Education

Learning and Development in Early Childhood - E

Keywords: Arts, Case studies, Cognitive development, Communities of learners, Developmental processes, Early childhood education, Learning approaches, Literacy, Mixed-method research, Quasi-experimental research, Student learning, Teacher Professional Development, Teaching / instruction

Interest group: SIG 05 - Learning and Development in Early Childhood

Chairperson: Minna Lakkala, University of Helsinki, Finland

Enhancing physical active play in Norwegian Kindergartens – a randomised evaluative controlled trial

Keywords: Learning approaches, Mixed-method research, Quasi-experimental research, Student learning

Presenting Author: Thomas Moser, University College of Southeast Norway, Norway; **Co-Author:** Steinar Øverås, University College of Southeast Norway, Norway; **Co-Author:** Eivind Andersen, University College of Southeast Norway, Norway; **Co-Author:** Janne Borch-Jenssen, Sandefjord municipality, Health services, Norway; **Co-Author:** Hanna Ellingsen, Sandefjord municipality, health services, Norway; **Co-Author:** Kari Anne Jørgensen, University College of Southeast Norway, Norway; **Co-Author:** Linda Nilsen, Sandefjord municipality, education and upbringing, Norway; **Co-Author:** Grethe Skalleberg, Sandefjord municipality, education and upbringing, Norway

The purpose of this paper is (1) to present the effects of intervention programs (IPs) on the amount of moderate- to vigorous physical activity (MVPA) in children four years of age and (2) to explore whether the IPs each Kindergarten has individually developed and implemented is associated with changes for MVPA from T1 to T2 (4 months). The term physical activity play is in this presentation used synonymous with MVPA. This longitudinal study includes data from 96 children in 11 public kindergartens (6 intervention; 5 controls). A start-up seminar and 3 courses (3 hours each) were conducted with the entire staff in the intervention kindergartens. The aim was that the staff at each institution systematically develop and implement measures tailored to their particular institution in order to increase physical active play. Staff (n=60) was followed up by during the entire project period (4 months) through visits in their institutions. Children from IG increased their MVPA twice as much than children in the control group (15,3min (SD=19) and 7.2 min (SD=15) respectively; p

Narrativity and Narratives in a Musical Playschool Teacher's Pedagogy

Keywords: Arts, Case studies, Early childhood education, Teaching / instruction

Presenting Author: Kyllikki Rantala, University of Tampere, Finland

The objective of this study is to examine how narrativity manifests itself in music education. The study sets out to find how and what types of narratives are used in musical playschool pedagogics.

This is a case study in which the phenomenon was examined in light of the educational methods used in one musical playschool group. The main data consists of videotaped teaching situations and interviews with the teacher.

The data were evaluated using theory-based analysis. In this case study, narrative first seems to be a conscious and target-oriented activity that uses narratives to direct children's attention to educational content and, context allowing, to musical learning as well.

Narratives seem to include three groups: tasks related to identity, community, and topics being taught in relation to one's experiences and life course. This last finding exhibits narratives in more detail. At the heart of the teacher's narratives lie the problem to be solved, emotions, and the identification of emotions. Caring and seeking for safety are the main emotions categorized according to Myllyniemi (2004). The extent of the narrative varies from a short sentence to a narrative permeating the whole class or a continuum of narrative across classes.

The last finding shows that pedagogics is seen as comprehensive and harmonizing.

Based on my data, narrative pedagogics is very well suited to early music education and many others areas.

A Pre-Literacy Intervention Study in a Multilingual Setting

Keywords: Cognitive development, Developmental processes, Early childhood education, Literacy

Presenting Author: Cyril Wealer, University of Luxembourg, Luxembourg; **Co-Author:** Silke Fricke, University of Sheffield, United Kingdom; **Co-Author:** Pascale Engel de Abreu, University of Luxembourg, Luxembourg

Phonological awareness and letter-sound training in a language-rich environment is effective in preparing children for literacy in alphabetic languages (Rose, 2006). However, the effectiveness of such approaches is not established for

children who are introduced to literacy in a second language. Preschool in Luxembourg is compulsory for all children and is conducted in Luxembourgish. Literacy instruction does not begin until Year 1 of primary and is conducted in German, the second language for 98% of the children. National statistics show that almost half of Luxembourg's nine-year-olds are not achieving national reading standards at the age of 9 (NSSA, 2012). This project aims to develop and evaluate the effectiveness of a theoretically motivated preschool literacy programme designed to systematically build up children's phonological awareness skills and letter-sound knowledge in Luxembourgish. The programme is administered by teachers and specifically designed to promote cross-linguistic transfer effects from Luxembourgish (L1) to German (L2 and language of literacy instruction) and to target the need of language minority children (roughly 50% of the sample). Two hundred children from 8 Luxembourgish preschools were allocated to either the intervention or the control condition (receiving the standard curriculum). The intervention runs for 12 weeks in Year 2 of preschool. Children are followed longitudinally and assessed on various language measures (phonological awareness, RAN, letter-sound knowledge, oral language) before and immediately after the intervention and 6 months after the end of the intervention. Preliminary data from the pre- and post-tests on the phonological awareness, letter-sound-correspondence and reading measures will be presented.

Enhancing Physical Activity in Taiwanese Early Childhood Education and Care

Keywords: Communities of learners, Developmental processes, Early childhood education, Teacher Professional Development

Presenting Author:Jyrki Reunamo, University of Helsinki, Finland; **Co-Author:**Li-Chen Wang, Chang Gung University of Science and Technology, Taiwan; **Co-Author:**Hui-Chun Lee, Tzu Chi University, Taiwan

We have conducted 16,846 systematic observations in Taiwanese preschools in 2015. One of the observed items was children's physical activity (PA). Only 6.1% of the children's activities included high PA with at least some running, romping and physical exertion etc. This means that Taiwanese preschool children do not have enough PA during the school day. We have shared the research results with 15 preschools in Taipei County and Hualien area. The teachers in each preschool have produced plans and models to enhance children's PA in their preschool and also shared the plans and ideas with each other. In this presentation we describe the results of children's PA that need pedagogical attention in the Taiwanese preschools. We also describe examples of the ideas and enhancements produced by the teachers based on the research results.

Session G 21

31 August 2017 08:30 - 10:00

Main Building E - E350

Single Paper

Assessment and Evaluation, Learning and Special Education

Special Educational Needs - C

Keywords: Assessment methods and tools, Computer-assisted learning, E-learning / Online learning, Educational Technology, Learning and developmental difficulties, Motivation and emotion, Peer interaction, Problem solving, Social aspects of learning and teaching, Social interaction, Special education, Technology, Vocational education, Writing / Literacy

Interest group: SIG 14 - Learning and Professional Development, SIG 15 - Special Educational Needs

Chairperson: Tahsin Oğuz Başoğlu, Turkey

SEN students, self and teacher perceptions of school performance: Relation with classroom ecology

Keywords: Peer interaction, Social aspects of learning and teaching, Special education, Motivation and emotion

Presenting Author:Joana Pipa, University of Lisbon, Portugal; **Co-Author:**Fátima Silva, Agrupamento de Escolas Dr. Azevedo Neves, Portugal; **Co-Author:**Sofia Freire, Instituto de Educação da Universidade de Lisboa, Portugal; **Co-Author:**Cecília Aguiar, ISCTE-Instituto Universitário de Lisboa, Portugal; **Co-Author:**Francisco Vaz da Silva, Escola Superior de Educação de Lisboa, Portugal; **Co-Author:**Maria João Mogarro, Instituto de Educação da Universidade de Lisboa, Portugal; **Co-Author:**Aurízia Anica, Escola Superior de Educação e Comunicação – Universidade do Algarve, Portugal

Preserving one's positive perception of competence is a central feature in the educational process, being a desirable outcome and a positive mediator of students' school achievement and motivation. The main goal of this study was to evaluate student self and teacher's perception of school performance in accordance to students SEN status and classroom social structure. Participated 27 teachers and 359 students (48 SEN students) from Portuguese schools attending to 3rd, 5th and 7th grades. Teachers and students completed a rating scale of perception of school performance in general and in Portuguese and Mathematics subjects and students also completed two sociometric tasks to assess classroom social ecology. Results showed that SEN students revealed lower self-perceptions of performance than those of their non-SEN classmates. Teacher-SEN students perceptions of performance shared little consensus. Considering classroom social dynamics and structure, the results showed that social acceptance was a positive predictor of perception of performance. Also, classrooms with a more hierarchical structure lead to a low dispersion of classroom perception of school performance. These results reinforce the need to focus on SEN students as a particular vulnerable group and highlight the relevance of classroom's social ecology in constructing and maintaining students' self-perception of competence.

Exposure to multimedia features in e-book for promoting literacy among students with ADHD

Keywords: E-learning / Online learning, Learning and developmental difficulties, Special education, Writing / Literacy

Presenting Author:Ravit Grumberg Vardi, Bar-Ilan University, Israel; **Co-Author:**Adina Shamir, Bar-Ilan University, Israel

The purpose of the present study was to investigate the effect of activity with an educational electronic book (e-book) on literacy acquisition of students with and without symptoms of ADHD, as well as to assess the contribution of multimedia features integrated in e-books to the participants' literacy acquisition. The study participant population comprised 160 2nd grade children, 60 of whom showed symptoms of ADHD and 100 did not. All participants were administered a screening test followed by literacy tests, namely, dictation, word recognition and vocabulary tests. The sample was randomly assigned to 4 groups in the form of e-book with highlighted text and a narrator, e-book with highlighted text, a narrator and a dictionary, e-book with highlighted text, and a static book. Each group was exposed to the e-book 3 times. Upon completion of the exposure process, the participants were tested again, given the literacy test as well as a reading comprehension one. The findings demonstrated significant differences in the word recognition test between the children exposed to the e-book with narrator combined with highlighted text and dictionary and those presented with the static book. The most significant difference between ADHD students and children without ADHD was found in the vocabulary test. In the reading comprehension test, the results of children with ADHD were the same as those of children without ADHD, and those who were exposed to the e-book with narrator and highlighted text had the most significantly higher scores in both populations.

Valid test scores of problem-solving competence and their use for final exams in vocational education

Keywords: Assessment methods and tools, Problem solving, Technology, Vocational education

Presenting Author:Felix Walker, Technical University of Kaiserslautern, Germany; **Co-Author:**Leo van Waveren, Technical University of Kaiserslautern, Germany

We examine whether it is possible to validly measure domain-specific problem-solving competence as assessed in the final exam using computer based assessment (CBA) (e.g. computer-simulations) for the occupation of electronics technicians for automation technology (ETAT). We assume that there is no difference between the competence as assessed in the final exam and in the computer-based environment. To test this hypothesis, we drew a sample of 308 ETAT attending the German dual apprenticeship track. The apprentices worked on eight real-life problems (troubleshooting-scenarios). To compare the computer-based and real-life (troubleshooting on a real automation system similar to the final exam) assessment, we created two groups: one group solved problems one to four in real-life, and problems five to eight computer-simulated; the second group solved the items vice versa. The data were analyzed applying a multigroup-structural-equation-approach and confirmed our hypothesis. As a second step we tested how high the correlations.

Enhancing pro-social ability among HFASD children with computer mediated intervention

Keywords: Computer-assisted learning, Educational Technology, Social interaction, Special education

Presenting Author:Sigal Eden, Bar-Ilan University, Israel; **Co-Author:**Atara Oren, Bar-Ilan University, Israel

ASD (Autism Spectrum Disorder) is a congenital neurodevelopmental disorder, whose symptoms are expressed in two central categories: persistent deficits in social communication and interaction, and repetitive patterns of behavior with limited interests and activities (APA, 2013). The children who participated in this study are high-functioning (HFASD). The research deals with the social aspect of the disorder and focuses on pro-social behavior, defined as the ability to channel positive feelings and behaviors toward others to their benefit (Eisenberg, 1992). The goal of the study was to determine whether there is a gap between children with HFASD and children with typical development in their ability to exhibit pro-social behavior, and to compare pro-social behavior between children experiencing a computer-mediated intervention and a non-computer-mediated intervention. The study was conducted among 58 preschool children, ages 4-7. The group of children with HFASD was randomly divided into two groups: one group experiencing computer-mediated intervention and the other group experiencing a non-computer-mediated intervention. The two months intervention was based on the Cognitive Behavioral Therapy (CBT) model, combining cognitive learning with active experience. Before the intervention findings indicate gaps in the pro-social abilities of children with HFASD and children with typical development. However, after the intervention the gap between the two decreased. Comparing the two HFASD interventions groups, the computer-mediated intervention group improved in some pro-social measures compared to children with typical development.

Session G 22

31 August 2017 08:30 - 10:00

Pinni B - B3109

Single Paper

Assessment and Evaluation, Educational Policy and Systems, Motivational, Social and Affective Processes

Educational Evaluation, Accountability and School Improvement - B

Keywords: Assessment methods and tools, At-risk students, Educational policy, Meta-analysis, Motivation and emotion, Primary education, Quantitative methods, Researcher education, School effectiveness, Secondary education, Survey Research, Teacher Professional Development

Interest group: SIG 23 - Educational Evaluation, Accountability and School Improvement

Chairperson: Margus Pedaste, University of Tartu, Estonia

Bayesian statistics in educational research – A look at the current state of affairs

Keywords: Educational policy, Meta-analysis, Quantitative methods, Researcher education

Presenting Author:Christoph Koenig, Friedrich Schiller University Jena, Germany; **Co-Author:**Rens van de Schoot, Utrecht University, Netherlands

The ability of a scientific discipline to build cumulative knowledge depends on its predominant method of data analysis (Schmidt, 1996). A steady accumulation of knowledge requires approaches which allow researchers to take into account results from comparable prior research. Bayesian statistics are especially relevant for establishing a cumulative scientific discipline, because the incorporation of prior knowledge is fundamentally anchored in its basic principles. Despite a considerable increase in attention in other disciplines (e.g., psychology), Bayesian statistics have not been the focus of recent reviews in educational research. The aim of this review is to provide insights into the current state of methodological affairs in educational research, with a focus on Bayesian statistics and the use of prior information. An analysis of publication histories of the 224 educational journals currently listed in the Thomson Reuters Journal Citation Report (Thomson Reuters, 2015) indicates that Bayesian statistics are primarily used to solve methodological problems (e.g., the estimation of complex models), rather than used to answer substantial research questions. Motivations for using Bayesian statistics indicate that Bayesian statistics are used to advance the methodological repertoire of educational research, as well as to produce knowledge which would not have been available with frequentist approaches. Lastly, the predominant use of noninformative prior distributions indicates that one of the biggest advantages of Bayesian statistics, although generally recognized, remains underutilized in educational research. Practical implications of these findings for educational research are illustrated and discussed.

Explaining halo effects in students' evaluation of teaching quality

Keywords: Assessment methods and tools, Quantitative methods, Survey Research, Teacher Professional Development

Presenting Author:Sebastian Röhl, University of Education Freiburg, Germany; **Co-Author:**Wolfram Rollett, University of Education Freiburg, Germany

Academic literature on the quality of teaching often reports a distorting halo effect, which is reflected in high correlations between various dimensions of quality of teaching (for example, Wagner, 2008; Clausen, 2002). This study examines if the halo effect can be explained by the teacher-appreciation perceived by the students as well as by the students' subject-specific interest. The sample consists of $n=860$ students in 41 classes from different types of German secondary schools. Analyses are done using structural equation modelling on individual and class level. Indeed, the results indicate a high importance of the perceived teachers-appreciation for the halo effect. The subject-specific interest shows a smaller effect which can only be observed at the student level. These findings seem to imply that considering the perceived teacher-appreciation might be necessary to take difference in this factor into account when measurements of teaching quality are based on student surveys.

Assessments and Accountability in Secondary Education: International Trends in Educational Policies

Keywords: Assessment methods and tools, Educational policy, School effectiveness, Secondary education

Presenting Author:Janna Teltemann, University of Hildesheim, Germany; **Co-Author:**Nina Jude, German Institute for International Educational Research (DIPF), Germany

A main focus of recent educational reform projects, which is also promoted by the OECD PISA study, is the targeted use of regular assessment and test-based accountability measures in schools and education systems. It is assumed that countries increased the use of assessments for purposes of teacher and school accountability and that, over time, countries become more similar with regard to their models and types of monitoring and evaluation of education. However, systematic empirical evidence on the prevalence and purposes of assessments is scarce. This paper describes national evaluation and monitoring systems in education and their change in implementation over time. This is achieved by classifying all past and recent PISA items focusing on assessment and accountability into the existing theoretical categorizations of evaluation and monitoring systems in education. First analysis for data from PISA 2000 to 2012 show that there is no clear trend of an increased use of assessment and accountability practices. The presentation will include latest results from PISA 2015 to be published in December 2016.

Individual and school-related factors which determine academic performance among at-risk students

Keywords: At-risk students, Primary education, Quantitative methods, Motivation and emotion

Presenting Author:Dóra Fanni Szabó, University of Szeged, Hungary

Research on educational resilience has increased considerably over the last decade and produced various understandings and explanations among success of students' who performed well in school, despite the presence of disadvantaged socio-economic background. This study investigated the factors and conditions that could help more students succeed at school despite challenging socio-economic backgrounds. The main purpose of this study is (1) to identify resilient students based on school performance in different school subject, (2) to explore the applicability of a resilience model, which comprise factors related to the self and attitudes toward school and learning, (3) to contribute to the development of a reliable online instrument, which appropriate to identify the protective factors among primary school students. Based on previous studies it is anticipated that findings will reveal a positive relationship between the investigated factors and performance. Participants were 96 Hungarian fourth grade students, all of them were socioeconomically disadvantaged. The students filled out a questionnaire, which contained five scale (general self-efficacy, school motivation, school attachment, academic self-

concept, persistence in learning). Preliminary results showed that the proportion of the resilient student is relatively high. Significant positive correlations between performance and investigated factors were reported. Self-concept and persistence were also a significant predictor of performance. The results of this study contribute to a more thorough understanding of the role of individual and learning-based factors among at-risk students. The implications of the findings are also discussed, and suggestions for future research are given.

Session G 23

31 August 2017 08:30 - 10:00

Main Building A - A32

Single Paper

Culture, Morality, Religion and Education, Higher Education, Teaching and Teacher Education

Learning and Teaching in Culturally Diverse Settings - C

Keywords: Achievement, Case studies, Citizenship education, Collaborative Learning, Cultural diversity in school, Cultural psychology, Culture, Higher education, Language (Foreign and second), Mixed-method research, Secondary education, Self-efficacy, Social aspects of learning and teaching, Teaching / instruction

Interest group: SIG 21 - Learning and Teaching in Culturally Diverse Settings

Chairperson: Roula Anastasakos, Toronto District School Board, Canada

Encouraging participation in cross-cultural group work: An RCT of local vs internationalised content

Keywords: Collaborative Learning, Cultural diversity in school, Higher education, Mixed-method research

Presenting Author: Jenna Mittelmeier, Open University, United Kingdom; **Co-Author:** Garron Hillaire, The Open University, United Kingdom; **Co-Author:** Bart Rienties, Open University, United Kingdom; **Co-Author:** Dirk Tempelaar, Maastricht University, Netherlands; **Co-Author:** Denise Whitelock, Open University, United Kingdom

With over four million international students studying globally, universities now have become unique spaces for cross-cultural exchange. At the same time, employers in many fields have expressed desires for graduates with cross-cultural competencies for careers in an increasingly globalised world. In response to these dual forces, many universities have attempted to internationalise their curriculums with an aim towards developing students' understanding of global citizenship and ability to interact in multicultural contexts. In this study, we considered one important component of an internationalised curriculum: the incorporation of globally-centred academic content in student assignments. Current research on this topic suggests that student participation and engagement with assignments may increase when academic content is internationalised. Yet, there have been no known studies that have unpacked the complexities of internationalisation by comparing students' behaviours and reflections when working with local (i.e. host) content versus internationalised content. To address this gap, we have conducted a randomised control trial study with 743 undergraduate students, who worked in small groups on a complex, authentic assignment using dynamic content from either the host country, their own country of origin, or an assigned country from which they are non-domicile. Interestingly, our analysis demonstrated a decrease in participation when content is internationalised, as well as strong barriers to positive cross-cultural learning experiences. At EARLI 2017, we will present the results of this analysis and discuss their implications for universities, educators, and students in the context of learning in diverse classrooms and contributing to globalised societies.

Dutch teachers on citizenship education in relation to their student composition

Keywords: Citizenship education, Cultural diversity in school, Secondary education, Social aspects of learning and teaching

Presenting Author: Isil Sincer, Erasmus University Rotterdam, Netherlands; **Co-Author:** Sabine Severiens, Erasmus University Rotterdam, Netherlands; **Co-Author:** Monique Volman, University of Amsterdam, Netherlands

Since 2006 Dutch schools are legally required to promote citizenship. As Dutch schools are becoming increasingly culturally and ethnically diverse, it is important to gain insight into the role of the student composition as regards citizenship approaches. Teachers may hold different views on and approaches to citizenship education, according to the student population in their classes. In this study, interviews were carried out with 16 Dutch secondary education teachers to explore what their views are on citizenship and how they approach citizenship goals. Teachers were selected from three schools across the Netherlands, varying by ethnic and socio-economic composition and educational level. The results of the study illuminate teachers' views regarding the student population, diversity and citizenship education and how the student population, explicitly or implicitly, is utilized in relation to the approach of citizenship goals.

The Validation and Exploration of the Chinese Culturally Responsive Teaching Self-efficacy Scale

Keywords: Cultural diversity in school, Language (Foreign and second), Self-efficacy, Teaching / instruction

Presenting Author: Wai Ming Cheung, The University of Hong Kong, Hong Kong; **Co-Author:** Yanli Huang, The University of Hong Kong, Hong Kong; **Co-Author:** Wing Yee W.Y. WONG, The University of Hong Kong, China; **Co-Author:** Hector W. H. Tsang, The Hong Kong Polytechnic University, Hong Kong

Background: The rapid growth of globalization and immigration pose great challenges to many countries and governments. Language learning is one of the greatest barriers faced by both immigrants and teachers. However, Hong Kong teachers have not been adequately trained to teach ethnic minority (EM) children. Aims: This study aims to (a) develop and validate

a Chinese scale of Culturally Responsive Teaching Self-efficacy (CRTSE) and (b) to examine Chinese language teachers' judgments of their capabilities to bring about desired outcomes of student engagement and learning in Chinese in multiethnic schools. **Methodology:** The original 40-item CRTSE was translated, revised to accommodate the subject-specific content and the local educational context. A total of 287 teachers from kindergartens, primary and secondary schools were recruited to complete the questionnaire. **Results:** Exploratory factor analysis showed that five factors accounted for 69.62% of the variability, which is consistent with the design of the scale. Overall, Hong Kong frontline teachers' total Chinese CRTSE mean score was 65.5. The highest mean score was attained for factor 2 "Efficacy to create positive and trusting relationship" followed by factor 1 "Efficacy to Accommodate Diversity" and the lowest score was factor 5 "Efficacy towards awareness of cultural difference". **Significance:** The results will provide a landscape to the government, researchers and educators on how to support teachers in teaching EM students. The Chinese CRTSE provided deeper insights on teacher's self-efficacy and on the provision of suitable effective professional development.

Examining tensions between achievement-oriented behaviour and cultural identity.

Keywords: Achievement, Case studies, Cultural psychology, Culture

Presenting Author: Emma Carter, University of Cambridge, United Kingdom

The past decade has witnessed further attention into educational initiatives targeting Indigenous students demonstrating high intellectual potential within Australia. These schemes have provided opportunities for students to leave their remote communities in order to pursue their education in urban centres. This paper presents an in-depth case study of one of these initiatives, 'The Academic Leader's Programme' (ALP), implemented by the Cape York Institute of Policy and Leadership. Principally, it examines the tensions that adolescent Indigenous students experience between their achievement-oriented behaviours and cultural identities. Methodologically, this study adopts a 'collective' case study design, focusing upon 7 Indigenous students. Using a grounded theory analytical approach, findings revealed the centrality of cultural identity for Indigenous Australian's sense of well-being within a community context. Students reported a number of interpersonal and intrapersonal issues related to their identification as both high-achieving students and indigenous Australians. Socially, students reported peer-group ostracisation upon leaving and returning to the community. According to Berry et al.'s (2006b) theory of acculturation, students were further found to adopt various profiles throughout their involvement including Diffuse, Ethnic, National and Integrated. In addition, students reported feelings of isolation, racism, anxiety and underachievement as a consequence of tensions arising between their achievement-oriented behaviours and cultural identity. Implications for research include the need for a review of recommended cultural identity models when working with high-achieving Indigenous students. Based upon findings, these should include include profile, rather than stage-based, approaches to the construct which explicitly incorporate the variable of achievement.

Session G 24

31 August 2017 08:30 - 10:00

Pinni B - B1096

Single Paper

Learning and Social Interaction, Teaching and Teacher Education

Social Interaction in Learning and Instruction - F

Keywords: Action research, Cooperative / collaborative learning, Educational Psychology, Educational Technology, In-service teacher education, Mathematics, Qualitative methods, Researcher education, Social aspects of learning and teaching, Social interaction, Student learning, Synergies between learning - teaching and research, Teacher Professional Development, Teaching / instruction, Video analysis

Interest group: SIG 10 - Social Interaction in Learning and Instruction

Chairperson: Britt Adams, Ghent University, Belgium

Gender differences in math: The role of psychological variables and teacher-student interactions

Keywords: Mathematics, Social aspects of learning and teaching, Student learning, Teaching / instruction

Presenting Author: Ana María Espinoza Catalán, Pontificia Universidad Católica de Chile, Chile; **Co-Author:** Sandy Taut, School of Psychology, Measurement Center MIDE UC, Pontificia Universidad Católica de Chile, Chile

The two studies presented here are inter-related and examine gender differences in the mathematics teaching-learning process in secondary mathematics classrooms in Chile. Chile, as other countries around the world, struggles with an important gender gap in favour of boys in mathematics achievement, especially in higher grade levels. The first study examines gender differences in longitudinal mathematics achievement pertaining to 1380 students from 43 7th grade classrooms, and how they relate to relevant psychological variables, and perceptions of their teachers, when learning mathematics. The results show differences in favour of male students in terms of math achievement, motivation, and self-concept. Also, after controlling for initial achievement, math self-concept and students' perceptions of teacher expectations are significant predictors of end-of-year mathematics achievement. The second study analyses 40 video-taped mathematics lessons, using a coding scheme focusing on gender differences in the amount and quality of teacher-student interactions. The results show that teachers, regardless of their gender, pose more questions at a higher cognitive level and give more feedback to male students than to female students, and that male students participate more in class, both

spontaneously and in responding to teachers' questions. The results are important input for educational policies on gender equity in Latin America and beyond.

The gains of teachers' interaction skills training? An international comparison

Keywords: Educational Psychology, In-service teacher education, Social interaction, Teacher Professional Development
Presenting Author:Markus Talvio, University of Helsinki, Finland; **Co-Author:**Minna Berg, University of Helsinki, Finland; **Co-Author:**Lauri Hietajärvi, University of Helsinki, Finland; **Co-Author:**Kirsti Lonka, University of Helsinki, Finland

Implementing 21st century skills at school, including social and emotional learning (SEL), has become increasingly important in many countries. This study investigated the development of teachers' readiness in promoting SEL. Internationally widely-used Lions Quest (LQ) was used as an intervention. The participants were 940 teachers from Finland, Italy, Japan, and Lithuania. Altogether 528 teachers who participated in the Lions Quest answered to the questionnaire before and after the training. The data of the comparison group (n = 412) not participating in the LQ were collected twice as well. The LQ inquiry consisted of two components, namely, how teachers perceived the significance of the goals, and their experienced competence in promoting the LQ goals. An exploratory factor analysis was conducted using data from the pre-test responses of first two countries. This analysis produced three factors. The created factor structure was further confirmed using pre-test data from another two countries. Repeated measures ANOVA (GLM) were used to examine the change between and within groups. After participating in the LQ the teachers perceived the importance of the LQ goals as more important and they felt more competent in implementing SEL skills in their classrooms. In addition, teachers valued the LQ higher after the workshop. In the comparison group no changes were found. The next phase of the study is to extend the study in six new countries. The universality of the LQ as a SEL program will be discussed.

The sociomaterial configurations of students' creative agency in school-based makerspaces

Keywords: Educational Technology, Qualitative methods, Social aspects of learning and teaching, Video analysis
Presenting Author:Kristiina Kumpulainen, University of Helsinki, Finland; **Co-Author:**Antti Rajala, University of Helsinki, Finland; **Co-Author:**Anna Mikkola, University of Helsinki, Finland; **Co-Author:**Sinikka Kaartinen, University of Jyväskylä, Finland

This paper discusses a study on the manifestation of students' creative agency in school-based makerspaces in two Finnish primary schools. By focusing on the temporal unfolding of sociomaterial configurations in students' maker activities, our study seeks to uncover how students' creative agency is shaped through the interplay between the creative intentions of students and the digital technologies and other sociomaterial resources of makerspaces. Our study holds that creative agency is a pivotal element of learning as it accounts for students' critical and generative engagement with novel problems and endeavors. The primary data comprise of 50 hours of video-records of students' (N: 100 students, aged from 10-12 years old) making activities collected intermittently over a period of one semester. Longitudinal, videodata details the micro and macro level dynamics of making activities in situ across time. The findings of the study illuminate how the students' achievement of creative agency was mediated by complex and nuanced sociomaterial configurations that encompassed not only the process of creating specific artefacts, but also making sense of operational, cultural and critical processes surrounding the maker activity situated across space and time.

Educational researchers and teacher educators: Learning to collaborate across boundaries

Keywords: Action research, Cooperative / collaborative learning, Researcher education, Synergies between learning - teaching and research

Presenting Author:Aleksander Baucal, University of Belgrade, Serbia; **Co-Author:**Francesco Arcidiacono, University of Teacher Education (HEP-BEJUNE), Switzerland; **Co-Author:**Äli Leijen, University of Tartu, Estonia; **Co-Author:**Nevena Budjevac, University of Belgrade, Serbia

This paper presents the main elements connected to the process of learning of educational researchers and teacher educators within the implementation of the project "REP-Synergy: Towards improvement of Research capacities essential for teacher Education and Practices in Serbia and Estonia". Participants were engaged in order to overcome existing identities and institutional boundaries connected to different scientific communities and to establish a productive collaboration through joint practice led research studies.

Through qualitative analyses, we identified the most important barriers (personal, identity and institutional ones) that prevent educational researchers and teacher educators to collaborate, as well as the ways they employ in order to establish a productive collaboration that will influence both educational research and teacher education. The results concerning these processes in Serbia and Estonia highlight differences in the main interests of participants coming from two professional communities, different perspectives in finding out models of research and teaching activities, and different identities that are supported by the institutional division. On another side, we also have identified key drivers of collaboration from the perspective of the researchers and of the teacher educators.

Session G 25

31 August 2017 08:30 - 10:00

Pinni A - A1081

Invited Symposium

Contextual influences on teachers' career choice and development in the profession

Keywords: Motivation, Pre-service teacher education, Quantitative methods, Teacher Professional Development

Interest group: SIG 08 - Motivation and Emotion

Chairperson: Paul Richardson, Monash University, Australia

Discussant: Fani Lauermann, University of Bonn, Germany

A burgeoning literature in which the symposium presenters have been at the forefront, has begun to collectively establish the importance of teachers' motivations and motivational beliefs, for their own professional practice and wellbeing, and students' engagement and learning. Against a political backdrop of concern regarding teacher attrition and burnout in many countries including those in our Symposium, we focus on the role of the teacher education (opportunities to learn)/school environment (pressures/supports) in influencing and potentially modifying teachers' motivations and professional development ("PD": engagement/aspirations, self-efficacy, task values, burnout).

We aim to empirically investigate the role of individually and collectively experienced environments, in promoting (or undermining) teachers' optimal motivation and continuing development and wellbeing:

involving teachers from different countries (Australia/Austria/Switzerland/Israel) and career stages (cross-sectional/longitudinal), employing complementary theoretical perspectives (expectancy-value/achievement goal theories) and sophisticated methodologies (longitudinal/multilevel).

Findings reveal which motivations/PD dimensions were most influenced during teacher education/school employment, suggesting targeted levers (opportunities to learn in teacher education, basic needs satisfaction and school leadership in employment) to promote adaptive (and reduce maladaptive) outcomes. Unaffected motivations/PD were especially intrinsic/altruistic/mastery-related, implying lesser potential for enhancing or influencing those positive, seemingly more traitlike qualities.

Our Discussant will elaborate implications for theory, future studies, teacher professional development, teacher education and educational policy.

Contextual Influences on Beginning Teachers' Career Motivations and Career Choice Satisfaction

Presenting Author:Paul Richardson, Monash University, Australia; **Co-Author:**Helen Watt, Monash University, Australia

Little is known about the malleability of initial teaching motivations in response to early career school contexts. In a longitudinal study (teacher education commencement until early career teaching), we examined how initial motivations changed, and their dependency on school contexts. Participants were 493 Australian primary/secondary school teachers from the FIT-Choice project. Self-report surveys tapped teaching motivations (both timepoints), and school contexts during early career. Highest initial motivations were intrinsic value, perceived teaching abilities, positive prior teaching and learning experiences, and "altruistic" social utility values (Richardson & Watt, 2006). Other motivations included social influences, personal utility values (job security, time for family, job transferability) and teaching as a fallback career. Motivations were moderately stable (median $f=.43$). Excessive demands during early career did not moderate stability. Other school context factors were considered through the lens of SDT, emphasising satisfaction of three basic needs (autonomy, competence, relatedness). Motivation change scores were correlated against each context factor. Most influenced motivations were the social utility subfactor "work with children/adolescents" (positively), and, "fallback career" (negatively). Satisfaction with a teaching career was also highly malleable (positively). Given the previously identified influence of the positive motivation to work with children/adolescents, and, the negative motivation to teach as a fallback career, the formative role of school context during early career to support the former and reduce the latter, seem highly important. Other most positively influential teaching motivations, however (*ability, intrinsic value, make social contribution*), were robust to measured context factors, suggesting intrinsic sources and lower trainability.

Factors influencing early career teachers' professional plans: a longitudinal study in Austria

Presenting Author:Johannes König, University of Cologne, Germany; **Co-Author:**Martin Rothland, University of Siegen, Germany; **Co-Author:**Stefan Klemenz, University of Cologne, Germany; **Co-Author:**Sarantis Tachtsoglou, University of Cologne, Greece

Early career teaching is considered a crucial phase of teachers' professional development. This is particularly true in Austria as the context of our study, where elementary/lower secondary teachers face this challenge after a short 3-years Bachelor teacher preparation program. Thus our research aims at analyzing factors that influence the professional plans they report after their transition from training into teaching. For this, we use the PECDA instrument developed by Watt and Richardson, comprising four subscales: planned effort, planned persistence, professional development aspirations, leadership aspirations. We hypothesize that factors from three areas can serve as predictors: contextual factors of their school (e.g., school climate), institutional factors of their teacher preparation career (e.g., practical learning opportunities they had been exposed to during preparation), and individual factors (e.g., motivational and cognitive dispositions of their professional competence). Longitudinal data of $n=131$ early career teachers is used from the EMW study comprising three time points conducted when the teachers entered their preparation program (t1), when they were in their last year of teacher preparation (t2) and when they had started their second year as in-service teacher (t3). In the presentation we first report about the factor structure of the PECDA scales (German translation) which can be replicated for the Austrian sample. Intercorrelations are low showing subscales measure different facets of professional plans. Second, findings from

regression analysis show that contextual, institutional, and individual predictors have different effects on the subscales. Implications of findings and suggestions for future research will be discussed.

Identity development in Swiss vocational education and training teachers

Presenting Author: Zoe Morris, Monash University, Australia; **Co-Author:** Jean-Louis Berger, Swiss Federal Institute for Vocational Education and Training (SFIVET), Switzerland

This presentation will investigate the evolution of vocational teachers' professional identity in Switzerland based on the analyses of two survey studies. The first study ($n = 390$ vocation teachers; cross-sectional research design) will allow examining the association between several components of identity (strength of identity as a teacher, perceived expertise, self-efficacy beliefs, task value and perceived cost) and teachers' experience, career steps and certification. The second study ($n = 71$ vocational teachers undertaking teacher education; longitudinal research design) will show how teachers' professional identity evolves during a two-year teacher education program. In brief, the results reveal that a) the components of identity are non-linearly associated with teaching experience; b) teacher education impacts some components of identity such as perceived expertise in subject-matter and pedagogy and self-efficacy beliefs for instructional planning but not others (e.g., strength of identity as a teacher and self-efficacy beliefs for classroom management). Conjointly, the results of the two studies indicated that vocational teachers' professional identity is dynamic and malleable. The studies shed light on the multiple factors influencing the various components and their differential effects on teacher professional identity.

Context influences on teachers' motivation, self-efficacy & burnout: Do schools & principals matter?

Presenting Author: Ruth Butler, Hebrew University of Jerusalem, Israel; **Co-Author:** Limor Shibaz, The Hebrew University of Jerusalem, Israel

We applied an achievement goal approach to school leadership and a multi-level design to examine whether and how school contexts influence teachers' professional motivation, self-efficacy, and burnout. The first objective was to examine the prediction that teachers' achievement goals for teaching, self-efficacy, and burnout will differ significantly between schools. The second objective was to examine the proposal that school principals influence school-level teacher motivation and wellbeing. Extrapolating from achievement goal theory, we predicted that principals who exert pressure on teachers to achieve high student performance orient teachers to less adaptive ability and work avoidance goals for teaching and higher burnout, while principals who support teacher development will promote teacher mastery goals and self-efficacy and will reduce burnout. 650 teachers in 42 schools in Israel reported on their motivation and perceptions of the principal. Results confirmed that schools matter: there were significant between-school differences for all measures save mastery goals. They also confirmed that the principal matters. Principal performance pressure emerged as an important dimension of school leadership, with significant and adverse consequences for teacher motivation not only at the individual but importantly also at the school level. Principal support for teacher development predicted higher self-efficacy, and to some extent lower burnout, but not achievement goals. We discuss how findings contribute to understanding contextual influences on teacher motivation and challenge the motivational assumptions of accountability policy initiatives.

Session G 26

31 August 2017 08:30 - 10:00

Linna - Väinö Linna (K104)

Invited Symposium

New measurements of professional learning: On the explanatory power of new data collection methods

Keywords: Assessment methods and tools, Biology, Cognitive skills, Cooperative / collaborative learning, Emotion and affect, Game-based learning, Informal learning, Motivation and emotion, Neuroscience, Quantitative methods, Social interaction, Workplace learning

Interest group: SIG 14 - Learning and Professional Development

Chairperson: Hans Gruber, University of Regensburg, Germany

Organiser: Christian Harteis, University of Paderborn, Germany

Discussant: Erno Lehtinen, University of Turku, Finland

The symposium aims at discussing four selected data collection methods (i.e., fMRI; physiological skin measures; automated social interaction tracking; eye-tracking combined with automated facial expression recognition) regarding their explanatory power for researching professional learning. Recently, methods of data collection that go beyond traditional self-reporting receive increased attention, since the application of new measurements becomes more and more convenient. However, there is yet no agreement what these measurements can contribute to a better understanding of professional learning. The contributions present exemplary studies on learning applying new measurements and put their findings up for discussion. The aim of this session is that all contributions reflect the strengths and limitations of their measures and provide a statement on how informative their data can be for researching professional learning. The discussant will put up these statements and relate the presentations to the current state of research. Hence, the session reflects recent methodological issues and discusses opportunities to progress in the current state of research.

Sociometric badges and WiFi sensors: using wearable sensors to study dynamics of social learning

Presenting Author:Maaïke Endedijk, University of Twente, Netherlands; **Co-Author:**Piet Van den Bossche, University of Antwerp, Belgium

Social interaction at the workplace is at the basis of various forms of social learning, such as knowledge sharing, feedback giving and help seeking. Due to the dynamic nature of these processes, social learning at the workplace is extremely difficult to measure using self-report measures. Wearable sensors have opened a new world of possibilities to study the dynamic characteristics of social interaction in an innovative way. With the present studies, we aim to increase understanding of how sensor technology can be used to understand the dynamics of social learning.

We experimented with two types of sensor technologies to continuously measure social interaction. In one of the studies, we tracked the location of 48 employees of a health care department for three weeks, using WiFi-tags. In addition, sociometric badges were used during four days to measure social interaction and validate the WiFi-tags. Social network measures (density, centrality) were applied to calculate the dynamics of social interaction patterns and were related to individual characteristics, such as proactive personality. Our study contributes to the existing literature with more detailed and ecological valid insights on how day-to-day interaction patterns between employees evolve and how this is related to individual characteristics. During the presentation, we will show a number of possible applications of how sensor technology can be used to describe the dynamics of social interaction patterns as a proxy for social learning. Based on our experiences, will discuss the benefits, downsides and main challenges of sensor technology to study social learning at the workplace.

Developing methods for understanding the Role of Emotions in Agentic Learning at work (REAL)

Presenting Author:Anneli Eteläpelto, University of Jyväskylä, Finland; **Co-Author:**Päivi Hökkä, University of Jyväskylä, Finland; **Co-Author:**Susanna Paloniemi, University of Jyväskylä, Finland; **Co-Author:**Katja Vähäsantanen, University of Jyväskylä, Finland

In the REAL project, our objective is to determine how salient emotions are related to the quality of professional learning processes and outcomes. In addition, we aim to develop an innovative method for the on-line assessment of emotions within professional learning contexts. In previous studies of emotions, the limitations of self-reported data have often been noted, and it has been suggested that self-reports should be combined with observational and psychophysiological data. In the REAL project, we shall utilize complementary data collected via (i) self-reports and (ii) physiological indicators of the autonomous nervous system (ANS). Self-reports include interviews and on-line assessment of the quality and valence (positive, neutral, negative) of emotions, plus the learning processes and outcomes. The on-line assessments will be collected via a net-based Emotion Circle. The physiological data include electro dermal activity (EDA), collected via a net-based Emotion Ring. Data on heart rate variability (HRV) will be collected using simultaneous registration of various heart rate indicators. In the first stage, we shall use a stimulated recording procedure in which we play back to the participants the videotaped recordings of their group-based training sessions. At this point we shall ask them to evaluate their emotions within the videotaped training sessions using Emotion Circle as combined with thinking aloud, interviews, plus the registration of EDA and HRV. In the data analysis, we shall identify the most important emotions and investigate how they are related to the quality of the learning processes and outcomes.

How can neuroscience and education move forward together? Myths and opportunities

Presenting Author:Nienke van Atteveldt, VU University Amsterdam, Netherlands

Modern neuroscience research, including neuro-imaging techniques such as functional magnetic resonance imaging (fMRI), enables exploring the living human brain with unprecedented accuracy. Not surprisingly, these recent developments in neuroimaging raise high expectations in society, and in the educational practice in particular. The translation of neuroimaging research to the practice is however not straightforward and sensitive to misconceptions. For example, common myths are that we only use 10% of our brain, or the idea that learners are either “left-brained” or “right-brained”. Moreover, it is often wrongfully assumed that we can use brain scanners to “see” any kind of trait (e.g. intelligence) or disorder (e.g. learning or developmental disorders) in individual brains. To clear the field for the promising opportunities provided by neuroimaging research, it is essential to unravel such misconceptions, as they distract attention and resources away from the promising developments. In this presentation, I will set out which steps are involved in translating neuroimaging research to the educational practice, to enable presenting a realistic overview of misconceptions vs. the opportunities provided by techniques such as fMRI.

Error detection beforehand? Eye-tracking and face recognition for analyzing learning from errors

Presenting Author:Christoph Fischer, University of Paderborn, Germany; **Co-Author:**Torben Tönniges, University of Bielefeld, Germany; **Co-Author:**Birgitta Wrede, Bielefeld University, Germany; **Co-Author:**Christian Harteis, University of Paderborn, Germany

Since working life becomes complex and challenging, learning from errors is an important issue of professional learning. Learning from errors implies consternation and emotional reactions, otherwise cause analyses and reflection upon alternatives remain undone. The eyes are crucial sensors for information processing and the human face reflects emotional reactions. Hence, both are relevant sources for the investigation of learning from errors. On the basis of standardized video tasks, 20 subjects are repeatedly prompted to problem solving and conducting errors. Learning from errors is measured through the avoidance of the identical error in a repeated attempt. The experiments aim at investigating (a) if learning from

errors requires an emotional reaction, and (b) if gaze behavior and face expression presage committing an error. The first issue is relevant for the theory on learning from errors, the second issue is of specific relevance for human-machine interactions and the design of digitalized workplaces. Looking behavior is gathered by eye-tracking data (e.g. saccadic amplitudes) and emotional reactions are gathered through automated face recognition via video camera. The contribution reflects the reliability of eye-tracking and face-recognition data for analyzing professional learning processes.

Session G 27

31 August 2017 08:30 - 10:00

Main Building D - D10B

Invited Symposium

Higher Education

Higher education teachers and teaching

Keywords: Higher education, Mixed-method research, Student learning, Synergies between learning - teaching and research, Teacher Professional Development, Teaching / instruction, Teaching approaches

Interest group: SIG 04 - Higher Education

Chairperson: Liisa Postareff, University of Helsinki, Finland

Organiser: Liisa Postareff, University of Helsinki, Finland

Organiser: Robert Kordts-Freudinger, Paderborn University, Germany

Organiser: Rike Bron, University of Twente, Netherlands

Discussant: Simon Barrie, Australia

Higher education teachers are facing demands to develop student-centred teaching practices with two goals: first, to engage their students to be active agents in the teaching-learning process and second, to improve the quality of students' learning outcomes. However, teachers often lack pedagogical competences, a fact that may be due to a strong focus on research productivity and to the fact that many have not attended pedagogical or faculty development activities. On this background, the symposium offers multiple viewpoints on the current challenges of higher education teaching, trying to view the topic from both the teachers' and the students' perspectives. The first two contributions focus on the use of student-centred and student-engaging teaching methods in promoting student learning and scientific thinking. The third contribution provides insights into barriers faced by mid-career teachers. The fourth contribution finally brings to front the students' perspective and shows the importance of positive relationships and emotions between students and teachers for the enhancement of deep understanding.

The contributions evidence the need for student-centred teaching practices, but also investigate the challenges faced by higher education teachers when creating positive relationships and meaningful interactions with their students. In addition, they highlight the active role of both teachers and students as well as the dynamic nature of the teaching-learning process. They also offer insights into teachers' professional satisfaction and the important role of emotions for the teaching-learning interactions.

Innovating pedagogical designs for student-centered learning: teachers' approaches and challenges

Presenting Author: Crina Damsa, University of Oslo, Norway; **Co-Author:** Rachele Esterhazy, University of Oslo, Norway;

Co-Author: Monika Nerland, University of Oslo, Norway; **Co-Author:** Heidi Hyytinen, University of Helsinki, Finland; **Co-Author:** Sari Lindblom, University of Helsinki, Finland

Pedagogies for student-centered learning have gained strong support in recent years. Still, little is known about the teachers' efforts and challenges when (re-)designing courses aimed to support active engagement and participation in learning activities. This contribution discusses findings from a mixed-methods study in four higher education courses in two Nordic countries, in the fields of biology, engineering and legal education. By way of interviews with teachers and students, observations of teaching and learning activities and a questionnaire to students, the study explored a) the teachers' approaches to innovate pedagogical course designs for student-centered learning and their experiences therewith and b) the students' experiences with the pedagogical design implemented in the courses. The findings indicate that the teachers were set out to support students to develop in-depth understanding of the domain knowledge, by outlining demanding activities and assignments. This was accompanied by experienced learning gains by students but also challenges. The complexity of the learning situation required increased guidance and support, as the students reported, and adjustments of the envisioned design, according to the teachers. Overall, the study provides relevant insights into pedagogical design aspects that matter for a meaningful learning experience, challenges experienced by both teachers and students, and implications for the educational research and practice.

Pedagogical training, use of engaging teaching methods and conceptions of scientific thinking

Presenting Author: Mari Murtonen, University of Turku, Finland; **Co-Author:** Heidi Salmento, University of Turku, Finland

The aim of this research was to examine what kind of conceptions university teachers have about the development of scientific thinking of their students and how these conceptions are connected to the amount of pedagogical training that the teachers have participated, and to the reported amount of use of engaging teaching methods in their teaching. The sample consisted of 101 teachers of one Finnish university, representing four faculties. The subjects were sent a questionnaire by paper mail, consisting of a question about their pedagogical training, 5 Likert-scale questions about use of engaging

teaching methods and 36 questions concerning the development of scientific thinking in students. Data showed that 43,9% of the teachers had taken part in pedagogical training while 56,1% did not have pedagogical training. The findings show that the teachers who had pedagogical training reported using more activating teaching methods (73,8%) than those teachers without pedagogical training (37,7%). A factor analysis was conducted on conceptions of the development of scientific thinking, revealing five sum variables, named: 1) Flexible thinking, 2) Mechanistic thinking, 3) Objectivistic thinking, 4) Methodological thinking, and 5) Expert thinking. There were statistically significant differences in teachers' conceptions of the development of scientific thinking when we looked at the groups who reported using plenty of engaging teaching methods and those not using so much engaging methods. Teachers who reported engaging their students much on lectures thought that scientific thinking is flexible and that understanding the process of science, e.g. research methods, is crucial for the development of scientific thinking.

Mid-Career Faculty: Trends, Barriers, and Possibilities

Presenting Author:Anita Welch, Ball State University, United States; **Co-Author:**Daniel Reardon, Missouri University of Science and Technology, United States; **Co-Author:**Jocelyn Bolin, Ball State University, United States; **Co-Author:**Rachel Stenger, Ball State University, United States

The purpose of this study is to examine an often overlooked period of academic life-that of the post-tenure mid-career faculty. According to data from the NSOPF, mid-career faculty, those with 12-20 years of teaching in higher education, comprise the largest segment of the academic profession. Although recent scholarship on this topic (e.g. Baldwin, Lunceford, & Vanderlinden, 2005; Austin, 2002; Boice, 2000) has identified numerous practices designed to aid the transition from pre-tenure to post tenure appointment, including mentoring, parental leave policies, and sabbaticals, scant comparable empirical evidence for the policies and practices related to post-tenure mid-career faculty can be found. What is known is that the largest and most important population of academia has been largely ignored by both researchers and policymakers. Therefore, the aim of this study is to deepen our understanding of the lives of mid-career faculty, with special focus on their productivity, and to suggest implications for future research on the subject. This study identifies factors related to the academic life of post-tenure mid-career faculty by analyzing trends and predicative patterns. This analysis will thus identify barriers to academic productivity and professional satisfaction. Our results indicate that productivity varies by career stage, and that the amount of scholarly productivity follows a downward trend beginning in mid-career. Overall job satisfaction declines during the mid-career period. Our study is significant in that it provides a base of information that can be used by faculty leaders, administration, and policymakers to transform their cultures and reexamine policies related to mid-career faculty.

Student's experiences of small-group teaching: 'Meeting of minds' in reaching personal understanding

Presenting Author:Noel Entwistle, University of Edinburgh, United Kingdom; **Co-Author:**Evangelia Karagiannopoulou, University of Ioannina, Greece

This study investigates students' perceptions of the teaching, experienced in small-group final-year classes in Greece, developing the idea of a 'meeting of minds' suggested in previous work (Karagiannopoulou & Entwistle, 2013). Twenty semi-structured interviews were carried out to investigate their perceptions of the teaching. Three categories were identified, one of which described a 'meeting of minds' in the learning relationship with the tutor. The second category saw teaching as encouraging understanding in other ways, while the final category described more pragmatic teaching, preparing students for the exam. Differing learning intentions were also found, again categorised into three groups, differing in the strength of the intention to understand for themselves. The study showed the powerful effect of experiencing a 'meeting of minds' in developing a personal academic understanding, but also indicated that this experience varied according to the students' learning intentions. The implications for quality of university teaching were then considered.

Session H 1

31 August 2017 10:15 - 11:45

Linna - K110

Symposium

Lifelong Learning

Informal learning in museums and exhibitions

Keywords: Arts, Comprehension of text and graphics, Educational Technology, Informal learning, Learning Technologies, Lifelong learning, Motivation, Out-of-school learning, Quantitative methods, Science education, Teacher Professional Development

Interest group: SIG 21 - Learning and Teaching in Culturally Diverse Settings

Chairperson: Doris Lewalter, Germany

Discussant: Susan Nolen, University of Washington, United States

There is growing interest in processes of learning and knowledge acquisition outside formal institutions, including informal learning settings like museums, exhibitions or zoos (Schwan, Grajal, & Lewalter, 2014). Accordingly, research in this field currently undergoes a substantial change from empirical evaluations of a certain exhibition to a more principled approach that is based on theories and methods of educational psychology. More specifically, according to the contextual model of museum learning (Falk & Dierking, 2013), processes of knowledge acquisition in museums result from an interplay of the

personal, the physical, and the social context of the visitors' museum experience. In the present symposium, the impact of the personal and the physical context on learning in museums will be discussed in four presentations. For the personal context, issues of visitor characteristics are of particular importance. Moser, Lewalter, Phelan and Schnotz present findings concerning the impact of visitor profiles on information processing, while Lewalter, Phelan and Bauer introduce a scale on visit motivation and present results for different informal learning settings. Regarding their physical context, museum exhibitions are increasingly supplemented by digital tools that aim to foster understanding by interactive access to additional material and explanations. Zahn and Vollenwyder report on an study about teachers' perspectives on the role of digital media for school class visits, while Schwan and Dutz describe an experiment how different types of visualizations on a mobile digital guide influence perception and comprehension of pictorial artworks in an exhibition. Nolan discusses the contributions based on her profound expertise on engaging learning environments.

The impact of visitor profiles on the processing of conflicting information

Presenting Author:Doris Lewalter, Technical University of Munich (TUM), Germany; **Co-Author:**Stephanie Moser, Technical University of Munich, Germany; **Co-Author:**Sielle Phelan, TUM, Germany; **Co-Author:**Wolfgang Schnotz, University of Koblenz-Landau, Germany

Museums are informal learning settings that present information to a very heterogeneous audience. They are increasingly taking on the challenge to present conflicting information (e.g., risk-benefit) in an effective and motivating manner. As we know from a multitude of psychological studies conducted in various educational settings that personality characteristics have an impact on information processing it is the aim of the presented study to investigate this relationship in the museum context. While the influence of recipients' personal characteristics has so far mainly been considered separately for each characteristic, we conducted a cluster analysis to identify visitor profiles in terms of combined personality traits that are assumed to be relevant for the processing of conflicting information (epistemological beliefs, tolerance of ambiguity, self-efficacy, interest, prior knowledge). This approach was chosen as for the museum practice, profiles of visitors and the frequency of their occurrence within the audience are more insightful than the frequencies of isolated personality variables as they better reflect the actual configuration of the audience. On the basis of data of 468 visitors four stable visitor profiles are identified. By calculating linear regression analyses we investigated whether belonging to a specific visitor profile has an impact on the processing of conflicting information. Results indicate significantly different influences of the four visitor profiles on the processing of conflicting information during the museum visit. The results are discussed regarding their implications for theory and research as well as possible consequences for practical educational work in the museum context.

Comparing visit motivation across educational leisure settings with a new short-scale

Presenting Author:Doris Lewalter, Technical University of Munich (TUM), Germany; **Co-Author:**Sielle Phelan, TUM, Germany; **Co-Author:**Johannes Bauer, University of Erfurt, Germany

In order to better understand motivational aspects of free-choice learning, a profound knowledge of people's visit motivation within and across educational leisure settings (ELS) is needed. We developed a short scale to enable quick and valid comparisons of visit motivation across educational leisure settings and investigated its dimensionality, reliability and measurement invariance across three sites (science museum, art museum, zoo; $N = 605$). Our 17-item short scale captures six theoretically important visit motivation categories with sufficient reliability ($p .65 < .85$). Analysis indicates an approximate scalar invariance of factor loadings and item intercepts, allowing for a comparison of latent factor means across sites. Subsequently, we found plausible mean differences in visit motivation dimensions across science museum, art museum and zoo. The implications for future research and theory as well as possible consequences for practical educational work in ELS are discussed.

Using multimedia guides to foster comprehension of pictorial artworks in museums

Presenting Author:Stephan Schwan, Leibniz-Institut für Wissensmedien, Germany; **Co-Author:**Silke Dutz, Leibniz Institut für Wissensmedien, Germany

Guiding viewers' attention in a picture is a prerequisite for successfully integrating additional verbal information into the picture's content, as research on multimedia learning has indicated. Therefore, the present study investigates the use of multimedia guides with audio narration and visual cues in an art exhibition and its effects on memory of pictorial elements and the perception of the artwork's principles of composition. We compared three different types of digital exhibition guides (audio guide vs. audio guide plus visual cues with a high resolution image vs. audio guide plus visual cues with a blurred image). 105 participants took part in the study. After the visit in the laboratory art exhibition and listening to 30 audio files on the multimedia guide in the three different conditions, participants were tested in a memory test about pictorial elements and the paintings' underlying composition principles. Results show that adding images with visual cues to an audio guide narration helps visitors to remember pictorial elements to which the audio narration refers, and to better comprehend the compositional principles. But this advantage comes at the cost of a decreased memory for further pictorial elements not mentioned in the audio guide. Whether visual cues are superimposed on high resolution or blurred images did not have a substantial impact on the results.

Teachers' Perspectives on the Role of Digital Media for School Class Visits to Science Museums

Presenting Author:Carmen Zahn, University of Applied Sciences Northwestern Switzerland, Switzerland; **Co-Author:**Beat Vollenwyder, Fachhochschule Nordschweiz, Switzerland

Research has shown that it is a highly demanding task for teachers to plan and carry out successful school class visits to science museums: Aside from dealing with logistical and organizational hurdles, teachers are also responsible for the trilogy of pre-visit preparation, the visit itself and post-visit follow-up activities that can foster their students' learning. Science museums increasingly provide digital media and tools in order to assist teachers in their planning and realization of school class visits, for instance, digital contents and mobile apps or virtual tours are offered for download from specific museum websites. The present visitor survey investigates *teachers' perspectives* on such support related to their own practices of pre-visit preparation, museum visit and post-visit follow-up activities. We obtained inquiry data from 195 teachers and calculated Fleiss κ in order to assess agreement among teachers. Results reveal that with fair agreement teachers considered museum-provided digital contents (e.g., from the website) important for pre-visit *preparation* and *post-visit activities*, while *during the visit* they would prefer mobile tools for both spatial orientation and "on-the-spot" pedagogical/didactic support. Generally, a positive attitude towards digital media and tools in the context of school class museum visits was clearly evident, underlining the potential for such applications.

Session H 2

31 August 2017 10:15 - 11:45

Main Building C - C8

Symposium

Temporal and adaptive process of regulated learning – what can multimodal data tell?

Keywords: Computer-assisted learning, Computer-supported collaborative learning, E-learning / Online learning, Educational Technology, Emotion and affect, Learning analytics, Metacognition, Multimedia learning, Problem-based learning, Self-regulation

Interest group: SIG 16 - Metacognition

Chairperson: Sanna Järvelä, University of Oulu, Finland

Chairperson: Maria Bannert, Germany

Discussant: Allyson Hadwin, University of Victoria, Canada

In self-regulated learning research (SRL) progress has been made evidencing that self-, co- and socially shared regulation of learning is critical for learning success as well as in explaining regulatory processes in today's increasingly social, interactive, and technology enriched learning situations. In conclusion, contemporary perspectives view SRL as a cyclical complex metacognitive and social process that involves adapting meta/cognition, motivation, emotion, and behavior. This is to say, regulation involves cyclical adaptation. It is neither static nor a state, but rather a series of contingencies over time. In other words, regulation evolves during learning. What is still not clear, is when those regulatory actions take place and how they influence each other. There is a lack of studies examining use and change of regulatory processes and types of regulation over time (temporality) as a variable in research about regulation. This is primarily because of the limited methodological ways to capture these evolving processes. The organizers of this symposium have been progressing the use of multimodal data in SRL research in their *EARLI Center of Innovative Research (E-CIR)* "Measuring and supporting students' SRL in adaptive educational technologies". The aim of the symposium is to discuss and share our empirical findings dealing with temporal and adaptive process of regulation while using multimodal measures.

Analysing Temporal Data for Understanding and Fostering Learning induced by Self-Created Prompts

Presenting Author: Maria Bannert, Technical University of Munich (TUM), Germany; **Co-Author:** Katharine Engelmann, Technical University of Munich, Germany

Research in self-regulated learning (SRL) demonstrates that learners often do not perform regulatory activities spontaneously, which results in lower learning outcome. Therefore, our research aims to provide instructional support for the activation of strategic learning processes during technology-enhanced learning utilizing students' self-created metacognitive prompts. In a pre-post experimental design, students in the experimental group ($n = 28$) were instructed to create their own metacognitive prompts before learning whereas students in the control group ($n = 29$) learned without prompts. Log file analysis of navigation behavior indicates that students who learned with their self-created prompts spent a longer time on relevant websites compared with students in the control group. Moreover, participants in the experimental group attained better comprehension performance. In the presentation we will focus on process mining techniques which we used to analyze temporal data in order to better understand student's learning induced by self-created prompts.

Examining the interplay of affect and self regulation in the context of clinical reasoning

Presenting Author: Susanne Lajoie, McGill University, Canada; **Co-Author:** Maren Gube, McGill University, Canada; **Co-Author:** Amanda Jarrell, McGill University, Canada; **Co-Author:** Shan Li, McGill University, Canada; **Co-Author:** Juan Zheng, McGill University, Canada

This study examines the relationship between self-regulatory activities and affect in the context of clinical reasoning in a computer based learning environment, BioWorld (Authors, 2013). We present a case study of high and low performing medical students to demonstrate the interplay between cognition, affect, motivation and self-regulation in a clinical problem solving context. The temporal nature of clinical reasoning was examined with a specific focus on how high and low performers handled uncertainty. In particular, we examined differences in the types of self-regulatory processes students enacted throughout the reasoning activity, and the emotions they experienced while diagnosing a patient case. Think-aloud

and log file analyses were used to code SRL using Meijer et al.'s framework (2006) that was adapted by Authors (2012) to classify both macro and micro levels of self-regulatory activities that pertain specifically to clinical reasoning. Affect was analyzed while students solved cases using behavioural data (through facial expressions). Achievement goal orientations (Elliot & Murayama, 2008) and habitual emotion regulation strategy use (Gross & John, 2003) were also assessed. We discuss the implications of these preliminary findings in terms of the validity and reliability of inferences made in relation to self-regulatory activities and affect.

Measuring, Analyzing, Inferring Temporally Unfolding Self-Regulatory Processes from Multimodal Data

Presenting Author:Roger Azevedo, North Carolina State University, United States; **Co-Author:**Michelle Taub, North Carolina State University, United States; **Co-Author:**Nicholas V. Mudric, North Carolina State University, United States; **Co-Author:**Garrett C Millar, North Carolina State University, United States; **Co-Author:**Amanda E. Bradbury, North Carolina State University, United States; **Co-Author:**Megan J. Price, North Carolina State University, United States

Understanding the complex nature of cognitive, affective, metacognitive, and motivational (CAMP) processes during learning with advanced learning technologies (ALTs) is key to understanding how these processes impact learning about conceptually challenging topics (Azevedo et al., in press). Current methodological and analytical approaches to studying SRL processes (e.g., self reports) have several weaknesses compared to capturing real-time deployment of SRL processes (see Molenaar & Järvelä, 2014). Our approach has been to use MetaTutor (an intelligent, hypermedia multi-agent ALT) to collect rich multimodal multichannel trace data of CAMP processes during learning (e.g., eye tracking, facial expressions of emotion). In this presentation, we focus on the challenges in measuring, analyzing, and inferring temporally unfolding CAMP self-regulatory processes during human-pedagogical agent (PA) interactions with MetaTutor. In our presentation we will present and discuss the methodological and analytical challenges associated with understanding and inferring the roles of CAMP processes by using examples from multichannel, multimodal data (e.g., log files, eye tracking, facial expressions of emotion, physiological data, and screen capture of learner-system interactions) collected from college students as they learned with MetaTutor.

How regulation evolves during collaborative learning ? – triangulation of multimodal dataset

Presenting Author:Sanna Järvelä, University of Oulu, Finland; **Co-Author:**Jonna Malmberg, University of Oulu, Finland; **Co-Author:**Márta Sobocinski, University of Oulu, Finland; **Co-Author:**Eetu Haataja, University of Oulu, Finland; **Co-Author:**Paul A. Kirschner, Open University of the Netherlands, Netherlands

Collaboration is not a snapshot of a task performance, but a progress in collaboration matters. In order to understand how regulation evolves during collaborative learning, research should inform students' strategic adaptation to the situated challenges and strategic regulation of cognition, motivation. The aim of this paper is to explore what multimodal data can tell us about SRL processes in authentic collaborative learning tasks. The study included high school students aged 15 to 16 ($N = 36$). The students worked in collaborative groups of three students in a total of 12 groups on the task of designing a "healthy breakfast" by using the WeSpot learning environment and following the principles of scientific inquiry. Data collection involved information from four data channels: observation data, two types of physiological data (electrodermal activity and heart rate), and facial recognition data processed from the video data. We will demonstrate what multimodal data can tell us about SRL processes in authentic collaborative learning tasks in terms of a) the adaptation and student's reaction to challenge situation, and b) how adaptation in collaborative learning evolves.

Session H 3

31 August 2017 10:15 - 11:45

Main Building A - A06

Symposium

Higher Education, Lifelong Learning

Researching professional learning in changing epistemic environments

Keywords: Engineering, Higher education, Knowledge creation, Lifelong learning, Professions and applied sciences, Qualitative methods, Social interaction, Teacher Professional Development, Workplace learning

Interest group: SIG 14 - Learning and Professional Development

Chairperson: Monika Nerland, University of Oslo, Norway

Discussant: Madeleine Abrandt Dahlgren, Linköping University, Sweden

Changes in how knowledge is produced and distributed transform professional learning in work as well as in educational settings. In this context, we need a better understanding of how epistemic shifts in the professional domains influence the micro-dynamics of education and learning in practice, and what such shifts imply for the ongoing learning and qualification of professionals. This symposium contributes to our understanding of professional learning today by comparing and contrasting how epistemic resources are provided and used in different fields of expertise. The four papers all employ sociocultural and material perspectives to examine professional learning in specific epistemic environments, but target different analytical levels and intersections of practice. Paper 1 presents results from an Australian project which compared how epistemic shifts in pharmacy, nursing, teaching, social work and school counselling generate new educational practices and requirements for learning in higher professional education. Paper 2 examines a specific aspect of epistemic environments in software engineering, i.e. how the provision of web-based knowledge resources stimulates object-related

learning in education and work. Paper 3 focuses on new epistemic resources in health care, and examines knowledge translation and learning among professionals dealing with chronic illness. Paper 4 examines changes in epistemic environments for work-based learning in the teaching profession by integrating findings from three related Norwegian studies carried out in the period 2004-2016. In sum, the symposium shows how professional education and learning is embedded in ongoing knowledge dynamics that span the education-work boundary, and suggest analytical approaches to research these relations.

Insights into the dynamics between changes in professional fields and teaching in higher education

Presenting Author:Lina Markauskaite, University of Sydney, Australia; **Co-Author:**Peter Goodyear, The University of Sydney, Australia

What counts as expert knowledge, and what is expected from knowledgeable practitioners are subject to continual change in professional fields. Consequently, professional education programmes are often challenged to ascertain their capacities to prepare “job-ready” graduates for such changing professional knowledge work. However, what is the nature of these changes and how they get incorporated into teaching and learning practices in university courses are rarely examined, so teachers running courses for professional education get little guidance about how it can be more clearly conceptualised, and done better. Our study focussed on “epistemic shifts” – observable changes in professional fields that bear on how professionals are expected to work with knowledge. We aimed to understand how recent epistemic shifts in specific professional fields were instantiated in assessment tasks in professional courses. We focussed on assessment tasks as these tasks give insights not only into what and how students learn, but also into what counts as “job-ready” graduates. Our detailed case studies came from five courses – in pharmacy, nursing, social work, school counselling and education. Our results show that the epistemic shifts varied in their transformative scale and in the ways they became incorporated in assessment tasks: from implicit incorporation of an ongoing flow of small shifts into established professional tasks, to introduction of new professional epistemic practices. The analytical framework we have constructed helps depict what is actually changing in students’ epistemic practices when assessment tasks are redesigned and what kinds of new epistemic capabilities students will consequently develop.

Students’ and beginning professionals’ learning with web-based resources in software engineering

Presenting Author:Monika Nerland, University of Oslo, Norway; **Co-Author:**Crina Damsa, University of Oslo, Norway

This paper examines how distributed knowledge resources in the field of software engineering provide opportunities for students and professional practitioners to set up learning opportunities for themselves. By using perspectives on artifact-mediated practices and knowledge construction as analytical lenses, we examine how learners in this field access versatile web-based knowledge resources, become involved in exploring and constructing knowledge objects, and pursue learning opportunities in deliberate and strategic ways as part of their local problem-solving activities. We draw on two empirical cases, one study of students’ project-based learning in computer engineering education and one study of novice engineers’ continuous learning in the context of engineering projects at work. Data comprises videotaped observations, learning logs, interviews, and documentation of tools and resources utilized in practice. Findings show how accessing distributed knowledge resources in both cases led to the participants’ involvement in object-related learning dynamics, which oscillated between opening new avenues for exploration and arriving at temporary closures. Moreover, the participants approached knowledge resources in deliberate ways and created learning opportunities for themselves through the ways resources were identified, attended to and examined. The resources served to link their practices with other sites and actors in the domain, which also stimulated further learning. However it varied how thoroughly the participants engaged with the knowledge resources. We discuss opportunities and challenges for learning provided in this environment, and suggest that models for professional education and learning should be reconsidered to support exploration along wider epistemic infrastructures and recognize self-initiated construction of learning activities.

Knowledge translation, professional communication and learning in the context of chronic illness

Presenting Author:Asa Makitalo, University of Gothenburg, Sweden; **Co-Author:**Mona Lundin, University of Gothenburg, Sweden

The epistemic work among professionals in the health sector is under transformation. Chronic diseases constitute a primary challenge for the sector and treatment of these call for technologies that can support a new relation with patients based on self-treatment and patient-generated data. In this study the aim was to analyse the implications of such self-treatment for professional epistemic work in hypertension care consultations. The data consists of 10 video-recorded consultations with professionals and patients after 8 weeks of self-treatment and reports through a mobile phone based system. Based on sociocultural and dialogical traditions the analysis focused on the in situ interaction with a focus on what epistemic orientations that emerged in the consultations as the data was visually displayed through graphs on the screen. Three orientations are reported: The system as a knowledge object, the system as a coordination device and the system as support in mediating professional and patient perspectives.

Epistemic shifts in teachers’ work and learning analyzed through three research projects

Presenting Author:Karen Jensen, University of Oslo, Norway; **Co-Author:**Eli Tronsmo, University of Oslo, Norway

This paper explores how the epistemic environments for teachers' work and learning are being reconfigured to meet new knowledge demands. The paper synthesizes and reviews findings from three empirical studies that examined Norwegian teachers' work-related learning, spanning a time period of twelve years. The studies were designed to build on each other, by following the same practitioners over time and by adding targeted case studies to investigate in depth questions emerging from the first study. Data was collected through questionnaires, interviews and learning logs (study 1 and 2) as well as through observations of knowledge practices and learning (study 2 and 3). A shared conceptual framework building on theorizations of professional knowledge cultures and artifact-mediated learning (Knorr Cetina 2001, Säljö 2010) was employed to analyze how professionals relate to and construct knowledge in everyday work, as well as how their situated enactments are linked with wider knowledge spheres. When synthesizing and reviewing the findings across the studies, we identify significant shifts taking place within the teaching profession. From a state in which teachers' learning were dominated by the sharing of personal experiences within the local workplace, the later projects documented an increased variety of knowledge resources which linked practitioners to larger knowledge networks. Moreover, teachers increasingly take on responsibilities for the epistemic basis for professional actions, by relating to and adapting knowledge-based standards and templates in everyday work. In doing so, they also become local knowledge producers. We discuss what these changes imply for continuous learning and development.

Session H 4

31 August 2017 10:15 - 11:45

Linna - K103

Symposium

Teaching and Teacher Education

Professional Development in Dialogic Teaching: Commonalities and Constraints

Keywords: Argumentation, Communities of practice, Comparative studies, Qualitative methods, Quantitative methods, Quasi-experimental research, Self-efficacy, Social interaction, Teacher Professional Development, Video analysis

Interest group: SIG 11 - Teaching and Teacher Education

Chairperson: Alexander Groeschner, Germany

Organiser: Alina Reznitskaya, Montclair State University, United States

Discussant: Jonathan Osborne, Stanford University, United States

The importance of classroom dialogue in supporting student learning has been recognized in numerous studies that span different school subjects, grade levels, and national borders (Alexander, 2008; Resnick, Asterhan, & Clarke, 2015). Educational researchers, policy-makers, and practitioners increasingly advocate dialogic teaching as a means of furthering students' development. Dialogic teaching is a general pedagogy that capitalizes on the power of talk to foster students' thinking, learning, understanding, and problem solving. Although research continues to demonstrate the pedagogical potential of dialogic teaching, it is still largely absent from today's classrooms. Further, only a few studies have systematically examined the features of professional development programs that can produce non-trivial and lasting changes in teacher's discourse practices and related student outcomes. The aim of this symposium is to examine professional development efforts that show promise for supporting teachers' implementation of dialogic teaching. Our discussion brings together researchers from multiple disciplines who propose various mechanisms of teacher change, use diverse approaches to professional development, and focus on different teacher and student outcomes. All proposals in this symposium use socio-cultural theories to frame advocated teaching practices as well as their professional development efforts. However, the authors expand these theories in a variety of ways, integrate them with other research traditions, and focus on the outcomes of professional development that range from quality of teacher and student talk to argumentation skills and self-efficacy. We examine the commonalities and constraints among different approaches, identifying more (and less) promising features of the programs.

Using Talk to Promote Argument Literacy: Effects of Professional Development in the Language Arts

Presenting Author: Ian A.G. Wilkinson, The Ohio State University, United States; **Co-Author:** Alina Reznitskaya, Montclair State University, United States; **Co-Author:** Min-Young Kim, The Ohio State University, United States; **Co-Author:** Ariel Sykes, Montclair State University, United States

In this paper, we report findings from the third yearlong iteration of a professional development program in dialogic teaching to promote students' argument literacy. We define argument literacy as the ability to comprehend and formulate arguments through speaking, listening, reading, and writing. The professional development program focused on helping teachers use a specific type of talk called 'inquiry dialogue' in classroom discussions about text to promote students' argument literacy. The program was delivered using a combination of workshops, study groups, and coaching sessions. Using a pretest-posttest experimental design, we examined evidence of growth in teachers' epistemological beliefs and enactment of discussions, and collected data on students' argument literacy and reading comprehension. Twenty-six fifth-grade language arts teachers, 14 in the experimental condition (professional development) and 12 in the control condition, and their students at two U.S. sites participated. Teachers made substantial shifts in their discourse practices and in the quality of argumentation in the discussions, though there was little apparent change in their epistemic beliefs. Some evidence of transfer to individual learning outcomes was observed.

Professional Development For Dialogic Teaching

Presenting Author:Robin Alexander, University of Cambridge, United Kingdom

This paper presents an account of progress to date on the joint Cambridge Primary Review Trust / Institute for Effective Education project *Classroom talk, social disadvantage and educational attainment: Raising standards, closing the gap*, funded by the UK's Education Endowment Foundation. The project's professional development programme aims to intensify the quality of classroom talk, teachers' as well as students', in order to increase engagement and improve attainment among students judged disadvantaged by government criteria. The approach builds on the notion of dialogic teaching, which emphasises a broad pedagogic/dialogic repertoire, and principles of procedure rather than specific talk formulae.

The strategy comprises a two-term reiterative programme of planning, target-setting and review using mentoring and video/audio analysis and structured into 11 fortnightly cycles. Trialled in 2014-15 in 10 London primary schools, it was subjected during 2015-16 to randomised control trial (RCT) in 72 schools in Birmingham, Bradford and Leeds. Alongside the RCT, the project team have undertaken their own process analysis using observation, interview and both quantitative and qualitative analysis of the teachers' lesson videos. The presentation will focus on outlining and reflecting on the project's rationale, methodology and strategy. It will also include a critique of the increasing colonisation of UK policy and research funding by the RCT as the supposed methodological 'gold standard,' showing how in a field as complex as classroom talk the viability of RCT is strictly limited.

Effects of Professional Development in Dialogic Teaching on Teacher and Student Self-efficacy

Presenting Author:Alexander Groeschner, Friedrich Schiller University Jena, Germany; **Co-Author:**Ann-Kathrin Schindler, Technische Universität München (TUM), Germany; **Co-Author:**Doris Holzberger, Technical University of Munich (TUM), Germany; **Co-Author:**Tina Seidel, Technische Universität München (TUM), Germany

Professional development (PD) programs in dialogic teaching often address dialogic moves and formats to change teachers' classroom practice and to scaffold student engagement. Scaffolding is a form of high quality support that may help to increase teacher self-efficacy. Similarly, students' self-efficacy may be promoted by high quality support of their teachers and may be relevant to the way students participate in classroom dialogue. To date, there is a lack of research investigating teacher learning in relation to both changes in classroom dialogue practice and the effects on teacher and student self-efficacy. This study contributes to this research by applying a quasi-experimental approach. Specifically, we investigated whether teachers and students in an intervention group (IG), who participated in an video-based PD program on classroom dialogue, improved their self-efficacy compared to a control group (CG) of teachers and students, who participated in a non-video-based PD approach. Quantitative instruments were administered to measure teachers' and students' self-efficacy. Qualitatively, a coding scheme was developed to capture changes in videotaped teaching practice and teacher verbal exchanges during PD workshops (IG only). The findings show a significant change in teachers' and students' self-efficacy in the IG. We suggest that the changes could be related to the IG teachers' practice of scaffolding, as scaffolding was directly addressed in a lesson planning workshop during PD intervention.

Developing Dialogic Pedagogy, Supporting Teacher Agency

Presenting Author:Alexander Groeschner, Friedrich Schiller University Jena, Germany; **Co-Author:**Adam Lefstein, Ben-Gurion University of the Negev, Israel; **Co-Author:**Benzi Slakmon, Ben Gurion University of the Negev, Israel

A key principle of dialogic pedagogy is respect for students' voice and agency, yet often attempts to promote dialogue through teacher professional development afford limited space for participating teachers' voice and agency. This paper reports on the design and initial progress of an initiative designed to facilitate teacher agency in experimenting with and appropriating dialogic practices. Key features of this programme include: learning on the job, as part of routine participation in work-groups; working with existing leadership and practices; quick feedback from research to practice; and deep partnership with the Ministry of Education and other partners. Drawing on interviews, surveys and audio-recordings of teacher team meetings and professional development workshops, the study explores (a) how the participating teachers are thinking about dialogic pedagogy, (b) what local practices they have developed, (c) central challenges encountered, and (d) design adaptations to address them. Emerging issues include gaps between the research team, Ministry of Education officials and teachers in our thinking about dialogue, and indeed in our goals for the intervention; different ways of appropriating and adapting dialogic pedagogy in the different cultural settings of Jewish and Bedouin schools; and the advantages and drawbacks of classroom video-recordings as a means of representing dialogic practice. The paper will contribute to comparative analysis of dialogic pedagogy across cultural contexts, to an appreciation of teacher agency and voice in appropriating dialogic pedagogies, and to a deeper understanding of the processes of informal teacher learning aimed at enacting dialogic practices.

Session H 5

31 August 2017 10:15 - 11:45

Main Building A - A07

Symposium

Context Effects in Learning and Instruction

Keywords: Attitudes and beliefs, Conceptual change, Educational Psychology, Higher education, Interdisciplinary, Language (Foreign and second), Mathematics, Motivation, Pre-service teacher education, Primary education, Qualitative methods, Science education, Secondary education, Teacher Effectiveness, Teaching / instruction

Interest group:

Chairperson: Mona Weinhuber, University of Freiburg, Germany

Organiser: Matthias Nückles, University of Freiburg, Germany

Discussant: Fritz C. Staub, University of Zurich, Switzerland

Context matters! Since the late 20th century, inspired by situated cognition approaches, analyses of contextual effects gained increasing attention in educational research. Researchers conducted in-depth analyses of authentic learning situations by observing teachers' and learners' actions in order to analyze potential effects of the context on distinct instructional practices (Brown 1992; Cobb et al. 2003; Collins 1992). Despite the valuable insights, however, processes of how context can shift mindsets and which factors influence such shifts are still under research. With this symposium we aim to contribute to this research field, by combining recent experimental and qualitative studies that provide evidence how instructional contexts affects students' learning and teachers' instructional practices. The first paper provides insight into how different language mindsets affect the way people perceive and interact with learners who fail a second language activity. The second paper presents results indicating that students adapt their conceptions of learning when entering a new context of learning. The third paper reports how different contexts influence the nature of math teachers' explanations. The final paper identifies contexts in which pre-service teachers are more and less likely to engage in responsive teaching practices. Together, the contributions to this symposium make up a coherent set of studies which shed light on how situational conditions may shape instructors' and learners' cognitive processes and thereby influence learning behavior and instructional practices.

Changing language mindsets influences beliefs towards and feedback given to language learners

Presenting Author: Nigel Mantou Lou, University of Alberta, Canada; **Co-Author:** Kimberly Noels, University of Alberta, Canada

Language mindsets refer to people's beliefs about whether language aptitude is malleable (i.e., incremental mindsets) or fixed (i.e., entity mindsets). Previous research suggests that a context that promotes incremental mindsets leads people to become more motivated and persistent in the face of challenges. This research examines whether language mindsets influence the type of feedback that people provide to language learners who fail a test in a language class. Two studies ($N = 258$) showed that holding or priming entity beliefs led Anglo-Canadians to attribute English learners' failure to a lack of language intelligence and thus, to provide consoling feedback to comfort for low competence (e.g., "don't worry, not everyone is good at language"), while holding or priming incremental beliefs led Anglo-Canadians to believe in English learners' potential to learn, and in turn to provide constructive feedback to improve competence. We conclude that promoting incremental mindsets may help people to become more effectively support language learners' developing competence.

How context influences pre-service teachers attending and responding to student ideas

Presenting Author: Leema Berland, University of Wisconsin-Madison, United States

Movements in science education increasingly emphasize responsive teaching practices in which teachers attend and substantively respond to their students' ideas. Existing literature examining these pedagogical practices seems to have conflicting findings; some work suggests it is extremely challenging for teachers while others demonstrate novices doing it from early on in their student teaching. We interpret these differences in findings as contextual, and our study explores the contexts in which pre-service teachers are more and less likely to reason with and about their student ideas while teaching. Preliminary analyses suggest that pre-service teachers are more likely to attend to the substance of students' ideas when interpreting them than when considering possible responses. Further, we find teacher attention becomes increasingly difficult as their context becomes increasingly similar to "real world" classrooms. We explore the implications in the full paper.

When learning becomes traveling. How metaphors of learning change when entering university

Presenting Author: Elisabeth Wegner, University of Freiburg, Germany

For successful learning, students need to adapt their conceptions of learning to the learning culture, especially when entering a new context of learning such as university. However, conceptions are usually implicit and thus difficult to assess. Metaphors have been proposed as a possibility to examine conceptions. Therefore, we examined how students' metaphors of learning ($N=30$) changed over the course of the first year of studies. Also, we analysed how the metaphors related to motivational aspects of learning.

Metaphors were more congruent with university learning culture in the 2nd year of studies than in the 1st year, and congruence of metaphors to university learning culture was related to perceived competence, indicating that students adapt their conceptions of learning when entering a new context of learning.

Context affects teachers' principle-orientation of explanations

Presenting Author: Mona Weinhuber, University of Freiburg, Germany; **Co-Author:** Andreas Lachner, University of Tübingen, Germany; **Co-Author:** Timo Leuders, University of Education Freiburg, Germany; **Co-Author:** Matthias Nückles,

University of Freiburg, Germany

Principle-based explanations have shown to be an effective scaffold to support students' understanding. However, prior research suggests that mathematics teachers often neglect principles and rather describe the algorithmic rules without explaining, why these mathematical steps are performed. One reason for this finding may be that classroom context activated a rather procedure-oriented mindset of the nature of mathematics (i.e., math as a "toolbox"), which triggered the teachers to generate more procedure-oriented explanations. We examined how different contexts affected teachers' provision of principle-oriented or rather procedure-oriented explanations. Using mindset priming, we had mathematics teachers either read a comic portraying mathematics as argumentation (students vividly discussed a mathematical problem), or a comic portraying mathematics as a toolbox (students rehearsing algorithms). Afterwards, the teachers wrote an explanation about an extremum problem for novice students. Results revealed that teachers primed with an argumentative context generated more principle-oriented explanations than teachers primed with a toolbox context. The findings suggest that the comics in fact activated different mindsets which led the teachers to either include more principle-oriented or more procedural information in their explanations. These results could stimulate math teachers to critically reflect on the mathematical culture in schools, given that principle-oriented explanations are more effective than procedure-oriented explanations in helping students gain transferable knowledge.

Session H 6

31 August 2017 10:15 - 11:45

Pinni B - B3110

Symposium

Motivational, Social and Affective Processes

Implementing SDT in practice: Improving need-supportive teaching through school-based interventions

Keywords: Assessment methods and tools, At-risk students, Experimental studies, Motivation, Quasi-experimental research, Teacher Professional Development, Teaching approaches

Interest group: SIG 08 - Motivation and Emotion

Chairperson: Lisette Hornstra, Utrecht University, Netherlands

Discussant: Idit Katz, Ben-Gurion University of the Negev, Israel

Many students are not optimally motivated for their academic courses or for physical activities. Teachers can play a crucial role in enhancing their students' motivation in these different areas. Self-determination theory states that fulfillment of students' basic psychological needs for autonomy, competence, and relatedness promotes students' motivation (Deci & Ryan, 2000; Stroet et al., 2013). However, in practice many teachers find it difficult to support students' basic needs and to optimally engage their students in learning or physical activity (Reeve, 2009). During the last decades, a wide variety of interventions for teachers have been developed and these are found to promote teachers' need-supportive interactions with students and consequently enhance students' motivation and academic or health-related behavioural outcomes. The four contributions of this symposium describe four different SDT-based interventions in primary and secondary school that vary in the teaching behaviours they focus on, the domains and type of student outcomes they target, and in their training methods. Previous research suggests that SDT-interventions can indeed be effective in enhancing need-supportive teaching and promoting student motivation (e.g., Su & Reeve, 2011). Yet, not much is known about the conditions under which or for whom these interventions are most effective, how these interventions can best be implemented in diverse settings, and which strategies are most effective for promoting desired teacher and students outcomes. The presentations in this symposium will address these key questions, which are relevant for successfully implementing theory into practice and for continuing research on SDT-based interventions.

Motivating primary school students with diverse backgrounds: Effects of a teacher training

Presenting Author: Desirée Weijers, Kohnstamm Institute, University of Amsterdam, Netherlands; **Co-Author:** Lisette Hornstra, Utrecht University, Netherlands; **Co-Author:** Ineke van der Veen, Kohnstamm Institute, University of Amsterdam, Netherlands; **Co-Author:** Thea Peetsma, University of Amsterdam, Netherlands

With growing diversity in classrooms, teachers face an increasingly complex task of meeting the different motivational needs of every student in the classroom. Autonomy-support, instead of control, is found to be an effective teaching strategy to foster students' motivation. However, teachers tend to be more controlling toward students from disadvantaged backgrounds, because they perceive these students to have a greater need for structure. However, structure can also be offered in autonomy-supportive ways. Therefore, this study investigated whether a teacher training focused on providing autonomy-support in combination with the provision of structure (need-supportive teaching) enhanced need-supportive teaching by teachers and resulted in higher autonomous motivation, self-efficacy, and effort of students. Differentiated effects for ethnicity and SES were examined. 484 primary school students participated. Teachers participated in either the intervention (n = 8) or control group (n = 13). Teachers and students filled out questionnaires at three moments throughout the academic year and observations of teachers' provision of autonomy and structure were carried out. Results of multilevel regression analyses showed that teachers in the intervention group reported more need-supportive teaching compared to the control group. However, students in the intervention group did not experience higher levels of need-supportive teaching or motivation compared to the control group. Also, results were similar for students with different socio-economic and ethnic

backgrounds. This suggest that a more intensive training is needed in order to help teachers become more autonomy-supportive in order to enhance the motivation of students.

How to train teachers to deliver a multi-level SDT-based intervention to promote youth activity

Presenting Author:Katariina Köykkä, University of Helsinki, Finland; **Co-Author:**Elisa Kaaja, University of Helsinki, Finland; **Co-Author:**Katariina Koykka, University of Helsinki, Finland; **Co-Author:**Martin Hagger, Curtin University, Australia; **Co-Author:**Taru Lintunen, University of Jyväskylä, Finland; **Co-Author:**Nelli Hankonen, University of Tampere, Finland

Background. No school-based interventions among older adolescents have shown with long-term effectiveness (Hynynen et al. 2016). The “Let’s Move It” (LMI) project is a school-based program to promote PA and decrease excessive SB among vocational school students and is based on behavioural science, e.g. self-determination theory. A central element is autonomy supportive interaction designed to foster high-quality motivation in students and teachers. **Aims:** To investigate process evaluation data from the original LMI trial to co-develop a teacher training for the LMI. We examine, what are 1) teachers’ views on the “Let’s Move It” program, 2) needs for training optimization, and 3) the final optimized intervention? **Methods:** We draw from the process evaluation quantitative survey of the LMI trial (n=120, teachers, n=1100 students), qualitative research materials (n=18 teachers, n=34 students), and field observations. **Findings:** 1.87 % of teachers would recommend LMI program to their colleagues, and majority (76-82%) agreed on statements regarding beneficiality and effectiveness. 2. Teachers valued the expertise but missed more strategies to motivate students. 3. The optimized training includes pre-course material, 2x2.5 hour contact course, self-support materials and maintenance sessions, and a web-platform. Motivational interaction principles (i.e. reflective listening, non-coercive language) are emphasized. Teachers are prompted to plan and self-monitor the use of these principles. **Theoretical and educational significance of the research:** Next, we will examine training’s acceptability, and its impact on teacher behaviours. This is one of the first studies to transparently report the phased development of co-creating teacher training to intervene on adolescent PA and SB.

Training teachers to assess in a more motivating way – the effects on teacher and student outcomes

Presenting Author:Christa Krijgsman, Ghent University, Belgium; **Co-Author:**Jolien Maes, Ghent University, Belgium; **Co-Author:**Nathalie Aelterman, Ghent University, Belgium; **Co-Author:**An de Meester, Ghent University, Belgium; **Co-Author:**Isabel Tallir, Ghent University, Belgium; **Co-Author:**Jan van Tartwijk, Utrecht University, Netherlands; **Co-Author:**Greet Cardon, Ghent University, Belgium; **Co-Author:**Maarten Vansteenkiste, Ghent University, Belgium; **Co-Author:**Leen Haerens, Ghent University, Belgium

Previous research argues that grading is negatively related to students’ motivational experiences whilst Assessment for Learning (AfL; to build progress and detect personal progress) is positively related to students’ motivational experiences. However, it is under investigated whether teachers could learn to implement AfL-teaching strategies more and if such strategies could positively influence students’ motivational experiences. To investigate this, we developed a one-day professional development (PD) programme for teachers on how to assess in a more motivating way. In a quasi-experimental design, a sample of 14 physical education (PE) secondary school teachers (N=6 intervention group, N=8 control group) and 222 students participated in this study. Questionnaires measuring the extent of applied AfL-strategies (completed by teachers and students) and students’ motivational experiences (completed by students) were completed pre and post intervention. MANOVA’s were conducted on teacher data and multilevel regression analyses were deployed on student data. Favourable intervention effects were found in the student reports. The intervention prevented students from a decrease in motivational experiences. However, these effects were not evident in the teacher reports. Results suggest that a first step in the right direction has been made. It is recommended to replicate the present study with a larger sample size and to extend the duration of the PD programme so that more collaborative and reflective practices can take place. Only then, teachers will be provided with an opportunity to internalize and implement the AfL-teaching strategies in a more efficient way and larger effects might be obtained in students’ motivational experiences.

Supporting students’ need for autonomy and structure: An intervention study in secondary school

Presenting Author:Lisette Hornstra, Utrecht University, Netherlands; **Co-Author:**Desirée Weijers, Kohnstamm Institute, University of Amsterdam, Netherlands; **Co-Author:**Ineke van der veen, Kohnstamm Institute, University of Amsterdam, Netherlands; **Co-Author:**Thea Peetsma, University of Amsterdam, Netherlands

Self-determination theory states that fulfilment of students’ basic psychological needs for autonomy, competence, and relatedness can promote students’ motivation for school. However, in practice many teachers find it difficult to support students’ need for autonomy and to provide structure in autonomy-supportive ways, especially when it concerns lower achieving students or students from low-SES or ethnic minority backgrounds. In this study, we developed a training for teachers in the lowest track of secondary school on combining autonomy and structure. We examined whether the training increased need-supportive teaching and positively affected developments in students’ domain-specific motivation. Fourteen teachers with 21 classes and 280 students in year one of secondary school filled out questionnaires on need-support and motivation during a pre-test, post-test, and follow-up. Questionnaire data were analysed with multilevel-regression analyses comparing the intervention and control group (N=9 and N=12 classes, respectively). Also lessons of teachers in the intervention group were observed. The results showed declines in experienced autonomy-support, relatedness, autonomous motivation, and effort for students in the control group, whereas these aspects did not decline for students of teachers who participated in the training. The observations indicated a small increase in autonomy-support (especially

choice). Overall, the effects were mostly similar for students with varying background characteristics. Even though this was a small-scaled study, the results show that a teacher training on autonomy-support and structure has the potential to prevent student motivation from declining and can benefit students from varying backgrounds.

Session H 7

31 August 2017 10:15 - 11:45

Pinni B - B3109

Symposium

Assessment and Evaluation, Learning and Social Interaction

Bridging Discourse in Educational Research Through Examining the Notions of Stability and Change

Keywords: Assessment methods and tools, Communities of practice, Comparative studies, Conversation / Discourse analysis, Culture, Educational attainment, Interdisciplinary, Philosophy, Psychometrics, Qualitative methods, Quantitative methods, Social aspects of learning and teaching, Social interaction, Student learning, Video analysis

Interest group: SIG 01 - Assessment and Evaluation, SIG 10 - Social Interaction in Learning and Instruction, SIG 25 - Educational Theory

Chairperson: Man Ching Esther Chan, The University of Melbourne, Australia

Organiser: Man Ching Esther Chan, The University of Melbourne, Australia

Discussant: Richard Lehrer, Vanderbilt University, United States

The goal of this symposium is to facilitate conversations between researchers from different research areas in education to further our understanding of each other's work and to promote reflectivity on our own theory and practice. The session will focus on examining the notions of stability and change from various theoretical perspectives, analytical approaches, and research areas. Stability and change are purposefully chosen to provide a neutral entry point for interpretation and reflection of different research perspectives.

The session will open with a presentation reporting a study which used the concepts of stability and change to elicit responses from high status educational researchers from a variety of fields regarding their research practices (e.g., classroom research, educational assessment, and developmental psychology). Following the presentation, three researchers from different research areas will each provide their own interpretation of stability and change in the context of their work. Paper 2 illustrates how trends and changes are conceptualised and measured in large-scale assessment of ICT Literacy. Paper 3 examines the cohesion and change in classroom learning trajectories through the use of Conversation Analysis. Paper 4 explores the tension between stability and variation in the identification of patterns in classroom practices in education systems that are culturally and geographically disjoint. In combination, the four papers offer important insights into the connection and distinction between different educational research perspectives. The symposium will provide the opportunity for the education research community to inquire into our own theory and practice and increase our sensitivity to each other's perspectives.

Examining Different Research Perspectives through Interviews with Researchers: A Dialectic Approach

Presenting Author: Man Ching Esther Chan, The University of Melbourne, Australia

This study aimed to connect the diverse perspectives and research traditions in education through interviews with ten senior researchers in multiple countries. It applied the dialectic approach (Overton, 2003; Stace, 1955) in philosophical investigation using the relational concepts of stability and change to stimulate and understand different views of learning and teaching and to explore the potential application of these different understandings of stability and change in classroom practices. Each interview was around 30 to 60 minutes and semi-structured, generally beginning with some background questions about the interviewee, how learning is defined and studied in their work, and how the interviewee might interpret the issue of stability and change in his or her work. The study found that all of the researchers interviewed could relate their work to stability and change in some ways. The interpretations offered by the researchers can be viewed in terms of two levels: the application of stability and change, and the relationship between the notions of stability and change. Through examining the researchers' interpretations of stability and change, what the researchers view as central to their work and how that relates to their method of investigation can be compared and contrasted. The findings of the study could help to address the incoherence and fragmentation in education discourse and explore ways in which different educational theories and methodologies can complement each other in classroom practice.

Measuring Change in ICT Literacy Over Time

Presenting Author: John Ainley, Australian Council for Educational Research, Australia; **Co-Author:** Julian M. S. Fraillon, ACER, Australia; **Co-Author:** Wolfram Harald Schulz Teuteberg, Australian Council for Educational Research, Australia; **Co-Author:** Eveline Gebhardt, Australian Council for Educational Research, Australia

This paper illustrates the notions of stability and change in terms of the challenges associated with the measurement of Information and Communication Technology (ICT) literacy using a performance assessment. Large-scale assessment studies are used to examine changes over time. Measuring change over time presumes an underlying construct that may be manifest in performance on particular tasks that may be different at different times. This paper focuses on challenges involved in studying change in achievement in ICT literacy where the contexts have changed over time. The Australian National Assessment in ICT literacy was a performance assessment in late primary (Year 6) and mid secondary (Year 10).

This paper discusses the assessment design that was applied in assessment cycles from 2005, through 2008 and 2011 to 2014. It also reports on the trends in ICT Literacy for Year 6 and Year 10, and the relationships of ICT Literacy with other variables, that were observed over this period of time. The notions of stability and change will be explained from the latent trait perspective in terms of how trends and changes are conceptualised and measured in the large-scale assessment study.

Epistemic Topicalizations as Resources for Cohesion and Change in Classroom Learning Trajectories

Presenting Author:Fritjof Sahlström, Åbo Akademi University, Finland; **Co-Author:**Marie Tanner, Karlstad University, Sweden

Despite a seemingly fragmented interactional context, teachers and students in classrooms routinely manage to co-construct coherent, inter-related and individually adapted learning trajectories distributed over days and weeks. The aim of this paper is to explore with what interactional resources progressivity is accomplished in learning trajectories, by focusing on how participants establish relations of cohesion and change between current and previous occasions. Analysis of empirical data shows how participants frequently topicalize aspects of epistemic stance towards a co-constructed learning content. This practice is conceptualized as epistemic topicalizations, shown to play an important role for maintaining cohesion in a learning trajectory, while making it possible for the teacher and the student to progressively change and differentiate their epistemic stance. Epistemic topicalizations are suggested as a useful analytic concept, grounded in Conversation Analysis (CA), to describe how cohesion and change are emically managed in interaction to accomplish progressivity in learning trajectories. The analysis shows how epistemic topicalization is a primary resource in establishing a shared understanding of the evolving epistemic status of the students, and consequently, as a primary resource for adapting and changing teaching and instruction. Epistemic topicalizations seem to be resources both for the contingent organization of learning as social action within and beyond situated interactions, and for the situated construction of differentiation and mutual adaptation of teaching and learning in relation to displayed needs and requests of various students.

Only the Ephemeral is of Lasting Value – Interrogating the Tension between Stability and Variation

Presenting Author:David Clarke, The University of Melbourne, Australia

This presentation illustrates the tension between stability and variation in international classroom research studies in the identification of patterns in classroom practices in culturally and geographically disjoint education systems. In our pursuit of structure in the social interactions we find in the classroom, we are trying to construct enduring portraits of phenomena that are fundamentally transient. When the classrooms that we are studying are culturally and geographically disjoint, identifying stability becomes both a challenge and a source of major insight. The interrogation of stability and variation in this presentation is organised around particular constructs, deliberately chosen because they all relate to classroom practice but are all of different levels of granularity. In this paper, consideration of all such constructs draws on a foundation of extensive cross-cultural classroom research. The purpose of this presentation is to illustrate the difference between those things that can be reported as stable concerning classroom practice internationally and those things that vary, either as a consequence of the vagaries of student learning progress or strategically as a result of teacher decision-making. In fact, it is the dynamic between the generalization and the essential accompanying qualifications that creates the conceptual space for educational speculation. The examples employed in this presentation are intended to highlight precisely such tensions between stability and variation and by interrogation of the revealed tensions, identify those elements most critical to our theorizing about the canonical nature of teaching/learning.

Session H 8

31 August 2017 10:15 - 11:45

Main Building A - A4

Symposium

Students', Peers', and Teachers' Monitoring and Regulation: Effects of Cognition and Motivation

Keywords: Cognitive skills, Comprehension of text and graphics, Computer-assisted learning, Developmental processes, Emotion and affect, Metacognition, Motivation, Motivation and emotion, Self-regulation, Social aspects of learning and teaching, Teacher Effectiveness

Interest group: SIG 16 - Metacognition

Chairperson: Mariette van Loon, University of Bern, Switzerland

Chairperson: Martine Baars, Erasmus University Rotterdam, Netherlands

Discussant: Daniel Dinsmore, University of North Florida, United States

Successful classroom learning depends on effective regulation of study, motivation, and affect. Both students and instructors need to accurately monitor learning processes, in order to foster effective regulation. In this symposium, we give consideration to cognitive and motivational factors, and their interrelations with monitoring, regulation, and performance.

Study 1 investigated how learners and teachers combine information to arrive at a judgment. Students (9th grade) studied texts, completed pre-structured diagrams or drew diagrams, and judged their comprehension. Diagram tasks improved monitoring for students, and inspection of diagrams improved teachers' insights into student learning. In study 2, 4th and

6th-graders scored their own and their peers' performance. Children could more accurately score peers than own performance, and high performers show most accurate monitoring. These two studies show that there was consensus between students and their teachers and peers, however, in some cases, teachers and peers can monitor more accurately than students. The last two studies relate monitoring to motivational and affective factors. In study 3, 8th-graders self-regulated their biology learning. Motivation, affect, and monitoring accuracy were related to learning performance. Study 4 investigated how 8th-graders used advanced learning technologies for 8 days in a row. On the later days, students' use of monitoring and self-regulated learning tools declined; students rarely monitored their understanding and motivation anymore. These four studies can give further insight into the interrelations between cognitive, motivational, social and affective factors, and imply that these should be taken into account when training monitoring and regulation in the classroom context.

The Effect of Cue-Availability on Teachers' and Students' Judgment Accuracy.

Presenting Author: Janneke van de Pol, Utrecht University, Netherlands; **Co-Author:** Anique de Bruin, Maastricht University, Netherlands; **Co-Author:** Mariette van Loon, University of Bern, Switzerland; **Co-Author:** Tamara Van Gog, Utrecht University, Netherlands

For effective regulation of student learning, it is imperative that both teachers' and students' judgments about students' current level of knowledge are accurate. Yet, judgments tend to be relatively inaccurate and existing interventions are not highly effective. This study aimed to investigate whether varying the degree to which teachers and students had access to diagnostic cues about students' understanding of texts (i.e., representations of their students' own knowledge in the form of a diagram) improved teachers' and students' judgment accuracy.

Students (N=229, Age M=14.6) from 17 teachers were randomly assigned to a control condition, a diagram-completion condition, or a diagram-drawing condition. Each teacher judged understanding of 15 of his/her own students based on their name only (control-condition, 5 students), name+completed diagram (completion condition, 5 students) and name+drawn diagram (drawing condition, 5 students).

We found that students' judgment accuracy increased by completing diagrams compared to not completing a diagram (i.e., control-condition) whereas teachers' judgment accuracy increased by viewing students' drawn diagrams, not by viewing students' names only. Teachers' and students' judgment accuracy did not differ significantly and their judgments were most similar in the diagram-completion condition, compared to the control condition. Thus, judgment accuracy can improve by having access to cues about students' knowledge representations, although overall, judgment accuracy was still relatively low, even in the experimental conditions. Nevertheless, we can conclude the key to further improve judgment accuracy – which is pivotal for effective regulation of student learning – may lie in helping teachers and students to focus on diagnostic cues.

Elementary School Children's Self- and Peer Scoring of Test Responses Using Feedback

Presenting Author: Mariette van Loon, University of Bern, Switzerland; **Co-Author:** Claudia Roebers, University of Bern, Switzerland

Children's calibration is often not accurate when making self-score judgments (SSJs) about performance, and as a result, their self-regulation is not effective. Feedback may support young learners to improve calibration of SSJs. Further, monitoring others' seems easier than monitoring oneself, and therefore, calibration may be more accurate when children make peer-score judgments (PSJs) than SSJs. Further, older children may be more accurate when making SSJs and PSJs than younger children. We investigated how well elementary children (4th and 6th graders) can score their own and their peers' test responses with use of feedback standards. Children they difficult concepts, took an open-ended test, then compared their own and a peer's test responses with a feedback standard, and made SSJs and PSJs about accuracy of test responses. Calibration of SSJs was less accurate than calibration of PSJs, and calibration of SSJs and PSJs was more accurate for 6th than for 4th graders. Children who were more overconfident when making SSJs were also more overconfident when making PSJs, indicating that overconfidence was consistent. Moreover, calibration accuracy for self and peers was related to task achievement; calibration of SSJs and PSJs was less accurate and more overconfident for children who had lower performance. Findings show that peer-scoring is more accurate than self-scoring, and imply that interventions to improve calibration should especially focus on children with low task performance.

The Influence of Affect and Motivation on SRL When Learning to Solve Problems in Secondary Education

Presenting Author: Martine Baars, Erasmus University Rotterdam, Netherlands; **Co-Author:** Lisette Wijnia, Erasmus University Rotterdam & University College Roosevelt, Netherlands; **Co-Author:** Fred Paas, Erasmus University Rotterdam/University of Wollongong, Netherlands

Self-regulated learning skills are essential for learning during school years and in working life. Secondary school students often encounter problem solving-tasks when learning about different subjects in their curriculum (e.g., biology or math). Furthermore, opportunities for learner control, such as monitoring and selecting study tasks, are becoming increasingly important to help students prepare for future learning. Next to cognitive resources, learning to solve problems in a self-regulated way demands emotional resources and motivation. Therefore, the current study investigated the relation between affect (i.e., Positive Affect and Negative Affect Scale), motivation (i.e., autonomous and controlled motivation), and self-

assessment accuracy and regulation choices when learning to solve biology problems in an online learning environment. Students first studied video-modeling examples demonstrating how to solve biology problems, self-assess performance, and choose a next task. Then they practiced this self-regulated learning cycle and took a posttest with the same procedure. Results showed that both affect and motivation were predictors of problem-solving performance, in such a way that negative affect had a negative effect on performance, and autonomous motivation was positively related to performance. Furthermore, better self-assessment accuracy was related to higher performance. The results from the current study showed that students' affect and autonomous motivation for learning play a crucial role in self-regulated learning in secondary education. Future research could further disentangle the relation between affect, motivation, monitoring accuracy and regulation choices.

Measuring Middle School Students' Metacognitive Monitoring during Science Learning with SimSelf

Presenting Author:Michelle Taub, North Carolina State University, United States; **Co-Author:**Nicholas Mudrick, North Carolina State University, United States; **Co-Author:**Roger Azevedo, North Carolina State University, United States

Advanced learning technologies (ALTs) can be used to measure and foster middle-school students' metacognitive monitoring and regulation during learning. This study investigated how 63 8th-grade students monitored and regulated their self-regulated learning (SRL) processes during three days (from an 8-day classroom study) during learning with SimSelf, an ALT designed to foster SRL during science learning. Results revealed that on day 2, students spent significantly more time using the Skill Diary than on days 4 and 6. Overall, middle students' students rarely monitor their emerging understanding and other critical SRL processes (e.g., motivation, emotions) and rarely use embedded metacognitive tools (e.g. skill diary) to facilitate monitoring and regulation of key cognitive, affective, and motivational processes during learning. Our results have implications for training the effective use of metacognitive monitoring during learning.

Session H 9

31 August 2017 10:15 - 11:45

Linna - K109

Symposium

Motivational, Social and Affective Processes

The development of achievement motivation during school years

Keywords: Achievement, Attitudes and beliefs, Goal orientation, Literacy, Mathematics, Motivation, Teacher Effectiveness

Interest group: SIG 08 - Motivation and Emotion

Chairperson: Jaana Viljaranta, University of Eastern Finland, Finland

Organiser: Kati Vasalampi, University of Jyväskylä, Finland

Organiser: Jaana Viljaranta, University of Eastern Finland, Finland

Discussant: Anna-Maija Poikkeus, University of Jyväskylä, Finland

This symposium focuses on the development of achievement motivation in different phases of the school career, bringing together quantitative empirical results from Finland, Estonia and Germany. Achievement motivation is considered to be a multifaceted concept including several different aspects, such as valuing of a specific subject and beliefs about one's abilities in a subject. One study uses Finnish samples with a cohort design to examine whether lower secondary school students' motivation overall has changed during the recent years. Three other studies examine the individual variation in motivation and in the development of motivation from kindergarten forward. One of them focuses on years from kindergarten to grade 2 of primary school in Finland, another covers grades 2 to 9 in Estonia, and the third one focuses on grades 9 and 10 in German system. Together these studies show that lower secondary school students' achievement motivation has not dramatically changed during recent year, but decline in achievement motivation is in particular risk at the end of primary school. Furthermore, the membership in maladaptive motivational groups can be identified very early, already in kindergarten or during first primary school years. The results give also important information to educational practices by showing that students' group membership show relatively high stability over school years, indicating that early interventions may be crucial for maladaptive motivational groups. Together these complementary studies provide insights into the changes and stability in students' achievement motivation and to the individual developmental pathways of achievement motivation.

Signs of changes in students' school motivation and well-being?

Presenting Author:Minna Torppa, University of Jyväskylä, Finland; **Co-Author:**Kati Vasalampi, University of Jyväskylä, Finland; **Co-Author:**Kenneth Eklund, University of Jyväskylä, Finland; **Co-Author:**Marja-Kristiina Lerkkanen, University of Jyväskylä, Finland

The present study aimed to examine with a cohort design whether lower secondary school students' school motivation (self-concept in literacy and in math, task values, achievement strategies and educational aspirations) and school well-being (school enjoyment and burnout) have changed from 2007 to 2014 in Finland. The sample was merged from two

follow-up studies. A sample concerning years 2007–2010 ($n = 1702$) is part of the Jyväskylä Longitudinal Study of Dyslexia (JLD) and a sample concerning year 2014 is part of the First Step Study ($n = 1167$). Results showed that students' educational aspirations and particularly girls' math motivation at Grade 7 have risen from 2007 to 2014. At the same time, students' literacy motivation has decreased. In addition, school motivation and school enjoyment differed between girls and boys: girls were more motivated to study literacy than boys, whereas boys valued math more than girls. Interestingly, although girls reported higher school enjoyment than boys, particularly boys' enjoyment had recently increased. School burnout, instead, had not changed across years.

Patterns of Word Reading Skill, Interest, and Self-Concept of Ability

Presenting Author:Jaana Viljaranta, University of Eastern Finland, Finland; **Co-Author:**Noona Kiuru, University of Jyväskylä, Finland; **Co-Author:**Marja-Kristiina Lerkkanen, University of Jyväskylä, Finland; **Co-Author:**Gintautas Silinskas, University of Jyväskylä, Finland; **Co-Author:**Anna-Maija Poikkeus, University of Jyväskylä, Finland; **Co-Author:**Jari-Erik Nurmi, University of Jyväskylä, Finland

Students who are interested in and who have positive self-concept of their ability in specific academic tasks typically perform better in those tasks than students with negative self-perceptions and a low level of interest (e.g., Eccles et al., 1983; Pintrich & Schunk, 2008). Recently it has, however, been suggested that the associations between academic skills, self-concept of ability, and interest are not necessarily similar for all individuals (e.g., Aunola, Leskinen, Onatsu-Arviolommi & Nurmi, 2002; Nurmi & Aunola, 2005). This study aimed to broaden the previous literature, which has mainly deployed variable-oriented approach, by using person-oriented methods to examine the patterns and dynamics of pattern change in Finnish children's ($N = 606$) word reading skill, self-concept of ability, and interest from kindergarten to Grade 2. Six groups of children were identified by using the I-states as objects analysis (ISOA) procedure: (a) low skills, negative self-concept but high interest; (b) high skills but low interest; (c) average; (d) high skills, positive self-concept, and high interest; (e) low skills, negative self-concept, and low interest; and (f) positive self-concept but low interest. The typically occurring transitions between groups were characterized by changes in either reading-related interest or simultaneously in self-concept and skills. Gender, risk for reading difficulties (RD), being an early reader, mother's level of education and home literacy environment predicted group membership in kindergarten, and gender, RD risk, being an early reader, and mother's level of education also predicted transitions between groups.

Motivation and well-being at Grade 9 and underlying development of self-concept and interest in math

Presenting Author:Anna-Liisa Jögi, Tallinn University, Estonia; **Co-Author:**Eve Kikas, Tallinn University, Estonia

Our study aimed to first differentiate graduating middle schoolers based on their math-specific motivation and general learning-related well-being, and next back-track the development of math self-concept and interest of students from different motivational and well-being profiles. We followed 253 students (54.5% of boys) from Grade 2 to Grade 9, measuring their self-reported self-concept and interest in math in Grades 2, 3, 6, and 9, and additionally their performance-avoidance goals, task-avoidant behavior, school burnout and well-being in Grade 9. We used latent profile analysis to determine four groups of students with distinct motivational and well-being patterns. Next we showed that although students' self-concept and interest had been very high in Grade 2, in almost all cases it had declined by Grade 9, most rapidly between Grades 3 and 6. There was a deeper decline for students with more maladaptive motivational pattern in Grade 9. Students with higher motivation and well-being in Grade 9 showed no decrease in their self-concept. Math interest and self-concept of students reporting less motivation and highest burnout, had started declining already during primary school, between Grades 2 and 3. Practical implications of these findings are discussed.

Student-perceived teacher behaviors and motivational profiles in mathematics:

Presenting Author:Charlott Rubach, University of Potsdam, Germany; **Co-Author:**Rebecca Lazarides, University of Potsdam, Germany; **Co-Author:**Julia Dietrich, Friedrich Schiller University of Jena, Germany; **Co-Author:**Päivi H. Taskinen, Friedrich Schiller University Jena, Finland

This longitudinal person-centred study investigated the stability and change of students' motivational profiles in mathematics and their relations to student characteristics (gender, mathematics anxiety and effort) and student-perceived teacher beliefs and behaviors in mathematics classrooms. Survey data stemmed from 6020 ninth Grades who participated in two measurement occasions of the PISA-I Plus Study 2004 (55.2% girls) of 152 schools and 275 classrooms in 108 classes. Latent class analysis revealed four motivational profiles: a moderate motivation profile, a low motivation profile, a high motivation profile, and a high self-concept, low interest profile. Girls were overrepresented in the low motivation profile and underrepresented in the other profiles. Stability of a student's motivational profile from Grade 9 to 10 was typical, but also more students than expected by chance moved from the high motivation profile to the high self-concept, low interest profile. Multinomial logistic regression analyses showed that when students perceived low levels of clearness of instruction at Time 1 they were significantly more likely to be in the high self-concept, low interest profile than in the high motivation profile at Time 2. In turn, students in the low motivation profile at Time 1 were significantly more likely to perceive lower mathematics teacher enthusiasm, clearness of instruction and teaching for meaning at Time 2 compared to students in the high motivation profile. The findings are relevant for research on learning and instruction as

they address the question of the heterogeneity of students in mathematics classrooms.

Session H 10

31 August 2017 10:15 - 11:45

Linna - Vainö Linna (K104)

Symposium

Cognitive Science

The neuroscience of learning: implications for education

Keywords: Cognitive development, Educational Psychology, Game-based learning, Interdisciplinary, Learning analytics, Learning and developmental difficulties, Mathematics, Neuroscience, Reasoning, Student learning

Interest group: SIG 22 - Neuroscience and Education

Chairperson: Jérôme Prado, France

Discussant: Roland H. Grabner, University of Graz, Austria

After two decades of debate about the scientific plausibility and the possibility of legitimate applied contributions to teaching and learning, the field of educational neuroscience currently emerges with sound theoretical foundations, a clear agenda for empirical research, and reaps the benefits from improvements in brain-imaging techniques and methodology. This symposium articulates a collection of examples/directions in how (cognitive and affective) neuroscience can inform education and teaching. The symposium is centered around the idea that a better understanding of learning at the biological level can refine our (cognitive) theories of learning and consequently improves pedagogical interventions. The four presentations articulate cognitive features of a learning task with underlying brain processes. Collectively, the papers illustrate how, when behavioral data is insufficient because relevant information cannot be obtained because operations are not manifested in behavior or are not obtained at the appropriate time scale, brain-imaging data can contribute new insights in modeling cognition, which in turn can inform the design and empirical validation of interventions.

Effort versus trait praise differentially influences negative feedback processing in adolescents

Presenting Author: Nienke van Atteveldt, VU University Amsterdam, Netherlands; **Co-Author:** Nikki Lee, VU University Amsterdam, Netherlands; **Co-Author:** Miriam Hollarek, VU University Amsterdam, Netherlands; **Co-Author:** Lydia Krabbendam, VU University Amsterdam, Netherlands

Adaptively responding to teacher's feedback is important for learning. Previous research has demonstrated that praising intelligence as a fixed trait can lead to less adaptive motivational and learning patterns, compared to praising someone's effort. Here, we investigated adolescent's neural processing of negative feedback during a math task, while manipulating task difficulty and praise context. After a correct response, half of the participants received trait praise ("you are smart!"), the other half effort praise ("again, great effort!"). Negative feedback after an incorrect response was always identical. Preliminary fMRI analyses indicate that activation of the insula and ACC during negative feedback was stronger in the effort-praise context. Ongoing analyses are testing how these differences relate to task-performance (with varying difficulty levels) and to theory of intelligence. Our findings of the impact of what is praised on how negative feedback is processed underlines the importance of how feedback is provided.

A neural dissociation between deductive and probabilistic reasoning in children

Presenting Author: Jérôme Prado, Centre National de la Recherche Scientifique (CNRS), France

Learning to deduce conclusions from prior information is central to the growth of scientific thought in children. Yet, the neural mechanisms underlying the development of deductive reasoning remain poorly understood. Here we investigated whether the brain regions that support deductive reasoning differ from those that underlie everyday probabilistic reasoning in 8- to 13-year-olds. In a functional magnetic resonance imaging (fMRI) scanner, children were presented with conditional premises and were asked to evaluate a conclusion either based on deductive or probabilistic instructions. We found that performance under deductive instructions was associated with activity in the left inferior frontal gyrus and posterior medial prefrontal cortex, whereas performance under probabilistic instructions was associated with activity in the right inferior frontal gyrus, anterior medial prefrontal cortex, and bilateral parietal cortex. Thus, making deductive inferences from conditional premises relies on brain mechanisms that qualitatively differ from those involved in making probabilistic inferences from similar premises in children. Implications for theories of deductive reasoning and education will be discussed.

Strategy over operation: Neural activation in fact retrieval and procedural strategy use in children

Presenting Author: Brecht Polspoel, KU Leuven, Belgium; **Co-Author:** Lien Peters, KU Leuven - University of Leuven, Belgium; **Co-Author:** Bert De Smedt, KU Leuven - University of Leuven, Belgium

Adult fMRI studies have indicated that activation in the arithmetic brain network is modulated by strategy use. However, little is known to which extent the use of different strategies affects the arithmetic network in children. We therefore, by using trial-by-trial verbal strategy reports, investigated the neural underpinnings of different types of strategy use during arithmetic in children. Participants were 23 typically developing 4th graders (9- to 10-year-olds). In a behavioral session, all children were asked to solve 100 subtraction and multiplication items, and to verbally report on a trial-by-trial basis how they had solved them. Next, in the fMRI scanning session, the children were presented with 80 of those items. With an event-

related design, we were able to analyze the brain responses during retrieval or procedural strategy use, based on the children's verbal reports in the behavioral session. During retrieval, we observed increased activity in the bilateral middle temporal gyrus, hippocampus, medial frontal gyrus and inferior parietal lobe. For procedural strategies, activation increases were observed in the bilateral superior parietal lobe, middle and inferior frontal gyri, insula and inferior occipital gyri. No differences were found between multiplication and subtraction, indicating that differences across items were driven by strategy use and not by the operation at hand. These data add to a better understanding of the development of mathematical skills at the biological level, which in turn can refine current psychological theories and improve interventions.

The neuroscience of learning: issues in modeling cognition and learning contexts

Presenting Author:Julien Mercier, University of Quebec (Montreal), Canada; **Co-Author:**Pierre Chalfoun, User Research Lab – Ubisoft Montreal, Canada; **Co-Author:**Kamran Shaikh, University of Quebec in Montreal, Canada; **Co-Author:**Babak Khosravifar, University of Quebec in Montreal, Canada

The optimization of learning contexts requires pertinent information corresponding to the rate of change of characteristics of interest pertaining to the learner and to the learning context. Such characteristics can change from state to state very rapidly. Indeed, cognition is seen as a cascade of top-down and bottom-up processes across behavioral and psychophysiological layers in a cognitive architecture (Anderson, 2002). Moreover, a learning task and accompanying context can be conceived of as a hierarchical decomposition of operations which, cumulatively and sequentially, are necessary to complete the task successfully. Such a multi-layered view of cognition, learning tasks and contexts provides a property that can serve as a cornerstone for the neuroscience of learning: as complexity increases, speed decreases, and as complexity decreases, speed increases. Capturing change at these various timescales and complexity levels requires both psychophysiological and behavioral data recorded concomitantly and presents significant challenges (Mercier, & Charland, 2013a; 2013b). The goal of this presentation is to illustrate an innovative cross-disciplinary methodology to define and track dynamic aspects of cognition and of a learning context as they unfold in time at various timescales during an initial episode of play with a video game, which aims specifically at developing a minimal level of mastery of the game's core mechanics (combat, crafting, economy, etc.). This approach could help bridge the gap between cognitive neuroscience and cognitive psychology in the study of learning and could contribute insights in the design of learning environments.

Session H 11

31 August 2017 10:15 - 11:45

Main Building A - A3

Symposium

Teaching and Teacher Education

The evolution of PCK of history teachers.

Keywords: Competencies, History, In-service teacher education, Inquiry learning, Meta-analysis, Pre-service teacher education, Qualitative methods, Quantitative methods, Teacher Professional Development, Teaching / instruction, Teaching approaches

Interest group: SIG 11 - Teaching and Teacher Education

Chairperson: Gerhard Stoel, RICDE / University of Amsterdam, Netherlands

Discussant: Jannet van Drie, University of Amsterdam, Netherlands

Traditionally, history education has the attention of politicians valuing goals such as transferring national narratives, citizenship and critical thinking. This interest is also reflected in the growing body of knowledge and research into the field of teaching and learning history, aiming at historical thinking. However, not much research exists about the subject related knowledge and skills history teachers need to fulfil the needs of modern society. This symposium explores the possibilities of the construct of Pedagogical Content Knowledge (PCK) in order to determine (1) what characterizes the PCK of history teachers, and (2) how PCK of history teachers evolves in theory and practice. The PCK of history teachers is captured in different ways; first the concept of PCK is explored in a review study with research on knowledge of history teachers. This provides a theoretical context for three empirical studies; a study that develops an instrument that measures PCK conducted among preservice teachers (N=336) trying to cover declarative and procedural knowledge of PCK in history education. The third study investigates the PCK-development of preservice teachers (N=36) in light of a training program that prepares these teachers for teaching inquiry in their classrooms. Finally the content and context dependency of PCK is explored by comparing the PCK of experienced history teachers (N=16). This symposium describes the evolution of PCK in history and critically reflects on the use of the construct of PCK in order to investigate the development of history teachers.

What makes a history teacher? An empirical review of PCK in History.

Presenting Author:Hanneke Tuithof, Utrecht University, Netherlands; **Co-Author:**Albert Logtenberg, Leiden University, Netherlands

Pedagogical Content Knowledge is teachers' knowledge about the transformation of subject matter knowledge to achieve enhanced student learning. To explore emerging research on history teachers' PCK in secondary education, 34 empirical studies that investigated beginning and experienced history teachers were systematically reviewed. We examined the conceptualization and operationalization of PCK and PCK development in empirical educational research. These mainly

American articles examine PCK on the basis of a small number of teachers and qualitative instruments. Moreover, they also refrain from giving a systematic definition of PCK, which makes it difficult to link the outcomes to other domains. However, we do point to specific avenues for further PCK research.

Test-Development for a standardized instrument to measure PCK of future history teachers

Presenting Author:Nicola Brauch, University of Bochum, Germany; **Co-Author:**Joana Seiffert, Ruhr-University Bochum, Germany; **Co-Author:**Andreas Seifert, University of Paderborn, Germany; **Co-Author:**Martin Rothland, Siegen University, Germany; **Co-Author:**Joergen Wolf, Ruhr-University Bochum, Germany

Before moving in their practical teacher training, German students of history education (Master of Education in history) attend several courses to learn about the theoretical principles and hands-on planning activities to prepare history lessons in school. Although there has scarcely been empirical research about professional competence development in the domain of history education for the German context yet one can identify a conventional set of concepts students learn in university courses. In order to gain a standardized test instrument to measure students' skills in conceptual knowledge and related activities to plan a lesson 165 items have been constructed. A framework covering four dimensions representing PCK's facet of knowledge of instructional strategies and representations has been modelled. In a study (N= 365) these four dimensions could be confirmed as distinct parts of PCK's facet of knowledge of instructional strategies and representations in the sense of planning skills. The four constructs are knowledge about (1) concepts and aims, (2) structuring principles, (3) learning material and (4) tasks.

Developing student history teachers' PCK: an introductory training on inquiry-based learning

Presenting Author:Michiel Voet, Ghent University, Belgium; **Co-Author:**Bram De Wever, Ghent University, Belgium

This study focusses on the development of student history teachers PCK, and, in particular, their implementation of inquiry-based learning (IBL) activities in the classroom. A workshop was developed to impart student teachers (n=36) with the knowledge necessary to organize IBL. After attending this workshop, student teachers were required to teach an IBL-activity during their teaching internship. Their work in practice was examined through: a questionnaire administered at three different times, the lesson plan of the IBL-activity, two reflection papers, and an interview. Three lesson templates emerged from student teachers' work: a fill in the blanks, synthesis and inquiry lesson. These templates differed with regard to (1) the structuring they provided, and (2) the required student mental activity. Next to providing concrete illustrations of these three lesson templates, the presentation will also explore the relation between student teachers' choice for a particular template and (1) their beliefs related to IBL, as well as (2) influences of the internship context.

The homogeneity of Dutch experienced history teachers' PCK in a curriculum innovation

Presenting Author:Hanneke Tuithof, Utrecht University, Netherlands; **Co-Author:**Larika Bronkhorst, Utrecht University, Netherlands; **Co-Author:**Jan van Tartwijk, Utrecht University, Netherlands; **Co-Author:**Leen Dorsman, Utrecht University, Netherlands

In this study we examine the content and context dependency of PCK of experienced history teachers in the specific Dutch context of in a radical curriculum innovation. Until now researchers have rarely described or compared the concrete PCK of two or more concepts. We capture the PCK of sixteen Dutch experienced history teachers on two substantive concepts that are part of a new history curriculum, namely (1) the clash between Greco-Roman culture and the Germanic cultures of North-West-Europe and (2) waging World Wars I and II. Our research question is a dual one: firstly, to what extent is history teachers' PCK homogenous on two different concepts in this history curriculum? And, secondly, how can we explain the degree of the homogeneity in history teachers' PCK? On balance, there seems to be a continuum in the homogeneity history teachers' PCK: at one end of this continuum the PCK seems less homogeneous and more related to one of the substantive concepts mentioned above. At the other end of the continuum, history teachers' PCK seems more homogeneous, what we relate to the fact that these teachers have the same subject-related goals for both substantive concepts. The continuum as a whole reaffirms the content and context dependency of PCK. We also discuss the significance of our outcomes for the debate regarding the role of the PCK element teaching orientation.

Session H 12

31 August 2017 10:15 - 11:45

Pinni B - B4116

Symposium

Instructional Design

How am I doing? Improving students' self-assessments

Keywords: Achievement, Educational Psychology, Experimental studies, Instructional design, Metacognition, Motivation, Qualitative methods, Self-regulation

Interest group: SIG 16 - Metacognition

Chairperson: Marloes Nederhand, Erasmus University Rotterdam, Netherlands

Discussant: Anique de Bruin, Maastricht University, Netherlands

Accurate calibration (accurately assessing your performance or your knowledge) is crucially important for the regulation of

study. However, assessing our own performance or knowledge is a challenging task, and students often overestimate their competence. Consequently, researchers in education are investigating various methods for improving calibration. The sine qua non of improving calibration is being aware of (the possibility of) miscalibration. In this symposium, we therefore discuss how learners can become more aware of their miscalibration. Raaijmakers et al. and Nederhand et al. focus on the effect of feedback. Raaijmakers et al. provided students with feedback on the accuracy of their self-assessment and investigated if subsequent self-assessments would become more accurate. Nederhand et al. showed in a previous study that high and low performers may differ in how they use feedback. In this symposium, Nederhand et al. will present a follow-up study in which they investigated whether providing students with extra guidance how to use standards can further remedy low performers' miscalibration. However, feedback alone is sometimes not enough to improve calibration accuracy. Roelle et al. focussed on motivational aspects of being accurately calibrated and investigated if calibration could be increased by informing students of the dangers of overconfidence. Finally, Gutierrez et al. provides an in-depth investigation into the differences in awareness of (mis-)calibration between poor and proficient calibrators. They provide guidelines for the designs of future interventional studies aimed at improving calibration accuracy. Anique de Bruin, expert in metacognition research, will discuss the different contributions to the symposium.

Providing Feedback on Self-Assessments: Effects on Subsequent Self-Assessment and Task Selection

Presenting Author:Steven Raaijmakers, Utrecht University, Netherlands; **Co-Author:**Martine Baars, Erasmus University Rotterdam, Netherlands; **Co-Author:**Fred Paas, Erasmus University Rotterdam/University of Wollongong, Netherlands; **Co-Author:**Jeroen Van Merriënboer, Maastricht University, Netherlands; **Co-Author:**Tamara Van Gog, Utrecht University, Netherlands

Monitoring and control are key components of self-regulated learning (SRL). Students' monitoring accuracy is often low, which negatively affects subsequent regulation (control) of study behaviour (e.g., prematurely terminating study, or studying unnecessarily long; selecting a too easy or too difficult subsequent task). Consequently, SRL often leads to suboptimal learning outcomes. It is thus imperative for educational researchers to investigate ways to improve students' monitoring accuracy. One effective instructional intervention consists of training students' self-assessment (monitoring) and task-selection (control) skills with video modeling examples, in which students observe another person (the model) engaging in self-assessment and task-selection. However, even after this training, there remains room for improvement in students' self-assessments. Therefore, we investigated whether scaffolding self-assessments with accuracy feedback after the training, would improve the accuracy of concurrent task-selection, as well as their future self-assessment and task-selection decisions in the absence of the feedback. Students either received no feedback, general feedback (i.e., information regarding the accuracy/inaccuracy of their self-assessment and information regarding the number of correct steps) or specific feedback (i.e., information regarding the accuracy/inaccuracy of their self-assessment and information regarding *which* steps were correct/incorrect). Contrary to our hypothesis, however, self-assessment accuracy feedback did not affect concurrent task-selection accuracy and even led to less accurate future self-assessments and task selection. Possible explanations are discussed.

Providing Standards both with and without Idea-Units to improve Calibration Accuracy

Presenting Author:Marloes Nederhand, Erasmus University Rotterdam, Netherlands; **Co-Author:**Huib Tabbers, Erasmus University Rotterdam, Netherlands; **Co-Author:**Remigius (Remy) Rikers, UCR / Utrecht University, Netherlands

Previous research showed that providing performance standards can improve calibration accuracy of students. However, low performers are less accurately calibrated than high performers, even when both groups receive standards. This experimental study investigated whether providing students with extra guidance how to use standards would remedy the significant difference in calibration accuracy between high and low performers. We hypothesized that by providing extra guidance, all students become equally able to compare their own answer to standards (i.e., significant differences in calibration accuracy will disappear). We provided 120 participants with texts that contained key terms. Students had to recall the correct definition of each key term and had to estimate the quality of their recall. One half of the participants received full definition standards while estimating performance, and the other half of the participants received idea-unit standards while estimating their performance. Data is being gathered at the moment and results will be discussed during the symposium.

Effects of Informing Fifth Graders About the Dangers of Making Overconfident Judgments of Learning

Presenting Author:Julian Roelle, Bielefeld University, Germany; **Co-Author:**Kirsten Berthold, University of Bielefeld, Germany

Learners often insufficiently monitor their level of comprehension, which results in overconfident judgments of learning and underachievement. One reason for insufficient monitoring is that learners do not know why they should invest significant effort in this process. In light of this reason, informing learners about the high frequency of and the detrimental consequences that result from overconfident judgments of learning (i.e., providing information about *the dangers of making overconfident judgments of learning*) has recently been introduced as an approach to foster comprehension monitoring. However, although this approach has shown promising effects, it is reasonable to assume that its benefits depend on learners' monitoring skills; if learners' lack monitoring skills, informing them as to why investing effort in monitoring is important could be of little use. To address this potential moderator, we tested the effects of the approach of informing learners about the dangers of making overconfident judgments of learning in a sample of fifth grade high school students

($N = 47$). Based on previous research, it is reasonable to assume that these learners lack monitoring skills to a large extent. As main results, we found that informing the learners about the dangers of making overconfident judgments of learning neither fostered monitoring nor reduced overconfidence in a subsequent learning phase. We conclude that, at least if it is not combined with components that focus on fostering monitoring *skills*, informing learners about the dangers of making overconfident judgments of learning is not necessarily a promising approach to foster monitoring in all situations.

The Calibration Process Among Proficient and Low Calibrators: A Qualitative Approach

Presenting Author: Antonio Gutierrez de Blume, Georgia Southern University, United States; **Co-Author:** Pamela Wells, Georgia Southern University, United States; **Co-Author:** Jason Parker, Georgia Southern University, United States

Traditional research on the metacognitive practice of calibration has been primarily investigated within the realm of quantitative experimental methodologies. This article expands the research scope of metacognitive calibration by offering a qualitative approach to the growing body of literature. More specifically, the current study investigates the learners' perspective on the calibration process. Ten undergraduate students were selected to participate in a structured interview on their previous calibration performances (five students low in calibration processing and five proficient in calibration processing). Ultimately nine students ($N=9$) participated in individual interviews. Participant interviews are qualitatively assessed through the mediums of (1) Serra and Matcalfe's original work on the "feelings of knowing" and (2) self-regulated learning theory (SRL). Results indicate a difference in feelings of knowing between low and proficient calibrators across a battery of themes: effort, strategies, planning, and evaluation. Implications of the results and direction for future research are explored.

Session H 13

31 August 2017 10:15 - 11:45

Main Building C - C7

Symposium

Developmental Aspects of Instruction, Educational Policy and Systems

Curriculum, pedagogy, and classroom quality: Promoting effectiveness of early childhood education

Keywords: Assessment methods and tools, Case studies, Comparative studies, Early childhood education, Educational policy, Educational Psychology, Qualitative methods, Social interaction, Teaching / instruction, Teaching approaches

Interest group: SIG 05 - Learning and Development in Early Childhood

Chairperson: Kathy Sylva, University of Oxford, United Kingdom

Discussant: Antje von Suchodoletz, New York University Abu Dhabi, United Arab Emirates

Evidence clearly indicates that high quality of early childhood education and care (ECEC) provisions shapes children's later learning and development. The term quality is a multidimensional construct referring to the extent to what is on offer to children in an environment that enhances child's development and wellbeing. Process quality refers to adult-child interaction, a positive climate, and how educators scaffold child's learning while structural quality refers to characteristics of the setting that provide the contextual framework within which process quality operates. The present symposium will show the evidence on the cultural sensitivity of the curriculum implementations as well as structural and process quality in ECEC settings using mixed-method approach. Drawing on research conducted in the EU funded CARE project (*Curriculum and quality analysis and Impact Review of ECEC*) papers in this symposium will present (1) approaches to curriculum and pedagogy based on surveys in eleven European countries, (2) the evidence of combined and interaction effects between structural and process quality in different contexts, (3) the quality of different activities in video observation study of good practice in ECEC settings, and (4) patterns of educational dialogues in toddler classrooms. Overall, the four papers of the symposiums suggest that the process quality should be a priority in ECEC. The discussion will highlight the cultural sensitivity of ECEC quality and curriculum implementations across Europe and discuss on key features of high quality practices in ECEC along with the institutional supports that underpin it.

Towards a new ECE curriculum for Europe: findings from the CARE research project

Presenting Author: Kathy Sylva, University of Oxford, United Kingdom; **Co-Author:** Katharina Ereky-Stevens, University of Oxford, United Kingdom; **Co-Author:** Martine Broekhuizen, Utrecht University, Netherlands

This paper summarises findings on the broad curricular goals of ECEC with regards to children's development, learning and wellbeing. It is based on two studies carried out in a broadly representative sample of European countries: a survey on curriculum completed by 'research experts' in 11 countries, and a face-to-face interview or on-line survey of parents' ($N = 2500$ parents) goals regarding ECE carried out in nine countries. This paper on curriculum uses the expert and the parent surveys to chart the conceptual and empirical landscape in which the symposium's papers are located. It shows that despite an emerging consensus on the advantage of combining aims for social-emotional development with cognitive ones, there is a lack of clarity on the way that learning – in particular learning related to intellectual goals – is conceptualized. Although experts and parents agree that the curriculum for children at age 3-6 should be more 'cognitive', there is no consensus on the pedagogy that will best support the development of content knowledge or of 'executive skills' such as problem-solving or teamwork.

Complex relations between structural characteristics and process quality in ECEC across Europe

Presenting Author:Pauline Slot, Utrecht University, Netherlands; **Co-Author:**Marja-Kristiina Lerkkanen, University of Jyväskylä, Finland; **Co-Author:**Paul Leseman, Utrecht University, Netherlands

Relations between structural and process quality in early childhood education and care (ECEC) provisions have been extensively studied with mixed and inconsistent findings. Although these inconsistent findings might in part be due to strong and country-specific regulation, which results in restricted variance, it may also point to more complex relations of different structural aspects interacting with each other and jointly affecting process quality. The aim of the current paper is to unravel these associations by looking at possible combined and interaction effects of structural features at the teacher, classroom and centre level on observed process quality in several European countries. The results can inform policy and practice in view of enhancing process quality in ECEC settings.

How does process quality vary according to the classroom activities? A multiple case study

Presenting Author:Joana Cadima, University of Porto, Portugal; **Co-Author:**Jenni Salminen, University of Jyväskylä, Finland; **Co-Author:**Pauline Slot, Utrecht University, Netherlands; **Co-Author:**Marja-Kristiina Lerkkanen, University of Jyväskylä, Finland

The current study investigates the extent to which the quality of interactive processes varies across different types of activities in ECEC centers from seven European countries. Using a common methodological framework, 4 ECEC centers per country, in a total of 28, were selected. Videos were made out of four common types of activities in ECEC centers (play, care routines, educational, creative), resulting in a total of 124 videos. Videos were scored by certified researchers from three countries using a standard observational tool (CLASS–Toddler and CLASS Pre-K). The results showed that observed classrooms scored high in emotional support and behavior support/classroom organization. However, there was considerable variation across types of activities and age of the children in the level of instructional support and consideration for child perspectives. In 3-6-year-old classrooms, educational activities seemed to represent moments in which educators facilitated children's broader conceptual understanding of concepts and ideas. Opportunities for learning varied less between types of activities in 0-3 classrooms. Across 0-3 and 3-6 classrooms, play activities provided the best opportunities to follow child lead, consider children's opinions and follow their initiations. Results will be discussed in view of how different types of activities can be intentionally used by educators to potentiate different types of interactions.

Educational dialogues in toddler classrooms

Presenting Author:Helena Rasku-Puttonen, University of Jyväskylä, Finland; **Co-Author:**Jenni Salminen, University of Jyväskylä, Finland; **Co-Author:**Heli Muhonen, University of Jyväskylä, Finland; **Co-Author:**Marja-Kristiina Lerkkanen, University of Jyväskylä, Finland

Educational dialogue (ED) refers to extended verbal exchange between teacher and children, striving to joint understanding. Daily situations in toddler classrooms enable discussions, but variation in the quality of teacher-child interactions and teacher's pedagogical support creates differing opportunities for EDs to emerge from classroom to classroom. Within this study we ask: What kind of patterns of ED can be identified from toddler classrooms; How do teachers' pedagogical practices support and enhance ED; and How does observed process quality reflect the similar characteristics with ED? Data were gathered in seven European countries as part of the CARE project. Within this study, video recordings from emerging academic activities and free play situations in 2–3-year-olds classrooms (n = 28 videos; 20 min each) were analyzed. The episodes of EDs were identified along the set of criteria (Alexander, 2006; Muhonen et al., 2016) and analyzed with respect to teacher's pedagogical practices, functions of talk and the quality of teacher-child interaction (CLASS-Toddler: La Paro et al., 2012). Modest amount of EDs were identified within toddler classrooms along with emerging EDs. Maintaining ED required the teacher to sensitively listen to children's developing verbal expressions and posing straightforward and simple questions (relating to concrete hands on materials or to children's daily experiences). The results indicated a relation between the CLASS dimensions and the depth of EDs. The results will benefit teacher training by increasing teacher awareness of the potential of shared talk in the toddler classrooms.

Session H 14

31 August 2017 10:15 - 11:45

Main Building D - D10B

Symposium

Motivational, Social and Affective Processes

New research perspectives on interest development in science education

Keywords: Biology, Case studies, Emotion and affect, Mixed-method research, Motivation, Motivation and emotion, Primary education, Science education, Secondary education

Interest group: SIG 08 - Motivation and Emotion

Chairperson: Kimberley Pressick-Kilborn, University of Technology Sydney, Australia

Discussant: K. Ann Renninger, Swarthmore College, United States

Globally, the importance of high levels of continued participation by students in science education is being recognised in policy, research and practice, as vital to strong economic futures. The aim of this symposium is to explore how new perspectives on the complexities of interest development can promote effective, engaging teaching and learning in school

science. The papers span science learning from the early years of primary (elementary) school to upper secondary school, with consideration of interest and other motivational variables such as self-efficacy and self-concept, as well as constructs such as time. Each paper either poses a research question that provides a different perspective on interest development, or employs research methods or theoretical frameworks that are relatively new in the study of interest. The cognitive and/or affective dimensions of interest are investigated in each of the papers, with each study situated in real-life, classroom-based learning and teaching contexts. The symposium thus brings together research that focuses on important but currently under-researched issues in relation to interest development, with the shared goal of improving participation and pedagogy in school science education.

A teacher's growing interest in science: Developing alongside Kindergarten students

Presenting Author: Kimberley Pressick-Kilborn, University of Technology Sydney, Australia

A number of researchers recently have investigated the facilitative role that teachers can have in supporting their students' interest development. Conversely, however, there is little research that has examined the process of the growth in teachers' interest that is promoted through working with interested students. This paper reports on a case study of a Kindergarten teacher whose own interest both in teaching science, and in the discipline of science, has been triggered and maintained over time in the context of her classroom teaching experiences. Valsiner's theoretical notions of *canalisation* and *self-canalisation* are drawn on, to analyse and interpret qualitative data gathered over three years through a series of in-depth interviews with the teacher, classroom observations and annotated class programs. The findings focus on an analysis of (1) the nature of the teacher's interest, and (2) her interactions with students and characteristics of the classroom teaching and learning context that constrained and promoted her own pedagogical and discipline-based interest. This case study highlights the bi-directional relationship between students' interests and the teacher's interest, as the teacher moves towards developing a professional identity more strongly inclusive of that of 'science teacher'. Furthermore, evidence is provided for the importance of responsive, playful, inquiry-based approaches in the early years of schooling in promoting *the teacher's* interest and sense of wonder, not only the students'.

Development of Secondary school students' interest and academic emotions over science lessons

Presenting Author: Kalle Juuti, University of Helsinki, Finland; **Co-Author:** Jukka Marjanen, University of Helsinki, Finland;

Co-Author: Jari Lavonen, University of Helsinki, Finland; **Co-Author:** Katariina Salmela-Aro, Helsinki Collegium for Advanced Studies, Finland; **Co-Author:** Barbara Schneider, Michigan State University, United States; **Co-Author:** Joseph Krajcik, Michigan State University, United States; **Co-Author:** Christopher Klager, Michigan State University, United States

In developed countries, there is lack of students' engagement in school science learning. Too few students select a science track in secondary school and then gravitate in a science-related field. It is known that in a classroom, it is possible to influence students' academic emotions through the interaction style and teaching and learning methods selected. In order to help teachers to tackle this problem of the lack of engagement in science learning, it is important to understand the development of the students' academic emotions in classroom situations. This paper presents the development of students' interest and academic emotions over 12 science (chemistry or physics) lessons in nine classrooms. We applied the experience sampling method (ESM) in order to investigate students' interest and academic emotions, namely feelings of success, confidence, activeness, happiness and enjoyment, anxiety, stress, confusion, and boredom in specific science learning situations. During a science lesson, students were asked to respond three times in the mobile phone delivered questionnaire that measured their interest and academic emotions in the specific situations. The ESM questionnaires were synchronized, thus the students in one class responded at the same time. The time-Academic emotion-graphs show that (1) academic emotions fluctuate over the lessons, (2) there are evident gender differences, and (3) academic emotion mean values of all classes appear to be rather stable over time. The Time-Academic emotion –graphs emphasize that situational interest and emotions may be rather easy to trigger, but difficult to maintain.

Students' perceptions of time in learning tasks supporting or lacking interest development

Presenting Author: Morten Rask Petersen, University of Southern Denmark, Denmark

Interest and learning are interdependent. In this study, the process of learning is seen as an enhancer of interest. This means that interest develops as students learn about the topic they are working with. It is through discovering the accessible learning in a task that students become interested, and willing to place effort in that task. In the present research, 19 interested and non-interested upper secondary biology students were studied in regard to their perceptions of time usage in a 4 hour simulation of natural selection. While non-interested students did not find it worthwhile, the interested students did but did not see any potential in prolonging the time frame for the exercise. This could be due to the available time for the task being set in advance without scope for negotiation or flexibility, but further research is needed to support such claims.

Psychological perspectives on 'negative' interest development in science education

Presenting Author: Niels Dohn, Aarhus University, Denmark; **Co-Author:** Nikolaj Frydensbjerg Elf, University of Southern Denmark, Denmark

There is a distinct lack of theoretical constructs that describe and explain 'negative' interest development, i.e. the transition from a well-developed individual interest in a school science domain toward lack of interest. In this study, we have followed one Danish student through six years. In grade 9, she had a strong interest in school science domains – especially physics. However, through gymnasium (grade 10-12) her interest declined because she felt that physics became more and

more challenging. In order to explain this 'negative' interest development, we suggest that interest in physics instruction is closely related to the students' physics-related self-concept, i.e. the picture students have of their own ability and competence in physics. Our data suggest that this student's feelings of being "insanely challenged" caused a revision in her values and motives through her transition from grade 9 to grade 12, which had a negative impact on her self-concept, resulting in loss of interest. The physics-related self-concept seems to have an important explanatory power for this girl. Thus, we assume when the psychological need for feeling competent is not fulfilled, this has a negative impact on the subject-oriented self-concept, which again can explain how a well-developed individual interest in physics instruction can diminish.

Session H 15

31 August 2017 10:15 - 11:45

Pinni A - A1081

Symposium

Teaching and Teacher Education

Teachers' adaptation to professional challenges and changes in Vocational Education and Training

Keywords: Attitudes and beliefs, Meta-analysis, Motivation, Qualitative methods, Quantitative methods, Self-efficacy, Social interaction, Teacher Professional Development, Vocational education

Interest group: SIG 14 - Learning and Professional Development

Chairperson: Viviana Sappa, Swiss Federal Institute for Vocational Education and Training, Switzerland

Organiser: Viviana Sappa, Swiss Federal Institute for Vocational Education and Training, Switzerland

Organiser: Carmela Aprea, Friedrich Schiller University Jena, Germany

Discussant: Susan Beltman, Curtin University, Australia

Many scholars investigated factors and processes supporting teachers to get a positive adaptation and a successful induction to the profession. In this framework there is a growing interest in investigating how teachers actively cope with professional challenges and changes they experience in their career and which resources support them to stay committed, competent and positively engaged in the profession. However, although primary, secondary and special education school teachers are researched quite widely, very few studies focused on vocational school teachers. This symposium aims at exploring and discussing vocational school teachers' adaptation to professional challenges and changes in different countries. The four papers here collected investigate teachers' adaptation from different and complementary perspectives and by adopting various methodologies. First, several psychological and sociological outcomes and processes relating to a positive adaptation oriented the studies, including resilience (paper 1), professional agency (paper 2), self-efficacy (paper 3), and work engagement (paper 4). Second, qualitative (paper 2), quantitative (paper 3,4) and mixed (paper 1) methodologies were adopted. Third, while two contributions provide a more comprehensive pictures of vocational school teachers (paper 1 and 4), the other two papers focus on specific challenging situations, that is the stream of an educational reforms (paper 2) and the beginning phase of teaching (paper 3). All together the papers contribute to put in light challenges, resources and processes influencing vocational school teachers' adaption and induction to the profession. Peculiarities related to vocational school teachers will be additionally discussed.

Resilient teachers in vocational education and training (VET): a Swiss study.

Presenting Author: Carmela Aprea, Friedrich Schiller University Jena, Germany; **Co-Author:** Viviana Sappa, Swiss Federal Institute for Vocational Education and Training, Switzerland; **Co-Author:** Elena Boldrini, Swiss Federal Institute for Vocational Education and Training, Switzerland

There is a growing interest in investigating teachers who succeed in facing professional challenges and keep positive adaptation despite adversities (i.e. resilient teachers). However, further studies are needed in order to refine the conceptualisation of "resilient teacher" and to clarify how those teachers can be empirically identified. Moreover, despite the increasing interest in focusing on particular categories of teachers (e.g. primary school teachers, secondary school teachers and special education teachers), there is a shortage of studies dealing with vocational school teachers. The study here presented is part of a larger research project investigating resilient teachers in vocational education and training in Switzerland. The first aim of the study is to empirically identify resilient teachers as those keeping positive adaptation despite professional adversities, as defined in the literature. An additional aim is examining which socio-demographic and biographical variables are associated with resilient teachers and which resources contribute to support teachers. A sample of 602 Swiss vocational school teachers (in the Canton of Ticino) took part in the study. Self-reported data about their perceived professional adversity, positive adaptation and perceived resources was collected by an online questionnaire. By means of a cluster analysis five types of teachers were identified, including the 'resilient teachers' who reported high levels of perceived adversity and positive adaptation. Additional analysis revealed differences among the identified profiles with respect to their career-phase. Finally, teaching resources, motivational resources and school-related resources, were showed to be particularly associated to the resilient teachers.

Vocational teachers' professional agency in the stream of change

Presenting Author: Katja Vähäsantanen, University of Jyväskylä, Finland

This study focused on Finnish vocational teachers' professional agency and its connection with positive adaptation in the

stream of an educational reform. Professional agency refers to the notion that teachers affect matters, make decisions, and negotiate regarding their work and their professional identities (including their professional goals and interests). To investigate teachers' positive adaptation to changes from the perspective of professional agency, we conducted a qualitative meta-analysis based on five interview studies. We found that the teachers experienced a lack of influence on the contents and conditions of the reform, and that they therefore expressed resistance and criticism. Despite lacking these kinds of opportunities to enact professional agency, the teachers did not refuse to implement the reform. However, their pathways within the reform varied according to their opportunities to enact agency in respect of their professional identity. The most positive adaptation pathways (involving increased commitment and enthusiasm) emerged when the teachers were truly able to realize their professional interests, or to renegotiate their professional identities to correspond with the changing work, on the basis of pleasant emotions gained during the change. The study provides an agentic perspective on teachers' adaptation in the context of vocational education reforms. To decrease the teachers' resistance to the reforms, and to foster positive adaptations, there is a need to support their professional agency in relation to both reform practices and professional identity.

Vocational school novice teachers' perceptions of school climate and self-efficacy

Presenting Author:Eve Eisenschmidt, Tallinn University, Estonia; **Co-Author:**Merilyn Meristo, Tallinn University, Estonia

Novice teachers' perceptions of school climate and self-efficacy play important role in their decision to stay in profession. Many countries are facing problems related to teacher shortage and teachers leaving the profession. Therefore it is essential to study how novice teachers adapt to professional challenges. The present study explored how novice teachers ($N=112$) perceive the school climate and self-efficacy and how these phenomena are interrelated. However, this paper sets a focus on vocational teachers who were part of the sample. Analysis of variance, correlations and multiple regression were performed. Most school climate aspects correlate positively with self-efficacy aspects. Cohesiveness appeared to play the most predictive role in self-efficacy beliefs. The findings show that vocational school novice teachers have lower self-efficacy beliefs than comprehensive or kindergarten teachers and they also showed lower scores in school climate aspects.

What support vocational teachers' work engagement? Explorative study among Swiss VET teachers

Presenting Author:Viviana Sappa, Swiss Federal Institute for Vocational Education and Training, Switzerland; **Co-Author:**Elena Boldrini, Swiss Federal Institute for Vocational Education and Training, Switzerland

In the field of teacher education there is an increasing interest in understanding how to effectively develop teachers' active engagement and well-committed professional identity. With this respect, several scholars have investigated those individual and contextual resources that foster teachers' work engagement, the latter being defined as a positive, fulfilling, work-related state of mind. However, further studies are needed to examine how individual and contextual resources contribute to support teachers' work engagement particularly in the vocational education and training (VET) context. Based on a preliminary qualitative study, the present contribution aims at exploring how perceived individual and contextual resources impact on VET teachers' work engagement. A total of 64 Swiss teachers were involved in the data collection by means of an online self-reported questionnaire. Work engagement was assessed by using the Utrecht Work Engagement Scale (Schaufeli, Bakker, & Salanova, 2006). In addition, three sets of items were adopted to investigate perceived resources (i.e. school-related resources, teaching-related competences and resiliency resources). Data analysis combined simple and multiple regressions and Structural Equation modeling procedures. Findings show the following effects: a) resiliency resources have the strongest direct and positive impact on work engagement; b) teaching-related competences influence work engagement directly as well as indirectly by fostering resiliency resources; c) school-related resources impact positively on teaching-related competences and resiliency resources; on the contrary they do not have any significant effect on work engagement. Implications for research and teaching education have been outlined.

Session H 16

31 August 2017 10:15 - 11:45

Main Building C - C5

Symposium

Learning and Instructional Technology

Understanding and stimulating children's digital reading

Keywords: Educational Technology, Learning disabilities, Learning Technologies, Multimedia learning, Primary education, Reading comprehension

Interest group: SIG 07 - Learning and Instruction with Computers

Chairperson: Ladislao Salmeron, University of Valencia, Spain

Organiser: Eliane Segers, Netherlands

Discussant: Jean-Francois Rouet, University of Poitiers, France

Understanding reading comprehension of digital documents (e.g. hypertexts or search engine results lists) has been the focus of a respectable body of research. However, we know far less regarding (the process of) children's process such documents, while it has been argued that digital reading comprehension is more difficult than linear (printed) text comprehension. Furthermore, intervention studies aiming at improving children's digital reading comprehension have so far scarce. This is surprising, as digital documents are rapidly becoming the default, also in schools. In the present

symposium, we present four studies. The first is an eye-tracking study comparing good and poor readers in reading search engine results lists, the second on how to improve digital reading comprehension using feedback, and the third and fourth are intervention studies, focusing on strategy usage by means of mind mapping and eye-tracking modelling examples. The symposium has both theoretical and practical implications, as theoretical models of reading comprehension are in need of an extension regarding digital reading, while teachers need evidence-based material to improve reading comprehension instruction of digital texts.

Internet search result viewing in sixth grade students with and without learning difficulties

Presenting Author:Jarkko Hautala, University of Jyväskylä, Finland; **Co-Author:**Otto Loberg, University of Jyväskylä, Finland; **Co-Author:**Carita Kiili, University of Oslo, Norway; **Co-Author:**Paavo Leppänen, University of Jyväskylä, Finland

This study aims at clarifying how sixth grade students with or without learning difficulties evaluate search results on the Web. The relevancy of the search results' components in respect to a given information search task was being manipulated, and eye movements were being recorded. Students' probabilities to look at each component during the initial and later encounter with the search result were analyzed. It was found that if a result had an irrelevant title, its snippet was often not looked at all during the first-pass viewing. This shows a usage of an eliminative reading strategy. During later viewing passes, all of the components of the best-matching search result were typically looked at, indicating a usage of a confirmatory reading strategy. Cluster analysis revealed three groups with different viewing strategies: 1) a group reading mostly titles, 2) a group reading titles and snippet text, and 3) a group reading all three available components. The title readers much more often chose competing search results instead of the best one. Children with reading difficulties were over-represented in the title readers -group, and performed overall quite poorly in the task. Students with attention difficulties started to make more errors towards the end of the experiment relative to the control group. Overall, the results suggest that sixth graders vary considerably in their information searching skills, which could likely be improved by targeted instruction. Such instruction may be especially beneficial for children with reading difficulties.

The effects of different types of online feedback on reading comprehension of highschool children

Presenting Author:Tami Katzir, University of Haifa, Israel; **Co-Author:**Einat Tesler, University of Haifa, Faculty of Education, Israel; **Co-Author:**Michal Shany, University of Haifa, Israel

This study aims to examine how 10th grade children respond to a computer based reading comprehension program using different types of feedback conditions. A sample of 120 10th graders participated in an online reading comprehension training program in which they read texts and answered questions as well as rated their confidence on the tasks. They were randomly assigned to one of three on line feedback conditions: 1) feedback on *performance*. 2) Feedback on *performance + CoC (calibration of comprehension)*. 3) Feedback on *performance + a text cue* for wrong answers. Time on task and online reading strategies (# of returns to text) were reported. Overall, preliminary pilot analyses suggest that strong readers made gains in terms of CoC and performance across the three conditions. Poor comprehenders benefited only from the text cue feedback in terms of performance but not CoC. Results highlight the importance of specific online feedback and the need to further understand ways to improve self regulation in poor readers.

Strategy training and mind-mapping facilitates children's digital text comprehension

Presenting Author:Eliane Segers, Radboud University Nijmegen / University of Twente, Netherlands; **Co-Author:**Sabine Fesel, Radboud University, Netherlands; **Co-Author:**Linda de Leeuw, Radboud University, Netherlands; **Co-Author:**Ludo Verhoeven, Radboud University Nijmegen, Netherlands

In perspective of literacy skills for the 21st century, children in primary school read hypertext for comprehension. However, children typically are taught reading strategies for linear text, while these strategies are not automatically transferrable one-to-one to hypertext. In the present study, a training group of 55 sixth-graders were taught four hypertext reading strategies (planning, monitoring, evaluation and elaboration) via mind mapping and the usage of a prompting paper-card. A control group of 29 children received no strategy training. We examined to what extent strategy training influenced children's strategy use and learning outcomes: (1) number of pages read and reading time per text, (2) explicit / implicit reading comprehension scores and (3) knowledge representations (relatedness judgment task and mind maps). At posttest, the training group showed higher scores on a self-reported strategy usage questionnaire, higher comprehension scores, and more advanced mind maps as compared to the control group. It can be concluded that hypertext strategy training in combination with mind-mapping supports children's hypertext comprehension.

Learning to construct navigable concept maps with eye-movement modelling examples

Presenting Author:Ladislao Salmeron, University of Valencia, Spain; **Co-Author:**García Victoria, University of Valencia, Spain; **Co-Author:**Franck Amadiou, University of Toulouse, France

Navigable concept maps are a hybrid document that combines hypertext and concept maps (Amadiou et al., 2015), in which readers not only navigate between hypertext nodes, but also create links between such nodes to create a concept map. Preliminary studies revealed that teenagers confront comprehension difficulties with such format, as compared to a hypertext with non-navigable maps (García, Salmerón, Amadiou, & Cegarra, 2013). In this study we tested an instructional program to teach teenagers how to navigate and create maps. Specifically, our program included the phases for the construction of concept maps (planning, organizing and reviewing) developed by Hilbert and Renkl (2009), to which we incorporated a navigation phase. Two groups of sixth graders were randomly assigned to the two conditions. The control

group discussed in pairs a series of videos depicting students' actions and verbalizations while navigating and constructing maps. The experimental group followed a similar procedure, but added to the videos the students' eye-movements (EMMEs). In the pre and post test sessions students created a navigable concept map using the Cmaps tool. No difference between groups was observed for an immediate comprehension test. Students from the EMMEs group identified better the phases illustrated in the videos during the intervention, and wrote better one-day delayed summaries of the hypertexts in the post-test. Those results indicate that EMMEs are a powerful instructional tool to instruct reading and navigation in complex digital formats.

Session H 17

31 August 2017 10:15 - 11:45

Pinni B - B3107

Symposium

Educational Policy and Systems

Learning to learn in Italy and in Latin America

Keywords: Competencies, Learning approaches, Metacognition, Self-regulation

Interest group: SIG 16 - Metacognition

Chairperson: Sirkku Kupiainen, University of Helsinki, Finland

Organiser: Cristina Stringher, Istituto Nazionale per la Valutazione del Sistema Educativo di Istruzione e di Formazione (INVALSI), Italy

Discussant: Amparo Moreno, Universidad Autonoma de Madrid, Spain

Our symposium aims to provide an initial overview of research on Learning to learn in Italy and in Latin American countries. The symposium stems from the initial phase of a wider project aimed at understanding the development of this key competence in different cultures, in order to sustain its acquisition with pertinent interventions throughout school grades and beyond. It is known that school systems seem to thwart Learning to learn competencies in children and adolescents (Deakin Crick, et al, 2007; Goldspink & Foster, 2014; Hipkins, 2015; OECD, 2010) and that interventions, as large and deep as they can be, struggle to make a difference in untouched education (Goldspink & Foster, 2014; Higgins et al, 2010; James et al, 2007; Montessori, 1948/1999). Possibly, Learning to learn might even be at odds with current curricula delivery modes around the world. This symposium originates from a systematic literature review carried out with the same methodology in all participating countries: Italy (coordinating country) plus all twenty Latin American countries. Symposium presenting countries are four. A quite unique conception of learning to learn emerges in these countries, with deep implications for policy, research, and practice. Results are discussed according to past (Bateson, 1977; Hounsell, 1979; Smith et al, 1990) and current Learning to learn research (Deakin Crick et al, 2014), paying attention to its core components (Demetriou, 2014; Hautamäki & Kupiainen, 2014; Kupiainen, Hautamäki & Rantanen, 2008; Moreno & Martín, 2014; Stringher, 2014a; 2014b), to its determinants and pre-requisites from early childhood onwards (Rao et al, 2014; Stringher, 2016). Bibliography and Fig. 1 with quantitative results of the literature search are attached.

Learning to learn in Italy and in Latin America: a systematic literature review

Presenting Author: Cristina Stringher, Istituto Nazionale per la Valutazione del Sistema Educativo di Istruzione e di Formazione (INVALSI), Italy

This presentation sets the stage for subsequent symposium contributions. Italy is providing the research background against which the literature review has been conducted. Each presenter in the symposium is developing the central theme according to a specific viewpoint. In 2014, Deakin Crick, Stringher and Ren edited the book *Learning to Learn. International perspectives from theory and practice*. The book collected significant experiences from twenty authors in eleven countries and four continents. In spite of this massive effort, learning to learn lacked a shared understanding among book authors. In 2015, the need to deepen knowledge on Learning to learn emerged from schools in Italy. From this need, INVALSI drafted an international project. Its focus is to understand the development of this key competence in different cultures, in order to sustain its acquisition. The symposium will refer to the first project phase: the systematic literature review carried out in 2016 in order to inform the theoretical framework of the entire project. This paper in particular reports on the international review methodology and initial outcomes. Italian and Latin American references mainly deal with theoretical issues and very few are the empirical studies. The main difference lies in the depth of theoretical arguments, with a few Latin American studies tackling the challenge to define the concept in a wide conception according to Hounsell (1979). The presentation addresses the other results of the review by research question and concludes with relevant policy and practice contributions to the learning to learn research agenda.

Learning to learn in Mexico

Presenting Author: Hugo Armando Brito Rivera, Metropolitan Autonomous University, Mexico

This study has been conducted with the same methodology already presented in the first contribution within the overall project. Results are based upon forty references selected based on the shared research criteria and reported according to research questions. Learning to learn in Mexico seems a quite developed field of study which deserves the attention of the international community for its breadth and depth. The paper addresses historical roots of the concept in the reviewed Mexican literature and presents current research, experiences and research tools developed locally. Learning to learn in the

70's was conceived around two problematic areas: a) the obstacles and personal limitations (disorganization, inconsistency, etc.); b) the development of critical thinking. Currently, the need for this competence stems from the complexity of contemporary societies. Nationally, several works have been developed around strategies, resources and exercises linked to learning to learn at all levels of education. Such a set of works, theoretical and practical, is divided into two types; a) contributions focused on activities for students; b) texts aimed at teachers. Another group of studies focuses on the reflection and analysis of the institutional change needed in order to make learning to learn a central element in schools and universities, in a collaborative effort typical of organization studies, whose actors are organized in communities of practice, for the development of shared competence and organizational learning. Critique on Mexican conceptions of this competence yield to the need to further examine it theoretically and empirically.

Learn how to learn in Brazilian intellectual production

Presenting Author: Claudia L. F. Davis, Fundação Carlos Chagas // PUC-SP, Brazil

This paper aims to analyze how the studies about 'learning to learn' are displayed in Brazilian intellectual productions, reviewing articles and books published from 2000 to 2016. Two perspectives were found: cognitive psychology sees 'learning to learn' as the acquisition, mastery and use of cognitive and metacognitive strategies, encouraging continuous learning throughout life in order to promote student's autonomy and independence; (b) the historical materialist and dialectical view, emphasizing the social nature of education, criticizes the prevailing notion of learning for focusing in individual processes, disregarding the contents of public schooling and the reasons why they must be learned. The former perspective, in this view, is seen only as an ideological subterfuge of capitalism to improve the ruling class education, making the one offered to the dominated class innocuous. The two perspectives go in parallel, without profiting from a dialogue between them. In such circumstances, knowledge about 'learning how to learn' difficultly will progress and those who work at school will hardly benefit from its findings.

Components of learning to learn in Italy and in Latin American countries

Presenting Author: Paolo Di Rienzo, University Roma Tre, Italy; **Co-Author:** Estefania García González, University of Valladolid/University of Roma Tre, Spain

Learning to learn is not univocally conceived in scientific literature. However, this concept is playing an important role in most education policies, and constitutes one of the main bricks of knowledge societies. Our study is focused on the current understanding of the Learning to learn concept in Latin America. To this aim, the research group performed a systematic literature review of scientific articles addressing this topic in Latin American countries. In this paper we report on a specific aspect of the literature review: the analysis of Latin American definitions. For our purpose, we used the resources published by Latin American authors that have been collected and selected by the research group according to the overall project methodology as detailed in Stringher's presentation within this symposium. From this database, we further selected articles with definitions of Learning to learn (whenever present) and constructed an analysis table. Finally, we performed a qualitative analysis on the identified definitions with respect to the Learning to learn components according to Stringher (2014). The results of our research show important differences between Latin American countries concerning the understanding and definition of Learning to learn. From a general perspective, the state-of-the-art Learning to learn components are not explicitly mentioned in most of the analyzed contributions. However, we could observe some aspects closely related to the topic, such as the cognitive, metacognitive, affective and social dimensions. We conclude by suggesting further work on the conceptualization of Learning to learn for its assessment in Italy and in Latin American countries.

Session H 18

31 August 2017 10:15 - 11:45

Main Building A - A2B

Symposium

Assessment and Evaluation, Higher Education, Learning and Instructional Technology, Learning and Social Interaction

Advances in the Assessment of Scientific Reasoning and Argumentation Across Disciplines

Keywords: Argumentation, Assessment methods and tools, Collaborative Learning, Conceptual change, Conversation / Discourse analysis, Higher education, Learning Technologies, Mathematics, Problem solving, Qualitative methods, Quantitative methods, Reasoning, Secondary education, Student learning, Teaching / instruction

Interest group: SIG 01 - Assessment and Evaluation, SIG 07 - Learning and Instruction with Computers, SIG 26 - Argumentation, Dialogue and Reasoning

Chairperson: Ingo Kollar, University of Augsburg, Germany

Discussant: André Tricot, University of Toulouse, France

Scientific reasoning and argumentation are widely seen as important skills. First, they are necessary to develop explanations for natural and social phenomena and can act as a motor for triggering conceptual change. Second, students as young citizens need scientific reasoning and argumentation skills to be able to effectively participate in science-related and societal debates. And third, many professional problems (e.g., such as how teachers might support student learning in an evidence-based manner) can only be solved competently by aid of scientific reasoning and argumentation skills. Current research on scientific reasoning and argumentation is characterized by an intensive debate that centers around three

interrelated questions: (1) How can scientific reasoning and argumentation skills be measured in an objective, reliable and valid way? (2) Is judging the quality of scientific reasoning and argumentation processes and skills dependent on the specific discipline in which it takes place or do also domain-general facets exist? (3) How can learning analytics be used to make phenomena in the natural world visible to help problem-solvers engage in higher levels of scientific reasoning? This symposium assembles four papers that shed light on these questions by uncovering and critically discussing innovative ways to assess and support scientific reasoning and argumentation in different domains such as mathematics, education, and the life sciences. The goal of the symposium is to explore new ways of assessing scientific reasoning and argumentation skills to inform future research regarding the development of objective, reliable and valid measurement tools.

Productive argumentation for conceptual change learning

Presenting Author:Christa Asterhan, Hebrew University of Jerusalem, Israel

In this contribution, I focus on argumentation for subject-matter learning that requires the transformation of misconceived knowledge about natural phenomena towards the scientifically accepted, canonical account (conceptual change). In this line of research, "high quality argumentation" is defined empirically and *ad hoc*. Those dialogue features that are associated with learning gains are defined as productive. Through a line of empirical studies we have identified three features of productive argumentation for conceptual change: Critical reasoning, supportive collaborative interpersonal regulation, and a content-specific focus on key conceptual issues. We present coding schemes to assess these features and discuss the implications for educational design and theory.

Conceptualizing content-related and formal quality aspects of mathematical argumentation and proof

Presenting Author:Sarah Ottinger, Ludwig-Maximilians-Universität (LMU), Germany; **Co-Author:**Stefan Ufer, Ludwig-Maximilians-Universität (LMU), Germany; **Co-Author:**Ingo Kollar, University of Augsburg, Germany; **Co-Author:**Freydis Vogel, Technical University of Munich (TUM), Germany; **Co-Author:**Matthias Schwaighofer, Ludwig-Maximilians-Universität (LMU), Germany; **Co-Author:**Ilka Terwedow, Ludwig-Maximilians-Universität (LMU), Germany; **Co-Author:**Anselm Strohmaier, Technische Universität München, TUM School of Education, Germany; **Co-Author:**Kristina Reiss, Technische Universität München (TUM), Germany; **Co-Author:**Frank Fischer, Ludwig-Maximilians-Universität (LMU), Germany

Mathematical argumentations are characterized not only by their deductive nature, but also by their formal presentation using variables and logical symbols. Students at all educational levels struggle with mathematical argumentation and proving. Constructing elaborate mathematical argumentations and proofs requires both the ability to find deductive lines of single arguments as well as skills to communicate these argumentations in a formally correct way according to mathematical standards. Even though these two sub-processes are intensively discussed in the literature, it is yet unclear to what extent they can be seen as independent from each other. In a study with $N=159$ students at the transition phase from secondary to tertiary education, students were asked to generate argumentations in elementary number theory. We examined the quality of the content of mathematical argumentations and the quality regarding several formal aspects of their presentation as well as relations between the different quality indicators. The study replicates students' problems in constructing mathematical argumentations. Moreover, the results indicate that not all, but some aspects of formal quality are related to the quality of the content of the argumentation which is presented. We discuss ways to conceptualize and operationalize different quality aspects of mathematical argumentation as well as implications of the results for further research.

Differential item functioning and bifactor model analyses in evaluating scientific reasoning tests

Presenting Author:Ansgar Opitz, Ludwig-Maximilians-Universität (LMU), Germany; **Co-Author:**Moritz Heene, Ludwig-Maximilians-Universität (LMU), Germany; **Co-Author:**Frank Fischer, Ludwig-Maximilians-Universität (LMU), Germany

Despite the importance of assessing higher education competencies in general and scientific reasoning in particular, past analyses in these areas have not used complex analytical designs. In this study, differential item functioning (DIF) and bifactor model analyses are used to evaluate the domain generality assumption of a scientific reasoning test and the overlap between scientific and general reasoning, respectively. A scientific reasoning test and three general reasoning scales were administered to 507 university students. The DIF analyses revealed up to five biased items most of them favoring biology students. In a traditional comparison of means, physics students had significantly higher scores, though. In the bifactor analysis, the scientific reasoning factor kept almost no unique variance after general reasoning had been controlled for. The overlap was less strong in traditional regression analyses. Thus, the newly deployed statistical methods provided insights that reached beyond statistical methods that were used in the past to analyze scientific reasoning tests. According to the results from these new methods, it is not possible to measure scientific reasoning in a completely domain-general way and the overlap between scientific reasoning and general reasoning is larger than previously thought.

Teacher reasoning about collaborative learning: the role of learning analytics

Presenting Author:Anouschka van Leeuwen, Utrecht University, Netherlands; **Co-Author:**Jeroen Janssen, Utrecht University, Netherlands; **Co-Author:**Gijsbert Erkens, Utrecht University, Netherlands; **Co-Author:**Mieke Brekelmans, Utrecht University, Netherlands; **Co-Author:**Ingo Kollar, University of Augsburg, Germany

Teachers support is essential for collaborative learning to be successful. In turn, teachers need to be able to reason about

how to support students based on scientific theories and evidence. Teachers may be stimulated to do so when students' collaborative interactions are judged in an objective and reliable way. Learning analytics, the automated analyses and visualization of student data, could be a means to do so by analyzing and aggregating data about students in specific ways. By means of a simulation study, we investigated the effects of providing teachers with learning analytics. It was found that the mean frequency of interventions was significantly higher when teachers had access to LA, and that their interventions were relatively more often directed at problematic groups than at non-problematic groups. The study showed how even simple analytics of student activities influenced teacher reasoning about student collaboration. An important direction for future research is to consider in what ways learning analytics could play a role for teacher professionalization in terms of more advanced analyses and visualizations of student data.

Session H 19

31 August 2017 10:15 - 11:45

Pinni B - B4113

Symposium

Motivational, Social and Affective Processes

Measuring and supporting collaborative learners' engagement in shared regulation processes

Keywords: Collaborative Learning, Metacognition, Peer interaction, Self-regulation, Social interaction, Technology, Video analysis

Interest group: SIG 16 - Metacognition

Chairperson: Hilde Van Keer, Ghent University, Belgium

Discussant: Deborah Pino-Pasternak, Murdoch University, Australia

Shared regulation of learning has been recognized as a new and growing field in metacognition research. Despite consensus on the importance of collaborative learners' shared regulative engagement, empirical evidence is still minor and distributed. Prior research focused on conceptualizing and validating the construct of shared regulation by identifying the latter in single learning contexts. Although providing us with innovative insights, previous studies equally raised questions regarding the generalizability of findings, the existence of different types of shared regulation, the learning dynamics evoking shared regulative acts, developmental evolution patterns of shared regulation, or how to support collaborative learners' shared regulative engagement. The present symposium aims at taking the research on shared regulation to the next level by presenting innovative findings derived from new empirical directions mentioned above. By comparing collaborative learners' regulation across contexts (both within and between studies), the symposium implies a first step towards generalizing results on shared regulation. The identification of variations in shared regulation further allows discussing and studying the potentially different impact of regulation acts on the quality and outcomes of collaborative learners. Further, by addressing developmental patterns as well as facilitative instructional designs eliciting learners' shared regulation, the symposium provides valuable input on how to (re)design collaborative learning interventions, allowing to scaffold their regulative potential to the fullest. Combining insights from video-based analyses conducted in a variety of settings further unravels important methodological guidelines and challenges. The symposium consequently advances both the theory and future research on shared regulation.

Metacognitive regulation during collaborative learning: does sharing always imply quality?

Presenting Author: Liesje De Backer, Ghent University, Belgium; **Co-Author:** Hilde Van Keer, Ghent University, Belgium;

Co-Author: Martin Valcke, Ghent University, Belgium

The present study investigates higher education collaborative learners' adoption of socially shared metacognitive regulation (SSMR) during reciprocal peer tutoring (RPT). Sixty-four Educational Sciences students participated in a semester-long RPT-intervention and tutored one another in small groups of six. All sessions of five randomly selected RPT-groups were videotaped (70h of video recordings). The focus of the study is twofold, directed at both identifying time-bound evolutions in RPT-groups' adoption of socially shared metacognitive regulation (SSMR) and at unravelling possible quality differences in identified utterances of SSMR. Multilevel logistic regression models allowing change points are adopted to study evolutions over time. A coding rubric is developed to investigate qualitative differences in engagement depth with shared regulation activities. The results indicate that RPT-participants significantly enhance their adoption of SSMR as the RPT-intervention progresses. They especially engage in shared regulative acts during orientation and monitoring activities. The results further reveal differences in the quality of identified SSMR-acts, based on the number of RPT-participants engaged in a shared regulation activity and the level of elaboration in RPT-participants' regulative contributions to SSMR-acts.

Supporting intra-group social metacognitive activities with technology: a grammar learning game

Presenting Author: Inge Molenaar, Radboud University Nijmegen, Netherlands; **Co-Author:** Anne Horvers, Radboud University Nijmegen, Netherlands; **Co-Author:** Peter Desain, Radboud University, Netherlands

This study investigates the effects of a technology enhanced collaborative grammar learning activity on students sentence parsing and formulation. These types of collaborative learning activities for grammar education are expected to support more effective learning. Yet, effective intra-group social metacognitive activities are essential for effective group learning. Groups engaged in these activities often fail to engage in collaborative control and monitoring of their learning. In this study, we examine how a technology enhanced game can support intra-group social metacognitive activities during a

collaborative learning activity to practice sentence generation and parsing. Results indicated that students indeed improved on aspects of sentence parsing, namely the naming of the direct subject in sentence parsing over time. Also, an improvement was seen in naming the direct verb in parsing and in the use of the subject, direct verb and indirect object in the formation of sentences. Finally clear examples were found where the technology design supported high quality intra-group interaction on cognitive and metacognitive levels.

Metacognitive regulation in collaborative science learning across different contexts

Presenting Author:Tuike Iiskala, University of Turku, Finland; **Co-Author:**Simone Volet, Murdoch University, Australia; **Co-Author:**Milo Koretsky, Oregon State University, United States; **Co-Author:**Cheryl Jones, Murdoch University, Australia; **Co-Author:**Marja Vauras, University of Turku, Finland

Research on metacognitive regulation, such as socially shared metacognitive regulation (SSMR), in collaborative learning has been studied with a broad array of analytic methods, but to date empirical work has been limited to the study of single contexts. Comparing findings across different contexts is needed to advance our understanding of, and further validate the construct of metacognitive regulation, including SSMR, in collaborative learning. The aim of this paper, therefore, is to examine how metacognitive regulation manifests itself in student groups' collaborative learning across several contexts, using the same analytical approach. The participants were groups of high-school students from Finland (general science), and university students from Australia (second year veterinary science) and the USA (final year engineering). One low-outcome and one high-outcome group from each research site were selected. Recordings of the groups' verbal interactions were coded for evidence of metacognitive regulation, including SSMR. Reliable inter-coding agreement between researchers was achieved. Statistical significance was determined using non-parametric tests, and differences in coding distributions were evaluated using logistic regression. Findings from the high school and the second year university veterinary site were similar in that in both sites the high-outcome group displayed a higher proportion of metacognitive regulation and SSMR than the low-outcome group, but this was not the case for the engineering data. A developmental pattern in SSMR also emerged across levels of education with lowest engagement in SSMR among high school students and highest among final year university students. In-depth comparisons and tentative explanations for the context-related differences are discussed.

Socio-cognitive and socio-emotional monitoring in collaborative learning

Presenting Author:Piia Naykki, University of Oulu, Finland; **Co-Author:**Jaana Isohätälä, University of Oulu, Finland; **Co-Author:**Sanna Järvelä, University of Oulu, Finland

The aim of this study is to examine social regulation in collaborative learning, particularly how socio-cognitive and socio-emotional monitoring processes emerge and function during student teachers' collaborative inquiry learning. The participants of this study were first-year teacher education students whose collaborative learning was supported with a designed macro-script during a six weeks environmental science course. The script divided the group work into three phases, namely: orientation-phase, intermediate-phase and reflection-phase. The script was put in use by prompting questions that were delivered to the students by utilizing iPads. Question prompts instructed groups to stop and reflect on their thoughts and to consider the efficiency of their strategies. The groups' face-to-face work were video-taped with spherical 360 degree cameras. The results show that the students used the provided macro-script more thoroughly in the orientation-phase than later phases. More active script discussion was followed by more active socio-emotional monitoring. It can be concluded that more profound regulation processes can be enhanced with a theory-based script that supports students' interaction about cognitive, metacognitive, motivational and emotional group processes.

Session H 20

31 August 2017 10:15 - 11:45

Main Building D - D13

Symposium

Learning and Social Interaction, Teaching and Teacher Education

Explaining Differences in Teacher Expectations and their Effects on Student Outcomes

Keywords: At-risk students, Attitudes and beliefs, Educational Psychology, Primary education, Quantitative methods, School effectiveness, Social aspects of learning and teaching, Social interaction, Student learning, Teacher Effectiveness, Teaching / instruction

Interest group: SIG 10 - Social Interaction in Learning and Instruction, SIG 11 - Teaching and Teacher Education

Chairperson: Petra Stanat, Humboldt-Universität zu Berlin , Germany

Organiser: Camilla Rjosk, Humboldt-Universität zu Berlin , Germany

Organiser: Anneke Timmermans, University of Groningen, Netherlands

Discussant: Sabine Krolak-Schwerdt, University of Luxembourg, Luxembourg

Teacher expectations guide behaviour during instruction, form a basis for student support, grouping, and choice of learning material. Accurate to high expectations are favorable for adaptive instruction and can positively affect future student achievement. Based on common theories and empirical findings on teacher expectations and self-fulfilling prophecies (e.g., Jussim, Robustelli, & Cain, 2009; Rosenthal & Jacobson, 1968), the four studies presented in the proposed symposium expand our knowledge on characteristics related to teacher expectations, their stability, and underlying mediating

processes for student achievement at different levels (see Figure 1). The empirical studies carried out in four countries investigate primary school teachers and their students predominantly using longitudinal designs and elaborated regression methods. The first two studies explore accuracy and stability of teacher expectations and their association with teacher-student relationships. The last two studies investigate effects of teacher expectations on student outcomes at the student and school level and their underlying mechanisms. The symposium provides insights into how teacher expectations function and into beneficial or detrimental consequences in the classroom. The findings will be discussed from the perspective of educational psychology.

Jussim, L., Robustelli, S., & Cain, T. (2009). Teacher expectations and self-fulfilling prophecies. In K. Wentzel & A. Wigfield (Eds.), *Handbook of Motivation at School* (pp. 349–379). New York: Routledge. Rosenthal, R., & Jacobson, L. (1968). Pygmalion in the classroom. *The Urban Review*, 16–20.

Stability of Teacher Expectations: A Longitudinal Examination

Presenting Author:Christine Rubie-Davies, University of Auckland, New Zealand; **Co-Author:**Elizabeth R Peterson, University of Auckland, New Zealand; **Co-Author:**Penelope Watson, The University of Auckland, New Zealand; **Co-Author:**Annaline Flint, University of Auckland, New Zealand; **Co-Author:**Lynda Garrett, The University of Auckland, New Zealand; **Co-Author:**Lyn McDonald, The University of Auckland, New Zealand

There is a paucity of research that has examined the stability of teachers' expectations across a single year and there are no longitudinal studies. The current study examined the stability of 88 teachers' expectations within three separate years at two time points each year and across three years (six time points) in mathematics and reading. In both subject areas, teachers' expectations remained stable from the beginning to the end of the year for each separate year of the study. However, teachers who had under- or overestimated their students by more than half a standard deviation over one year, became less extreme in their views over three years. Nonetheless, the under-estimators continued to underestimate their students albeit to a lesser degree at every time point in both reading and mathematics. Similarly, the over-estimators remained positive in their predictions of student achievement. The educational and theoretical implications of the findings are discussed.

The Interpersonal Character of Teacher Expectations

Presenting Author:Anneke Timmermans, University of Groningen, Netherlands; **Co-Author:**Christine Rubie-Davies, University of Auckland, New Zealand; **Co-Author:**Greetje van der Werf, GION - University of Groningen, Netherlands

Teacher expectations of students have long been recognized as a form of interpersonal expectation. Although it is assumed that the teacher's perceived teacher-student relationship is principally influential in educational decisions, the marks that are given, and as a source of information on which to build expectations, these constructs have rarely been investigated simultaneously. In this study, we aimed to investigate the interpersonal character of teacher expectations by analyzing the association between teacher expectations and the dimensions closeness, conflict and dependency of the teacher-student relationship based on a large sample of 5,836 students and 400 classes in the final grade of Dutch elementary schools. The results indicated that teacher expectations and the dimensions closeness and conflict shared similar antecedents in terms of demographic student characteristics. Perceived closeness positively predicted teacher expectations but only for minority students. A negative association was found for both perceived conflict as well as dependency with teacher expectations, although the latter relationship appeared stronger for high performing students. These results underline teacher expectations as an interpersonal construct, and indicate the power of the dyadic teacher-student relationship to influence teacher expectations, and the importance of a close teacher-student relationship, especially for minority students.

Effects of Teacher Expectations on Teacher Behaviour and Students' Achievement Development

Presenting Author:Sarah Gentrup, Humboldt-Universität zu Berlin, Germany; **Co-Author:**Georg Lorenz, Berlin Institute for Integration and Migration Research, Humboldt-Universität zu Berlin, Germany; **Co-Author:**Susanne Rahmann, Universität Mannheim, Germany; **Co-Author:**Petra Stanat, Humboldt-Universität zu Berlin, Germany; **Co-Author:**Cornelia Kristen, Otto-Friedrich-Universität Bamberg, Germany; **Co-Author:**Irena Kogan, Universität Mannheim, Germany

Previous research has established that biased teacher expectations can influence students' achievement development (see Jussim & Harber, 2005). Whereas the earlier studies focused on upper grades, exploring the relationship after a significant period of teacher-student-contact, research that starts at the beginning of first grade is rare. Moreover, little is known about the mechanisms whereby teacher expectations are transmitted during instruction. Based on data from $N = 1,039$ students from $N = 65$ classes in Germany, part 1 of this study examined whether biased teacher expectations predicted students' achievement gains in reading and mathematics during first grade. In part 2, we investigated how teacher expectations played out in teacher behaviour by performing in-depth analyses of videotaped German and math lessons from a subsample of $N = 19$ classes ($N = 352$ students). The results from part 1 of the study suggested that teacher expectations had an effect on students' year-end performance in reading and mathematics. More detailed analyses, based on categories of over- and underestimation, revealed that overestimations were associated with larger increases of students' skills in both reading and mathematics. Negative effects of underestimations were found for reading. The results of part 2 of the study indicated that teacher behaviour varied depending on teacher expectations. High-expectancy students received more positive feedback from their teachers, in the reading domain, even after controlling for students' prior achievement. In turn, the amount of positive feedback was associated with students' achievement gains.

Merton Scores Twice: Teacher Expectations as Self-fulfilling Prophecy and Matthew Effect

Presenting Author:Orhan Agirdag, KU Leuven, Belgium

Previous studies demonstrate that school SES is related to pupils' academic achievement. That is, pupils who attend high SES schools are found to perform better than similar pupils in low SES schools. More recently, scholars revealed that process variables such as teacher expectations mediate effects of school SES. This study builds further on this research on teacher expectation effects while it contributes with novel aspects. Most importantly it examines school composition and teacher expectations effects while controlling for student ability (IQ) with longitudinal data and it investigates neglected moderation effects. Data from 67 schools in Flanders show that school SES is related to science achievement growth, and this holds true even after controlling for previous achievement, pupil-level SES and IQ. In line with previous studies, it is revealed that school-level teacher expectations mediate the effects of school SES. Moreover, the interaction term between school SES and school-level teacher expectations is also significant, which shows that teacher expectations moderate the impact of school SES. It seems that teacher expectations not only function as self-fulfilling prophecies that explain why pupils in high SES schools perform better, but they also cause a Matthew effect as pupils enrolled in high SES schools accumulate advantages because they are exposed to higher teacher expectations.

Session H 21

31 August 2017 10:15 - 11:45

Pinni B - B3117

Symposium

Teaching and Teacher Education

Context, support and agency in new teachers' induction and learning

Keywords: Attitudes and beliefs, Case studies, Communities of practice, In-service teacher education, Mixed-method research, Motivation, Peer interaction, Qualitative methods, Quantitative methods, Teacher Professional Development, Workplace learning

Interest group: SIG 11 - Teaching and Teacher Education

Chairperson: Tsafirir Goldberg, University of Haifa, Israel

Discussant: Jan Vermunt, University of Cambridge, United Kingdom

New teachers' induction is a crucial phase in the teaching career. It serves as a formative stage both in terms of developing a professional identity and in terms of on the job learning. Individual agency and environmental support determine the degree to which new teachers realize the potential for professional learning and professional identity formation. Social-cultural contexts may have strong influence both on norms of support and on new teachers' perceptions of agency and learning patterns, thus calling for cross-cultural comparative perspectives. Our aim is to glean the insights that can be gained from contrasting different contexts and different methods we used to explore the ways new teachers learn their practice, shape and come to terms with their role and place. The proposed symposium brings together findings from Holland, Israel and Belgium, and looks both at majority members and at ethnic minorities. It features a range of methodologies, spanning from in-depth qualitative analysis of individual career narratives to wide scale quantitative analyses of social networks and learning patterns. The preliminary findings point to the complex inter-relation between teachers' individual agency and identity and the school norms and frameworks of support. We also find that, while institutional induction initiatives bear surprising resemblances across countries, school norms and teachers' strategies show uniqueness and diversity. The cross-cultural perspective allows us to point possible trajectories for a more nuanced and adaptive induction initiatives.

Is initiative an indicator of neglect? Social context, support, and new teachers' learning patterns.

Presenting Author:Tsafirir Goldberg, University of Haifa, Israel

School and community are assumed to deeply influence new teachers' induction into practice. However, not enough is known about the way these contexts actually shape or interact with new teachers' ways of learning. While there are clear theoretical assumptions about the best practices for teacher learning, for example through professional learning communities, it is unclear whether such practices are feasible for all contexts. Nor is it established that all new teachers opt for such learning, or what new teacher learning strategies lead to better performance. This study explores the relations of school contexts (age, ethnic sectors, socio-economic status) with new teachers perceived support and learning patterns. Using structural equation modeling it traces the complex relations between context, learning patterns, and new teachers' appropriation of professional knowledge and performance. Findings show that in minority and lower SES contexts new teachers reported lower support, and opted for more individualistic learning patterns. Context moderated the relation of new teachers learning patterns with appropriation of professional knowledge and its enactment. In Supportive contexts, new teachers' collegial learning was associated more strongly than individualistic learning with acquiring professional knowledge and with better performance. In less supportive contexts, individualistic learning patterns were just as strongly related to professional knowledge and performance and in some aspects new teachers showed more initiative. We discuss the significance of findings for creating more nuanced induction frameworks, adapting them both to context and to new teachers' learning preferences.

How does the guidance offered to newly qualified teachers determine their collegial network?

Presenting Author: Simon Beusaert, Maastricht University, Netherlands; **Co-Author:** Sanne De Vos, Odisee, Belgium; **Co-Author:** Johan De Wilde, Odisee, Belgium; **Co-Author:** Chloé Meredith, KU Leuven, Belgium

Lack of support is one of the reasons why newly qualified teachers (NQTs) tend to leave the job during their first years. Previous research made a distinction between support structure and support culture. Support structure can be defined as the induction programs that are aimed at guiding NQTs, e.g. mentoring. Support culture is related to the informal support NQTs get, e.g. the exchange of advice. Studies show that a wider network of support is related to a greater level of commitment. A support culture that focusses on equality amongst novice and experienced teachers and on reciprocal cooperation and thus support by the *social network* may be sufficient to cope with high drop-out rates among NQTs. However, few is known on the relation between support structure and culture. It is unclear how support structures contribute to the support culture of NQTs. The aim of this study is to investigate this relation and to unravel how support structures contribute to the network of NQTs. Data from 443 NQTs with less than 3 years of experience were collected and are going to be analyzed in Egonet. To gain more insight 14 NQTs will participate in interviews on the determinants and effects of their collegial network. At the EARLI 2017 results and contributions to the professional learning during the early career stage will be discussed.

Tensions of beginning teachers: Professional Identity and Agency at work

Presenting Author: Merel van der Wal, Radboud University Nijmegen, Netherlands; **Co-Author:** Harmen Schaap, Radboud University Nijmegen, Netherlands; **Co-Author:** Helma Oolbekink-Marchand, Radboud University Nijmegen, Netherlands

This study reveals how tensions of beginning teachers experience are at work between their professional agency and to who they want to be as teacher. To study teacher agency 54 teachers from secondary education filled out a log three times during one school year about their professional agency, about the image they have of themselves as a teacher and their tensions. The results show that most teachers experience agency in the school to develop professionally but they also experience tensions due to the many tasks they have to fulfil and the high demands they place on themselves as teachers. Consequently, beginning teachers perceive that they have to teach in way which does not align with who they want to be as a teacher.

Sliders: parallel universes of novice teachers' entrance and learning of the profession

Presenting Author: Tal Palevsky, University of Haifa, Israel

In their first years of teaching, novices are required to learn how to handle various new challenges. The present research aims to expand research on novices' "on-job" learning in the context of their habitat and from a social-cultural perspective. Thus, this research addresses the need to investigate novices' professional identity construction in relation to their learning and the social-cultural context, as they become teachers and negotiate their place in their school. From this perspective, we also examine the connections between learning and performance, which have not been sufficiently researched. The suggested paper for this conference presents contrasting school habitats, which influence novice teachers' learning and identity construction, demonstrating parallel universes of novices' entrance to the educational system. It also reveals a vicious circle, connecting between novices functioning and learning, indicating that a teacher who is in a survival state and barely functions, isn't available for learning and thus remains in survival, eventually "dropping-out" of the profession. This research is part of a large research program on novice teachers' learning in Israel. The present research relies on a qualitative approach, consists of teachers in Jewish Israeli schools and combines research tools (questionnaires, observations and interviews).

The research addresses a call to expand research on the relations of context, learning and professional identity. Through examining contrasting stories, it indicates new ways for improving novice teachers' learning and identity construction, and how their schools and the educational system as a whole can better support them at the entrance to the profession.

Session H 22

31 August 2017 10:15 - 11:45

Main Building D - D11

Symposium

Teaching and Teacher Education

Teacher Self-Efficacy: Difference, impact, and correlates

Keywords: Comparative studies, Educational Psychology, Mathematics, Mixed-method research, Motivation, Pre-service teacher education, Quantitative methods, Self-efficacy, Teacher Effectiveness, Teaching approaches

Interest group: SIG 11 - Teaching and Teacher Education

Chairperson: Lisa F. Smith, University of Otago, New Zealand

Discussant: Jeffrey Smith, University of Otago, New Zealand

Teacher self-efficacy beliefs concern teachers' capacity to carry out their professional roles successfully. These beliefs are of interest to educational researchers, as they have been shown to relate to significant outcomes for students, schools, and teachers themselves (Tschannen-Moran, Hoy, & Hoy, 1998). Over the past forty years, interest in teachers' self-efficacy

beliefs and their impact has spread from studies conducted by the Rand Foundation in the USA (Armor et al., 1976) to a wide variety of global contexts, as evident here. Indeed, this symposium brings together studies of both preservice and serving teachers from Norway, England, and New Zealand to consider how teacher self-efficacy beliefs may differ among nations, schools, and individuals, and how these beliefs relate to positive and negative outcomes. The first paper presents a study exploring how the pedagogical practices in mathematics of 327 New Zealand primary and middle school teachers differ according to their level of teacher self-efficacy belief. Next, using a sample of 523 Norwegian teachers, the relationship between teacher self-efficacy and job demands, resources, emotional exhaustion, and engagement in teaching are discussed. The third presentation takes a very different methodological tack, using a mixed methods approach to understand how teacher self-efficacy beliefs are shaped by mastery experiences in schools in England. The final presentation involves a comparative study of the teacher self-efficacy beliefs of preservice teachers in Norway and New Zealand.

The impact of mathematics teaching efficacy on teachers' pedagogical practices

Presenting Author:Naomi Ingram, University of Otago, New Zealand; **Co-Author:**Mustafa Asil, University of Otago, New Zealand; **Co-Author:**David Berg, University of Otago, New Zealand

This study explores the pedagogical practices of 167 Year 4 and 160 Year 8 New Zealand mathematics teachers who have different levels of mathematics teaching efficacy. Using data from the National Monitoring Study of Student Achievement 2013, the teacher questionnaire items believed to be the indicators of mathematics teaching efficacy were selected, represented by six items such as "I feel confident about teaching maths". Then, low, mid, and high efficacious teachers were identified and compared to see how they differed with respect to their teaching profile and the frequency they used effective pedagogies when teaching mathematics (italicised below) (Anthony & Walshaw, 2007). Twenty eight percent of Year 4 and 41% of Year 8 teachers had high mathematics teaching efficacy. Compared with the other teachers, teachers with high mathematics teaching efficacy were better able to provide an *ethic of care* in their classroom, they more frequently *arranged their classrooms for learning* to enable students to collaborate, and more frequently expected their students to *communicate* their thinking and debate ideas with others. They more frequently provided students with *worthwhile mathematical tasks*, they more frequently provided opportunities for their students to *build on their own thinking* and to explore how new learning linked to or changed what they already knew. They more frequently expected their students to make *mathematical connections* by reflecting on their learning, to use multiple representations, and use ideas and skills from different curriculum areas.

Job demands and job resources in the teaching profession: Relations with teacher self-efficacy

Presenting Author:Einar Skaalvik, Norwegian Univ. of Science and Technology, Norway; **Co-Author:**Sidsel Skaalvik, Norwegian Univ. of Science and Technology, Norway

The purpose of this study was to explore how teacher self-efficacy was related to (a) job demands and job resources in the school environment, (b) emotional exhaustion and (c) teachers' engagement in teaching. The study was based on Social cognitive theory and the Job Demands – Resources model (JD–R model). The job demands measured in this study were (a) time pressure or work overload and (b) low student motivation. We included two measures of job resources in the study: one organizational resource (teacher autonomy) and one social resource (supportive social climate at school). Participants were 523 teachers in three counties in central Norway. We analyzed data by means of confirmatory factor analyses and SEM analysis for latent traits. The results showed that teacher self-efficacy was positively predicted by both job resources in the study whereas it was negatively related to lack of student motivation. However, in the SEM-model self-efficacy was not significantly predicted by either time pressure/work overload or by emotional exhaustion. Self-efficacy positively predicted engagement whereas emotional exhaustion predicted engagement negatively. The study clearly indicates that self-efficacy is influenced by both job demands and job resources in the school environment. However, it also indicates that it is not affected by all job demands. Possible interpretations will be discussed.

Enhancing Preservice Teachers' Efficacy Beliefs Through a School-University Partnership Programme

Presenting Author:Claire Lloyd, Liverpool Hope University, United Kingdom; **Co-Author:**Sue Cronin, Liverpool Hope University, United Kingdom; **Co-Author:**Michelle Pearson, Liverpool Hope University, United Kingdom

For over 30 years, teacher efficacy has been identified as a teacher characteristics relating to student achievement and motivation. Moreover, some of the most powerful influences on the development of teacher efficacy are mastery experiences during student teaching and the induction year, alongside vicarious experiences and social persuasion (Charalambous & Philippou, 2010). This paper reports the results of an investigation into student teachers' efficacy through participation in an intensive school-university partnership programme in the first year of their three-year BA. The programme provides students with mastery experiences through a cycle of Ambitious Teaching, (Smith, Lee & Newman, 2001; Lampert et al. ,2013) and builds upon a collaborative cycle of modelling and feedback. Data were collected from 30 students who participated in the partnership programme. Using The Teacher Sense of Efficacy Scale (Woolfolk-Hoy, nd), pre- and post-programme levels of self-efficacy were analysed quantitatively. Qualitative arts-based methods were also used to explore students' perceptions of schools in challenging circumstances. This complementary form of data collection allowed for further exploration of changes in beliefs (Liamputtong & Rumbold, 2008; Pink, 2006). Preliminary analysis of questionnaire data revealed pre-post shifts in students' self-efficacy. Qualitative data lent further support to the power of the programme in changing beliefs. Indeed, the qualitative analysis revealed a consistent pattern of improvement and nuancing

in students' perceptions of schools in challenging circumstances. The results suggest that carefully designed partnership programmes, which provide student teachers with guided mastery experiences in challenging school contexts, can lead to positive changes in self-efficacy.

Preservice teachers' self-efficacy and choice of teacher education in Norway and New Zealand

Presenting Author: David Berg, University of Otago, New Zealand; **Co-Author:** Einar Skaalvik, Norwegian Univ. of Science and Technology, Norway

In this presentation, we present preliminary findings from year-one of a five-year longitudinal study exploring the teacher self-efficacy beliefs and motivation to teach of preservice and beginning teachers in Norway and New Zealand (NZ). Here, the reported reasons for enlisting on an initial teacher education degree and the self-efficacy beliefs of Norwegian and NZ preservice teachers are compared. The primary purpose of the study is to compare the reasons for enlisting in a teacher preparation degree programme and the teacher self-efficacy beliefs of preservice teachers in two nations. A second purpose was to contrast the self-efficacy beliefs of these preservice teachers with findings from previous studies examining in-service teachers. Preservice teachers from Norway ($n = 292$) and NZ ($n = 50$)*, in the first weeks of their first year of their initial teacher education, completed the 24-item Norwegian Teacher's Self-Efficacy Scale (NTSES) and the 36-item Reasons for Choosing Teacher Education Scale (RCTES) in Norwegian and English respectively. We explore how these cohorts of students differ and consider possible explanations for such differences. Our main finding was that the NZ cohort in comparison to their Norwegian peers reported both higher motivation to teach and teacher self-efficacy beliefs. This may be accounted for by a response bias, cultural difference, and/ or contextual factors. A second finding is that the factor patterns of preservice teachers are less differentiated than found with experienced teachers.* NZ sample size to be expanded prior to presentation.

Session H 23

31 August 2017 10:15 - 11:45

Main Building D - D14

Symposium

Cognitive Science

Executive functions as precursors of mathematical skills

Keywords: Cognitive development, Cognitive skills, Early childhood education, Educational Psychology, Mathematics, Primary education

Interest group: SIG 15 - Special Educational Needs

Chairperson: Piia Björn, University of Eastern Finland, Finland

Discussant: Annemie Desoete, Belgium

Executive functions (EF) refer to higher order cognitive abilities used in planning, information processing, and problem solving, and they contribute significantly to children's math performance (Clements, et al. 2016). They include at least three main processes: 1) attention shifting and cognitive flexibility, 2) inhibitory control, and 3) working memory (WM). This symposium aims to investigate the relationship between EF and mathematical performance by using cross-sectional, and longitudinal data from four different countries (Singapore, South Africa, The Netherlands, and Finland). The first paper (Ragpot et al.) concentrates on how children's EFs relate to their numerical skills and listening comprehension at the beginning of formal schooling. The second paper (Kroesbergen et al.) explores how number sense, EFs and mathematics are related during first years of primary education, and whether the relation between EFs and mathematics is mediated by number sense. The third paper (Lee et al.) explores whether four-year-old children's WM capacity mediates the effects of SES on children's math gains. The fourth paper (Kytälä et al.) shows how WM skills measured before school start predict later mathematical performance at 2nd grade. We expect the studies presented here to strengthen our knowledge on the interrelationship between EF and mathematics skills. Also, we expect the presentations to give new insights for approaches in learning via the findings of the studies presented. Finally, the symposium is completed by discussing the implications of the studies onto cumulative information on EF but also suggesting direction to future research.

SES related differences in gains in early math achievement are mediated by working memory

Presenting Author: Kerry Lee, National Institute of Education, Singapore; **Co-Author:** David Munez, National Institute of Education / Nanyang Technological University, Singapore; **Co-Author:** Rebecca Bull, National Institute of Education/Nanyang Technological University, Singapore, Singapore

Socioeconomic status (SES) is an important predictor of academic achievement and working memory capacity. In particular, SES has been found to predict children's math achievement at school entry, and in early elementary school. Research aimed at understanding relationship between SES, working memory, and early academic achievement has found that the effect of SES on children's academic achievement throughout childhood (6-15 year olds) may be mediated by executive functioning. The present study explores whether four-year-old children's working memory capacity mediates the effects of SES on children's gains in math achievement scores ($N = 866$). Results are consistent with a mediation effect and points to early differentiation in working memory. These findings suggest that early intervention programs, aimed at improving child's working memory capacity, may be necessary to mitigate the SES related achievement gap.

Working memory resources in children - stability and relation to subsequent mathematical skills

Presenting Author:Minna Kyttälä, University of Turku, Finland; **Co-Author:**Piia Björn, University of Eastern Finland, Finland; **Co-Author:**Kaisa Kanerva, University of Helsinki, Finland

In this study, we aimed to investigate the stability of Working Memory (henceforth WM) skills from kindergarten to second grade, and the extent to which WM skills measured at kindergarten predict counting skills, basic arithmetic skills and math word problem solving skills at second grade. WM is part of executive functions (EF) which are suggested to incorporate all high-level brain processes including attention and inhibition. At the time of the first measurement point, the participants were 62 Finnish six to seven year-old kindergarten children. The second measurement point (P₂) took place approximately

2 years after the first measurement point when the children were eight to nine year-old and at 2nd grade. The results showed that WM capacity significantly increased over the 2-year period suggesting that the WM capacity does develop during early school age. However, individual skill profiles seemed to show stability, as sixty-two percent of the participants were ranked in the same skill group in WM skills at both time points. Verbal WM (VWM) and visuospatial WM (VSWM) resources seem to develop quite independently VWM skills showing more stability at this age phase than VSWM skills.

Math word problem skills at 2nd grade were predicted by prior VWM skills but not by prior VSWM skills. Basic arithmetic skills at 2nd grade were not predicted by prior WM skills.

The relation between executiver functions, number sense and mathematics throughout primary education

Presenting Author:Evelyn Kroesbergen, Utrecht University, Netherlands; **Co-Author:**Ilona Friso-Van den Bos, Utrecht University, Netherlands; **Co-Author:**Eveline Schoevers, Utrecht University, Netherlands

In this study, it was investigated how number sense, executive functions and mathematics are related in grades 1-4 of primary education, and whether the relation between executive functions and mathematics is mediated by number sense. 467 children were assessed on working memory, inhibition, mathematics (basic facts & problem solving), and three different number sense tasks. Working memory showed the strongest associations with mathematics, with no differences between the basis facts tests and the problem solving test. Both working memory and inhibition were found to be related to number sense. Furthermore, it was found that both working memory and number sense are most important during second year of mathematics education, and that number sense partially mediates the relation between working memory and mathematics. This study indicates that number sense is still developing during the first years of primary education and that it is necessary to foster children's number sense during this period, especially for low mathematics achievers and for children with working memory difficulties.

First grade children's competence in executive functions, numeracy and listening comprehension

Presenting Author:Minna Törmänen, University of Helsinki, Finland; **Presenting Author:**Pirjo Aunio, University of Oslo / University of Helsinki, Finland; **Co-Author:**Lara Ragpot, University of Johannesburg, Unknown; **Co-Author:**Riikka Mononen, University of Oslo, Norway; **Co-Author:**Johan Korhonen, Åbo Akademi University in Vaasa, Finland; **Co-Author:**Elizabeth Henning, University of Johannesburg, South Africa

Early numeracy competenc is crucial for children's mathematics learning beyond the early grades. South African children's performance in maths is of particular concern and early recognition of the possible causes for low performance are investigated in a number of research projects in the Centre for Education Practice Research at the University of Johannesburg's Soweto campus. This paper reports on one of these studies, in which first graders (n=238) in Gauteng Province were assessed by way of three instruments: The cross sectional data captured the relation of their (i) early numerical competency on a maths measurement developed by Aunio and Mononen (2014), (ii) their EF on a Flanker task test (Roebers & Kauer, 2009) and (iii) their listening comprehension skills on a test (Ragpot & Brink, 2016), which was adapted from Snow (1998). The results show that there is a positive relation between the children's early mathematics/numeracy competence, their listening comprehension and their EF.

Session H 24

31 August 2017 10:15 - 11:45

Pinni B - B1100

Symposium

Learning and Social Interaction

„Work agency“ - a promising concept for facing culturally challenging affordances

Keywords: Collaborative Learning, Competencies, Content analysis, Ethnography, Higher education, Knowledge creation, Multicultural education, Qualitative methods, Quantitative methods, Self-regulation, Social interaction, Vocational education, Workplace learning

Interest group: SIG 14 - Learning and Professional Development

Chairperson: Frank Achtenhagen, University of Göttingen, Germany

Discussant: Doreen Holtsch, University of Zurich, Switzerland

Discussant: Fritz Oser, University of Fribourg, Switzerland

Today's economic, technological, and societal challenges – including the busy migration processes impose strong demands on labor market participants across all hierarchical levels, cultures and European countries. Hence, employees and migrants are required to develop their professional competencies and practices, across traditional professional boundaries, negotiate their career, re-construct professional relationships and transform their cultural and professional identity. Within this symposium we are introducing the concept of „work agency“ and explore it with regard to its potential for coping with culturally challenging affordances. The first paper „Human agency at work: A conceptual Introduction“ works out theoretical discourses on human agency in relation to work-related learning and development as well as work-related behavior in general. By the second paper „Migrants' career decisions and agentic adaptability“ career decisions and adaptability of migrants and refugees across Germany are investigated. The third paper „Fostering professional learning and agency – An identity coaching programme“ focuses on a successful identity coaching programme implemented with professionals from universities and hospitals. The fourth paper „Institutional social dynamics and the absence of collective agency in academic work“ reports on a self-ethnographic approach to critically analyze the relationship between social structure, culture(s) and distinct forms of agency within academic settings. By the contributions we shed light into these processes of building intercultural relationships, adaptability within career decisions and suggest programs but also context factors for arranging successful learning arenas for promoting „work agency“.

Human agency at work: A conceptual introduction

Presenting Author:Michael Goller, University of Paderborn, Germany

The concept of human agency describes that human beings are agents of influence and power that are able to cause things and to bring about change. In this sense, notions of human agency are usually explicitly or implicitly associated with ideas that individuals make choices, take initiatives, and act proactively to exert control over their lives and their respective environments. This presentation gives a brief overview about theoretical discourses on human agency in relation to work-related learning and development as well as work-related behaviour in general. A special focus will hereby be laid on the development of a theoretical framework that integrates different perspectives about human agency discussed in the literature. In addition, this presentation aims at discussing how the concept of work agency can be used to explain how individuals and organisations can cope with current societal and economic challenges like mass migration, digitalisation of work or demographic changes.

Migrants' career decisions and agentic adaptability

Presenting Author:Susanne Weber, Ludwig-Maximilians-Universität (LMU), Germany; **Co-Author:**Josef Guggemos, Ludwig-Maximilians-Universität (LMU), Germany

Current migration challenges all participants at the labor market. In July 2016 more than 600.000 people migrate into the EU (Eurostat: 30.09.2016). Most people coming from Syria, Irak and Afghanistan have an age of 16 to 26 years. Just 10% had no formal education (BAMF, 2016). As the German labor market seeks for middle- and high-skilled non-academics there is hope to fill the given demographic gap by migrants. Critical considerations arise whether the migrants step in or whether they have other career aspirations (Solga, 2016). Within this study we asked (N=150) migrants in an ad hoc sample about their career decisions and adaptability behavior (Ratschinski, 2014) to the labor market – to get insight into their professional identities, knowledge and competences as well as their strategies and future goals as resources for the enactment of life course agency (Eteläpelto et al., 2013). Running qualitative and quantitative analyses (like rubrics, (non-)parametric tests) the results show that the migrants have clear career goals for prestigious occupations and a strong professional identity. Migrants with an option to stay have a significantly higher motivation to adapt to given and non-foreseeable new workplaces. But most of them are lacking for additional information on options. The results give fruitful hints for creating supportive means for these groups with few individual resources to get engaged in continuous professional learning demands for developing their individual well-being, satisfaction but also organizational performance and commitment at work (Vähäsantanen 2016) and for formulating new research questions and expectations in labor market policy.

Fostering professional learning and agency – An identity coaching programme

Presenting Author:Susanna Paloniemi, University of Jyväskylä, Finland; **Co-Author:**Katja Vähäsantanen, University of Jyväskylä, Finland; **Co-Author:**Päivi Hökkä, University of Jyväskylä, Finland; **Co-Author:**Anneli Eteläpelto, University of Jyväskylä, Finland

This study addresses the professional learning that occurred in an identity coaching programme. The arts-based programme aimed to enhance the participants' professional learning, notably through helping them to process their professional identities. Professional learning was seen as resourced by the participants' professional agency, and by the promotion of such agency. Via interviews, we investigated what the participants perceived they had learnt during the programme, and the potential differences in learning outcomes between professional groups from university and hospital contexts. The findings showed that the programme was perceived as a rich learning arena in the domains of the professional self (involving a crafted professional identity), professional relationships (involving increased knowledge of colleagues and becoming an active participant in the work community), and professional competencies (involving socioemotional knowledge and skills). The professionals (academics and administrative personnel) from a university learnt

more during the programme than did the nurses and physicians working in a hospital. The findings suggest that the primary emphasis in professional learning should be on professional identity and agency within the social relationships that exist in training and work settings. The study also presents the theoretical considerations regarding the connection between professional agency and learning.

Institutional social dynamics and the absence of collective agency in academic work

Presenting Author: Frank Achtenhagen, University of Göttingen, Germany; **Co-Author:** David M. Hoffman, University of Jyväskylä, Finland

Self-ethnography offers a useful approach in the critical analysis of the relationship between social structure, culture(s) and distinct forms of agency within academic settings where personnel are unaware of key obstacles to the emergent collective agency inherent in continuous renewal and innovative development. The paper illuminates hidden institutional dynamics, social practices, and career trajectories which spotlight obstacles and constraints for the productive renewal of research traditions, including HR practices, modes of inquiry, methodology, methods and substantive focus within a research institute. It is shown how institutional practices and traditions reproduce global inequities, rather than the societal transformation Finland's education system was historically noted for. Concretely, the analysis explains emergent patterns of structural scholarly precariousness and their relationship to the lack of work agency manifested both at the individual and collective levels which prevents the institutional renewal of organisations and individual career trajectories. Hoffman et al. (2016) identify three transnational strata that explain the global division of scholarly labor, which in turn highlight distinct institutional dynamics that explain the structural characteristics in which agency plays out, as well as the most important types of culture(s) relevant within each stratum.

Session H 25

31 August 2017 10:15 - 11:45

Main Building E - E222

Invited Symposium

Teaching and Teacher Education

Why should teachers engage in research? - examples from Learning study and Lesson study

Keywords: Action research, Phenomenography, Teacher Professional Development, Teaching / instruction

Interest group: SIG 09 - Phenomenography and Variation Theory

Chairperson: Peter Davies, University of Birmingham, United Kingdom

Organiser: Angelika Kullberg, University of Gothenburg, Sweden

Discussant: Kirsti Klette, University of Oslo, Norway

The theme of the EARLI 2017 conference emphasizes "the role of research in the advancement of public good". In this symposium we address this theme by focusing on research on the development of teaching in order to promote enhanced student learning in schools. In the symposium the question why teachers should engage in research is discussed by means of examples from practitioner research conducted through lesson study or learning study. The aim of this symposium is to discuss what practitioner research based on lesson studies and learning studies can contribute with, e.g., in terms of practice based knowledge production to be shared with others.

Learning study, Chinese lesson study and the keys of learning

Presenting Author: Ming Fai Pang, The University of Hong Kong, Hong Kong; **Co-Author:** Ference Marton, Göteborg University, Sweden

Our paper has two purposes. First, we want to advance the thesis that lesson study should be considered the signature pedagogy of teachers. Shulman (2005) pointed out that different professions have different and unique ways in which novices acquire professional knowledge and attitudes, i.e. the "signature pedagogies". The three versions of Lesson study mentioned i.e. Japanese lesson study, Learning study and Chinese lesson study, all have the idea of the lesson and its different aspects in common. Several teachers specializing on a subject and on a level within the subject plan, discuss, analyze, evaluate a lesson, observe one of them interacting with students, as well as students interacting with each other. It is deemed a reasonable signature pedagogy for the teaching profession. Second, we argue that teachers should be involved in research. The above three versions of Lesson study have in common that pedagogical knowledge is sought: How can we contribute to better learning in the sense of making it possible to discern aspects of the object of learning that are necessary for students to discern. Such aspects are critical for learning (a particular object of learning); they are the "keys of learning". If this is the case, we would need to develop pedagogical theories of how we can contribute to making it possible for students to discern those critical aspects. If we want to put pedagogical theories to test, teachers have to mediate the theories and make them his/her own. And doing so amounts to doing research.

Can public knowledge be created through practitioner research?

Presenting Author: Anna Vikström, Luleå university of technology, Sweden; **Co-Author:** Angelika Kullberg, University of Gothenburg, Sweden; **Co-Author:** Ulla Runesson, University of Jonköping, Sweden

The purpose of this paper is to discuss the character of practitioner research in schools and the question asked is: *Can a specific form of teachers' research produce practice-based knowledge relevant beyond the borders of the local school*

context? The possibilities for this have been questioned by for example Enthoven & de Bruijn (2010) who in an extensive literature review focus the question of which mechanisms can be identified as enabling practice based knowledge production. They found that objectives and intended products are rarely clearly defined and operationalized in practitioner research conducted within professional communities. Instead, teachers' collaboration seemed to be aiming at practical innovations and change through teacher learning, and not through evaluation of the innovations, and that the practitioner's networks were not used to create public practical knowledge beyond the borders of the local school. On the other hand, Morris & Hiebert (2011) have, by studying the quality movement in health care science and lesson studies in Japanese schools, found three characterizing features that enabled the construction of knowledge products in practitioner research: 1. Shared problems across the system, problems that the products help to solve. 2. Small tests of small changes, with research methods that are associated with testing and revising the products, methods often ignored or dismissed in descriptions of scientific approaches. 3. Jointly created products where the knowledge used to build the products is harvested from participants with different kinds of knowledge and competence.

The Contributions of Learning study to teacher engagement in research in an Asian setting

Presenting Author:Wai Ming Cheung, The University of Hong Kong, Hong Kong; **Co-Author:**Stephanie Wing Yan Chan, The University of Hong Kong, Hong Kong; **Co-Author:**Kevin Ka-Hin Tsang, The University of Hong Kong, Hong Kong

Globalization leads to the increasing number of minority language learners (MLL) in Hong Kong classrooms with different languages and different language proficiencies who face great obstacles in learning Chinese. Their teachers also lack the capability to teach Chinese as a second language. Effective professional development for primary school teachers who strive to provide MLL with high-quality Chinese literacy instruction is clearly needed. A 2-layered Professional Development Model, inspired by the Variation Theory and Learning Study, has been developed to equip 69 teachers the capability of teaching Chinese as a second language in 18 primary schools. The aim of this study was to explore the characteristics of this 2-layered professional development model for teachers that contributes to teacher engagement in classroom-based research in helping MLLs learn Chinese. The effectiveness of this model in terms of teachers' culturally responsive teaching self-efficacy and the interview which has been found related to student outcomes and teaching behavior will be reported. The practical relevance and the interactions between these 2 layers of the model will also be discussed. This model shed light on a powerful model of the professional development.

Sustaining School and Teacher Development through Lesson-based Teaching Research Practice

Presenting Author:Yanping Fang, National Institute of Education / Nanyang Technological University, Singapore

Teachers engaging in practitioner research most often to improve practice and student learning while researchers to improve practice by building more knowledge, understanding and form theories to make sense of practice and its nature and meaning. In the age of reform demanding drastic change in classroom teaching, teachers are also engaged in research to more effectively implement curriculum with better understanding to inform their teaching and student learning as well as their own professional learning. This unified process of teacher learning from doing reform has been what teachers in Shanghai engaged in since 2001, the Second-phase of National (Municipal) Curriculum Reform that called for inquiry-based and student-oriented teaching. This paper, through case study of five schools Shanghai based on school principals master's thesis work at National Institute of Education, will focus on how Shanghai schools have developed new school-based teaching research practice in the form of lesson case research (keli yanjiu) that expected schools to capitalize on the traditional public lessons (similar to lesson study) in schools to engage teachers in studying and implementing the new curriculum and reflecting on their experience through repeated planning, observing and improving their classroom lessons and writing lesson cases. How the process is framed and conducted as problem-based and project-led practices across different types and levels of schools in Shanghai provides both intriguing and meaningful cases to uncover the social-cultural mediations of this technology of practice and to help make sense of its seamless integration into the school routines and teachers' work.

Session H 26

31 August 2017 10:15 - 11:45

Pinni A - Paavo Koli

Invited Symposium

Defining, measuring, and supporting central concepts in inquiry learning

Keywords: Inquiry learning, Knowledge creation, Learning approaches, Problem-based learning, Reasoning

Interest group: SIG 20 - Inquiry Learning

Chairperson: Bram De Wever, Ghent University, Belgium

Organiser: Bram De Wever, Ghent University, Belgium

Organiser: Wouter R. van Joolingen, Utrecht University, Netherlands

Organiser: Annelies Raes, Ghent University, Belgium

Discussant: Wouter R. van Joolingen, Utrecht University, Netherlands

Traditionally, inquiry learning has been based on the processes that make up the inquiry cycle, including hypothesizing, experimenting, analyzing and concluding. However, to meet the needs of the 21st Century, the way inquiry learning is conceptualized should be placed under renewed scrutiny. This is a consequence of developments in technology in society.

Technology allows for new ways of interacting with learning environments, such as through robots and tangible interfaces and also allow for new kinds of monitoring students' learning activities based on large data sets. Also, in our dynamic society students need to critically collect, assess and act upon (scientific) information. This emphasizes the need for inquiry learning as a means to acquire those skills. This symposium brings together researchers working on the challenges of (re)defining, measuring and supporting central concepts in inquiry learning in different settings. The paper by Gomoll and colleagues aims to reconceptualize the concept of *engagement* in collaborative inquiry investigating the role of nonverbal engagement in the process of joint problem solving from a qualitative approach. Lazonder & Janssen deal with the challenge of measuring young children's scientific reasoning proficiency. Finally, De Grez et al. and Montrieux et al. both focus on the third challenge, namely how to design effective inquiry learning environments and the necessary scaffolds.

Reconceptualizing Engagement: How Embodied Interaction Can Support Collaborative Inquiry

Presenting Author:Andrea Gomoll, Indiana University, United States; **Co-Author:**Cindy Hmelo-Silver, Indiana University, United States; **Co-Author:**Erin Tolar, Indiana University, United States; **Co-Author:**Selma Šabanović, Indiana University, United States

As students engage in the complex work of collaborative inquiry, they construct shared meaning using resources available to them. In the research to be presented, we examine how this occurs for middle school students engaged in a human-centered robotics (HCR) experience. The robots that students design, build, and program in this inquiry-based curriculum are used to serve a need in their school and to connect with peers in remote contexts—using telepresence technology to make connections and spark curiosities across urban and rural classrooms in the US. Exploring what might pose challenges and provide support for the construction of shared meaning informs the design of learning environments and activities that can help learners to see themselves as capable STEM learners and practitioners. In past research, behavioral engagement and social engagement have been privileged as evidence of students' collaborative inquiry and learning. This study aims to reconceptualize engagement in collaborative inquiry—investigating the role of nonverbal engagement in joint problem solving for one small group. This work is a qualitative case study centered on the collaboration of four students in a human-centered robotics intervention. Tenets of discursive psychology are used to consider how this group's nuanced discourse shaped their collaborative inquiry. We explore how discursive features including gaze, embodied gesture, the positioning of artifacts, and interaction with technology contributed to the problem solving process. This analysis draws implications for the design of future iterations of inquiry-based curricula.

How do students deal with 2 different scripts for a collaborative inquiry scientific reasoning task

Presenting Author:Nore De Grez, Ghent University, Belgium; **Co-Author:**Joni Lämsä, University of Jyväskylä, Finland; **Co-Author:**Raija Hamalainen, University of Jyväskylä, Finland; **Co-Author:**Ingo Kollar, University of Augsburg, Germany; **Co-Author:**Bram De Wever, Ghent University, Belgium

This study illustrates the effects of two different scripting approaches (Vogel, Wecker, Kollar & Fischer, 2016) to scaffold students' scientific reasoning abilities while being engaged in collaborative writing activities on their learning processes and outcomes within Web 2.0 environments in higher education. Three similar studies were set up for university students (N=88) in Germany (n=27), Belgium (n=43), and Finland (n=18). Although the content of the course differed, the scripted task was the same in all settings, namely writing a recommendation paper on a specific subject. Students collaborated in small groups of three to four via Web 2.0 technology, i.e. in a shared Google Document. In each course, groups were divided randomly over two scripted conditions: (a) phase-script: a script that segmented collaboration in different phases (based on a script used by De Wever et al. 2015) and (b) phase-plus-activities script: an extended script that also provided learners with guidance on the specific activities to engage during each phase. As dependent variables we measured students' scientific reasoning (SR) ability with a performance and declarative test, their subjective knowledge acquisition (both with respect to content and SR ability) and their acceptance of the scripts. This presentation however focuses only on the latter. By qualitatively analyzing students' reflection notes, we investigate how students perceived the scripts and whether and how students made use of the script. This is important in view of later analyses focusing on the differential impact of the script on students' learning outcomes.

Performance-based assessment of scientific reasoning in children

Presenting Author:Ard Lazonder, Radboud University, Netherlands; **Co-Author:**Noortje Janssen, University of Twente, Netherlands

Recent longitudinal and cross-sectional studies have examined how scientific reasoning skills such as experimenting, making inferences and evaluating evidence develop in young science learners. Results, although informative, likely underestimate children's true capabilities because data in these studies was collected by written tests. To circumvent this possible threat to predictive validity, a three-year project was launched to monitor children's performance on practical inquiry tasks through time. Using a longitudinal design, 170 elementary schoolchildren aged 7-10 participate in three annual waves of data collection. Specifically, they undertake an investigation with physical materials under guidance of a test administrator, who captures their scientific reasoning processes by observing and eliciting explanations. Results of the first year demonstrate good psychometric qualities of this new performance-based assessment instrument, and a consistent linear increase in scientific reasoning proficiency across age categories that was largely independent of children's language and math abilities. Analyses at the level of individual skills revealed that scientific reasoning develops asynchronously in children. The skills of experimenting and inferencing were already performed quite well, 'predicting' was more difficult, and

'evaluating data' and 'drawing conclusions' were the least well-developed skills. The second wave of data collection takes place in February and March 2017; results will be analyzed within-subject to find out to what extent children have improved in scientific reasoning and whether the five scientific reasoning skills develop at the same pace in same-aged children.

How technology can support teacher and students to differentiate during web-based inquiry learning

Presenting Author:Hannelore Montrieux, Ghent University, Belgium; **Co-Author:**Annelies Raes, Ghent University, Belgium; **Co-Author:**Elise Ameloot, Ghent University, Belgium; **Co-Author:**Tammy Schellens, Ghent University, Belgium

Organizing differentiated instruction has always been a challenge. However, technology has opportunities to provide students with adaptive content tailored to their needs. Next to this, technology does not only support student learning, but technology has also the opportunity to provide real-time visualization of student activities with the aim of supporting instructors' orchestration. This study investigated the impact of four differentiated instruction conditions on science learning through a web-based collaborative inquiry project called 'High'. The project aimed to improve conceptual knowledge about the effect of drugs, as well as inquiry skills. Three experimental conditions (1. differentiation through adaptive content, 2. differentiation through teacher support based on the progress monitor, and 3. both types of differentiation combined) were compared with a control condition in a two-by-two factorial quasi-experimental design. The content-based differentiation was based on the theoretical framework of Tomlinson. In a four-week field study in secondary science education that involved 309 students from 20 secondary school classes, pretest-posttest differences were measured. Findings reveal that students in all conditions make significant improvement in terms of conceptual knowledge and inquiry skills. However, analyses of covariance show that the conditions differ significantly on conceptual knowledge. Students from the condition provided with both types of differentiation outperform students from the conditions only provided with one mode of differentiation. These conditions however showed better results compared to the control condition. Next to the presentation of the main findings, we will discuss both the challenges of differentiated inquiry instruction and the opportunities of technology in this context.

Session I 1

31 August 2017 12:00 - 13:30

Linna - K108

Poster Presentation

Teaching and Teacher Education

PO: Teaching and Teacher Education

Keywords: Assessment methods and tools, Attitudes and beliefs, Case studies, Cognitive skills, Competencies, Computer-assisted learning, Educational Psychology, Mathematics, Out-of-school learning, Problem solving, Reasoning, Secondary education, Student learning, Survey Research, Teacher Professional Development, Teaching / instruction, Technology, Video analysis, Writing / Literacy

Interest group: SIG 11 - Teaching and Teacher Education

Chairperson: Paul Warwick, University of Cambridge, United Kingdom

Teachers' epistemic thinking: Investigating effects of knowledge domains and educational fields

Keywords: Educational Psychology, Reasoning, Secondary education, Teaching / instruction

Presenting Author:Tessa van Schijndel, Leiden University, Netherlands; **Co-Author:**Nadira Saab, Leiden University, Netherlands; **Co-Author:**Amanda Berry, RMIT University, Australia; **Co-Author:**Jan van Driel, The University of Melbourne, Australia

Recent developments in the field of education, such as the focus on inquiry-based approaches (European Commission, 2007) and 21st Century Skills (Voogt & Pareja Roblin, 2010), ask for advanced levels of student epistemological understanding. However, in order for teachers to improve students' levels of epistemic thinking, they need to show advanced levels themselves. Kuhn & Weinstock (2002, in Kuhn, Iordanou, Pease & Wirkala, 2008) defined the development of epistemic thinking in terms of the coordination between objective and subjective dimensions of knowing. Kuhn et al. (2008) investigated teachers' epistemic thinking and besides finding evidence for a more general trajectory explaining development across domains, they also demonstrated a 'specificity of content and context' (Kuhn et al., 2008, p.447). Therefore, the present study aimed at investigating secondary teachers' epistemic thinking, taking into account different knowledge domains in which epistemic thinking is assessed (history and biology), as well as including teachers from different educational fields (sciences, humanities, and languages). We used Barzilai and Weinstock's (2015) Epistemic Thinking Assessment (ETA), which was based on the theoretical perspective developed by Kuhn and colleagues. The ETA is a paper-and-pencil assessment, for which the reliability and validity have been investigated, and the measure allows for comparing epistemic thinking across knowledge domains (Barzilai & Weinstock, 2015). The study's results (are momentarily being analyzed, and) will bear relevance to the educational context by providing suggestions for teacher training in the area of epistemic thinking.

Development of Web-based Investigation System for Teachers' Judgements on Students' Performance

Keywords: Assessment methods and tools, Computer-assisted learning, Teacher Professional Development, Technology

Presenting Author:Kae Nakaya, University of Tokyo, Japan; **Co-Author:**Kazuhiro Yamaguchi, The University of Tokyo,

Japan; **Co-Author:**Hidekazu Kaminishi, Dokkyo Medical University, Japan; **Co-Author:**Tatsushi Fukaya, Gunma University, Japan; **Co-Author:**Yuri Uesaka, University of Tokyo, Japan; **Co-Author:**Masanori Nakagawa, Otsuma Women's University, Japan

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p.p1 {margin: 0.0px 0.0px 0.0px 0.0px; text-align: justify; font: 10.5px Times} span.s1 {font: 10.5px 'Times New Roman'} To provide suitable instruction to their students, teachers have to predict their students' learning performance accurately. Uesaka and Nakagawa (2012) proposed a new mathematical model for analyzing "teachers' judgement", which indicates the accuracy of teachers' predictions of distribution of students' performance. Based on this model, we are developing Web-based Investigation System for Teachers' Judgements on Students' Performance, termed Wits. The final goal of this research is to offer an application that enables teachers to analyze teachers' judgement easily and provides information for improving their teaching methods. In this paper, we describe the features and preliminary analysis results of Wits.

How students in schools with personalized learning concepts solve mathematical problems

Keywords: Competencies, Problem solving, Student learning, Teaching / instruction

Presenting Author:Mirjam Schmid, University of Fribourg, Switzerland; **Co-Author:**Christine Pauli, University of Fribourg, Switzerland

This contribution presents research examining the problem-solving competencies of ninth grade students (N=250). This study is part of a longitudinal research project on schools with personalized learning concepts in Switzerland. These schools emphasize, among other things, the promotion of cross-curricular competencies. Problem-solving competencies represent a central skill in various academic and extracurricular learning and performance areas. This research analyses the extent to which cross-curricular competencies and problem-solving competencies in particular are acquired at schools with personalized learning concepts. The literature usually employs models that break problem-solving processes down into different stages. Though theoretically substantiated, the classic models are criticized for suggesting the different stages occur consecutively, when it has been empirically demonstrated that various stages of problem-solving processes do not always occur in a linear manner. The research presented in this contribution analyses students' problem-solving competencies, by distinguishing different stages in their problem-solving process and considering students' own account of the process. The students were asked to solve a mathematical problem and subsequently complete a questionnaire with both open and closed-ended questions on their approach to solving the problem, as well as problem solving in general. The students' results were scored according to a coding guide, and the open-ended questions regarding the problem-solving approach were evaluated by means of content. First results show that students' problem-solving performances as well as strategies are very diverse. Next steps consist in considering the quality of the problem-solving strategy, and identifying different student types based on common approaches to problem solving.

How can teachers promote children's effective learning strategy use while doing Kanji homework?

Keywords: Case studies, Cognitive skills, Out-of-school learning, Writing / Literacy

Presenting Author:Eriko Ota, University of Tokyo, Japan

Many children in Japan experience some difficulty in learning *Kanji*, which is one of the scripts used in the modern Japanese writing system. Japanese people are expected to learn at least 2,136 *Kanji* characters by the end of their school education. In this situation, teachers need to promote children's acquisition of skills for learning *Kanji* effectively and in a self-regulated way. Over the last few decades, many psychological research studies have shown the effectiveness of using cognitive (e.g., elaboration, organization) and metacognitive (e.g., monitoring, controlling) learning strategies, including where studying *Kanji* is concerned. However, the homework that most teachers assign students tend to be drill practice and effective learning strategies are not adequately taught in school. The present study introduces two educational practice cases intended to promote children's acquisition of cognitive and metacognitive skills while doing homework: provision of individual tutoring sessions for a 6th-grade child with LD, and provision of extracurricular lessons at an elementary school. In these two cases, children who had encountered problems in learning *Kanji* improved in their performance and motivation to spontaneously use effective learning strategies. The result of these cases implies that it is effective to teach learning strategies in a way that conforms to the context of children's daily learning at home. This finding may have useful implications in the field of teacher education (e.g., pedagogical content knowledge, lesson planning), as well as in school instructional practices.

Learning to diagnose – Aiming to support students in their learning process

Keywords: Assessment methods and tools, Mathematics, Teacher Professional Development, Video analysis

Presenting Author:Rita Hofmann, University of Koblenz-Landau, Germany; **Co-Author:**Jürgen Roth, University of Koblenz-Landau, Germany

The learning process of students is a complex aspect of lessons. To support this process it is important that the requirements of the tasks conform to the knowledge and skills of the students. Moreover, at this state, there is special need for the teacher who must have special skills to support the learners as good as possible. One essential skill is to see what the students' current level of learning is, which concepts and misconceptions they have, whether further instructions and help are needed – and if so, in what way. Such diagnostic competences, are essential for teacher actions. However pre-service teachers mostly do not have the opportunity to train these skills at university. Thus, there is a need to find out how to promote diagnostic competences in teacher training. In recent years, several projects have started to use videos to train

diagnostic skills, but there is still the question if pre-service teachers really acquire diagnostic skills better by analysing videos than by analysing tasks. This study aims to contribute to this growing area of research by exploring which one of these two methods promotes diagnostic skills better. An intervention study with a pre-post-test design shall give the answer to this question. Thereby the thematic focus lies on students' abilities, problems and misconceptions with graphs of functions (line graphs), which are essential for the understanding of and participating in economy, politics and media.

How school context and other factors relate to teachers' attitudes toward teaching integrated STEM.

Keywords: Attitudes and beliefs, Secondary education, Survey Research, Teaching / instruction

Presenting Author:Lieve Thibaut, KU Leuven, Belgium; **Co-Author:**Heidi Knipprath, KU LEUVEN, Belgium; **Co-Author:**Wim Dehaene, KU LEUVEN, Belgium; **Co-Author:**Fien Depaepe, KU Leuven, Belgium

Integrated STEM (Science, Technology, Engineering and Mathematics) education is an emerging approach to improve students' achievement and interest in STEM disciplines. However, the implementation of integrated STEM education depends strongly on teachers' competence, which entails, among others, teachers' attitudes. Nonetheless, not much is known about the factors that influence teachers' attitudes toward teaching integrated STEM. Therefore this paper uses a survey method to get insight in the influence of three groups of variables on the attitudes toward teaching integrated STEM: teacher background characteristics, personal attitudes and school context variables. The results of the multiple regression analyses reveal five variables that exert a positive influence on teachers' attitudes: non-teaching work experience, professional development, personal relevance of science, personal relevance of technology, and social context. Moreover, two variables show a negative effect: more than 20 years of teaching experience and experience in mathematics. These results are valuable since they can be deployed by school administrators to guide them when composing and supporting a team of teachers to implement integrated STEM education.

Session I 2

31 August 2017 12:00 - 13:30

Main Building E - E350

Poster Presentation

Motivational, Social and Affective Processes

PO: Motivation and Emotion

Keywords: Achievement, At-risk students, Computer-supported collaborative learning, Cooperative / collaborative learning, Emotion and affect, Goal orientation, Higher education, Mathematics, Mixed-method research, Motivation, Motivation and emotion, Peer interaction, Primary education, Science education, Self-regulation, Vocational education

Interest group: SIG 08 - Motivation and Emotion

Chairperson: Monika Waldis, University of Applied Sciences Northwestern Switzerland, Switzerland

Development and validation of an emotion regulation strategies self-reported instrument

Keywords: Emotion and affect, Mathematics, Primary education, Self-regulation

Presenting Author:Vanessa Hanin, Université catholique de Louvain (UCL), Belgium; **Co-Author:**Van Nieuwenhoven Catherine, Université catholique de Louvain (UCL), Belgium

Although emotions constitute a more recent object of research, they are known, like cognitive and motivational dimensions, as a major component of learning and academic performance. Insomuch as emotions are regarded as a major component of the learning process in the same way as cognitive and motivational dimensions, it becomes necessary to be able to regulate them. In this respect, we investigated the strategies mostly used by fifth and sixth graders to regulate negative emotions when resolving mathematical problems. Among the various classifications of emotion regulation strategies proposed in the literature, we retained that of Mikolajczak (2009). Given the lack of an instrument grasping the particular set of strategies used by students, we designed a self-reported instrument: Childrens' Emotion Regulation Strategies in Mathematics (CERS-M). There were 1380 5th and 6th graders from 23 Belgian schools who took part in this study. The validation of the CERS-M consisted of three steps. First, the exploratory factor analysis showcases six strategies explaining 42% of the total variance, i.e., emotional expression, help seeking, task focusing, short relaxation, emotional interiorization and dysfunctional avoidance. Let us note that the internal consistency of the scales was satisfying. Second, the fit indices resulting from the confirmatory factor analysis carried out, indicate that the model fits well with the data. Thirdly, the assessment of the validity and reliability of the questionnaire was good.

Is it all about the goal? Findings on cardiac reactivity in a laboratory mental arithmetic task.

Keywords: Achievement, Goal orientation, Motivation, Motivation and emotion

Presenting Author:Sigrid Wimmer, University of Graz, Austria; **Co-Author:**Helmut Lackner, Medical University of Graz, Austria; **Co-Author:**Silke Luttenberger, University of Teacher Education Styria, Austria; **Co-Author:**Ilona Papousek, University of Graz, Austria; **Co-Author:**Manuela Paechter, University of Graz, Austria

Students' academic goal orientations are important for their motivational approaches towards learning and education. Moreover, goal orientations are related to coping behavior and adjustment to environmental demands. The study investigated the role of different types of goal orientations concerning coping in achievement situations. Therefore, the relationship between goal orientations and cardiac reactivity, which indexes coping in the sense of investment of effort to

overcome a challenge, was examined. Overall 72 students participated in a laboratory achievement situation. They processed mental arithmetic tasks while their heart rate was recorded. Overall, performance was rather low with only $M = 12.5$ ($SD = 6.5$) out of 60 tasks answered correctly. Learning/Mastery Goals or Performance Goals did not reveal any significant relationships with cardiac reactivity; however, high scores on Work Avoidance Goal orientation were related to low reactivity. Hence, a high tendency to avoid work is related to rather low investment of resources. This result is expected to reflect high task difficulty, low interest in the task, and/or low personal importance of success. Although the dimension of Work Avoidance is often neglected in research, the present results underline that it might play a role concerning the goal orientations students apply. In addition, current results underline the importance of goal setting in the course of effort investment. Further research should investigate the concept of goal orientation in different situations which vary with regard to the consequences of one's behavior.

Giving and Taking?! Cooperation and Competition among University Students

Keywords: Cooperative / collaborative learning, Higher education, Peer interaction, Motivation and emotion

Presenting Author:Kerstin Helker, RWTH Aachen University, Germany; **Co-Author:**Carolin Schultz, RWTH Aachen University, Germany; **Co-Author:**Maike Harff, RWTH Aachen University, Germany; **Co-Author:**Karen Zschocke, RWTH Aachen University, Germany

While research has studied university students' appraisals of small group-work in higher education, this exploratory study aims to expand this view by focusing on students' general cooperation and competition during their studies. 92 undergraduate student teachers completed online questionnaires that included open-ended questions as well as adapted versions of the SAGA instrument, scales on general learning beliefs and resource management (MLSQ). Results showed that students' willingness to share their learning material and study information with co-students correlated with their viewing cooperation as generally beneficial. Regarding the aspects that were named as criteria for a good student, two clusters were identified which differed with regard to their own attitudes towards cooperating with others. Results suggest it worthwhile to focus on university students' general openness to cooperating with co-students and the implementation of structures for new students to build these cooperative networks.

Students' Affect and Group Work During Science Learning

Keywords: Computer-supported collaborative learning, Emotion and affect, Mixed-method research, Science education

Presenting Author:Tarja Pietarinen, University of Turku, Finland; **Co-Author:**Marja Vauras, University of Turku, Finland; **Co-Author:**Simone Volet, Murdoch University, Australia

This study examines affect and group work during a challenging science learning process, when students in upper secondary schools ($n = 120$) were working in small groups (39 groups of two to three peers for three sessions of 75-95 minutes) conducting a scientific experiment integrating biology and chemistry in a collaborative virtual science learning environment (Virtual Baltic Sea Explorer), and preparing a shared group presentation at the end. This group outcome was assessed by two science experts on the basis of hypotheses, research plan, conclusions and the quality of the use of scientific language. After each session, the students were asked to fill in a questionnaire, including self- and peer-assessments on the nature of their group work. Students' self-reports are combined with observed affective activity in six target groups of three students working together through the sessions and differing in the quality of their group outcome. Affective activity connects affect, social interaction and power relationships to examine group functioning in collaborative settings. The aim of the study is to show the different patterns of affect and group processes in collaborative virtual science learning and especially in relation to the quality of the productive outcomes. Students' self-reports are widening the understanding of affect and group processes by supplementing the individual differences within the groups. Preliminary observations are indicating, that affective activity varies in small groups showing different levels of affect, social interaction and power relations.

Emotions in Group Work Settings at University

Keywords: Emotion and affect, Mixed-method research, Motivation, Motivation and emotion

Presenting Author:Marold Wosnitza, RWTH Aachen University, Germany

The review of the existing body of literature reveals a broad range of theoretical frameworks on the affective and emotional experiences in group learning settings. It also shows a broad range of methodological approaches to research these experiences. In this paper results from a series of studies on emotions of university students will be presented and methodological implications and approaches discussed. The results presented are from two survey studies on emotions in group work learning settings ((a) Veterinarian and Teacher Education Students ($N=713$) and (b) 446 German Teacher Education students). Furthermore results from (c) an interview study with 35 college students and (d) emotion process data from 11 groups playing a serious game will be presented. Overall, the results showed different types of emotions, a broad range of relations between emotions and learning and motivation, ongoing changes over time related to the context and different types of students in regard to their emotional profiles. The results may provide educators with valuable information how to foster positive and to prevent harmful emotional patterns and, ultimately, may pave the way for enhancing educational practice in higher education. Furthermore the paper may indicate directions for future research from a methodological as well as theoretical perspective.

Students at risk for early academic drop-out

Keywords: At-risk students, Mathematics, Vocational education, Motivation and emotion

Presenting Author:Elke Baten, University of Ghent, Belgium; **Co-Author:**MarieClaire Vandeveld, Ghent University, Belgium; **Co-Author:**Edwin Hantson, Ghent University, Belgium; **Co-Author:**Brigitte De Craene, Ghent University, Belgium; **Co-Author:**Annemie Desoete, Ghent University & Artevelde University College, Belgium

The aim of this study is to investigate the characteristics of students at risk for academic drop-out in vocational education. Therefore, 54 pupils of 9th and 10th grade and 40 of their teachers participated in a large assessment program of the City of Ghent. Measurements of preferential transactional patterns, autonomous vs. controlled mathematical motivation, well-being and fact retrieval mathematics were conducted in the pupils. Intelligence was taken into account as a control factor. For the teachers, preferential transactional patterns were assessed. Results revealed that 58.14% of pupils were motivated by playful contact, whereas only 5% of teachers spontaneously focused on such a playful contact, demonstrating a mismatch. Further, only 10.91% of the pupils had the best qualitative motivation (high autonomous and low controlled motivation), according to the Self-Determination Theory. In addition, for pupils with focus on facts, better mathematical proficiency was found. Finally, the self-esteem among the pupils was low. All these findings might be related to the large rate of early academic drop-out in this particular school. Limitations and educational implications will be discussed.

Session I 3

31 August 2017 12:00 - 13:30

Pinni B - B3110

Poster Presentation

Higher Education, Teaching and Teacher Education

PO: Higher Education

Keywords: Case studies, Competencies, Computer-assisted learning, Content analysis, Higher education, Intelligence, Learning Technologies, Lifelong learning, Motivation, Peer interaction, Qualitative methods, Researcher education, Social aspects of learning and teaching, Survey Research, Teacher Professional Development, Workplace learning

Interest group: SIG 04 - Higher Education, SIG 11 - Teaching and Teacher Education, SIG 24 - Researcher Education and Careers

Chairperson: Hege Hermansen, University of Oslo, Norway

Job Requirements and their Fulfilment during the first Years on Job: Findings from a Graduate Survey

Keywords: Competencies, Higher education, Survey Research, Lifelong learning

Presenting Author:Sonja Markwalder, University of Applied Sciences and Arts Northwestern Switzerland, Switzerland

Competencies that students need to develop have become a central characteristic of higher education. It has consequently become an important issue of higher education research whether these competencies meet job requirements. Following this question, the aim of the present study was to evaluate whether graduates equipped with professional competence fit and fulfil their job requirements. The study was conducted with graduates of social work, who were invited one and three years after graduation to complete an online survey. The study was conducted with graduates of social work who were invited one and three years after graduation to complete an online survey. Results showed that job requirements differed between the different fields of social work, but that graduates did not differ in their rating of whether they fulfilled them. The poster presents the results of the analysis of the longitudinal data from the first and the second survey, one and three years after graduation. The focus lies on shifts in job requirements and changes in the ratings of whether graduates fulfil their job requirements. Therefore the poster offers insights in graduates' career paths during the first years on the labour market and points to the contribution of graduate surveys to higher education.

Developing student-led research: Customer, consumer, colleague, collaborator

Keywords: Case studies, Computer-assisted learning, Learning Technologies, Qualitative methods

Presenting Author:Elaine Tan, Newcastle University, United Kingdom; **Co-Author:**eleanor loughlin, Durham University, United Kingdom; **Co-Author:**Andrew Joyce-Gibbons, Durham University, United Kingdom

Three case studies, three years and three differing student-led methodologies. The common factor across all three case studies is that they are informed by student engagement and have a student-led focus. Research carried out by a team comprising of academics, support services and students explored the use of learning technologies in higher education with the aim of improving the learning experience for all. We share and explore our use of; students as co-researchers, open space technology, and students as partner methodologies to evaluate and understand the complex questions surrounding technology enhanced learning at one institution to create clear, understandable and actionable information that is negotiated between staff and students. In this paper we contrast the practicalities and lessons learned of each approach and share our developing understanding of student engagement for evaluation and educational development.

How does peer-group mentoring support university teachers' work and well-being?

Keywords: Higher education, Peer interaction, Teacher Professional Development, Workplace learning

Presenting Author:Saara Repo, University of Helsinki, Finland; **Co-Author:**Nina Katajavuori, University of Helsinki, Finland

The aim of this study was to find out whether peer-group mentoring programme can support university teachers' work and

well-being. The pilot programme, based on Finnish school teacher peer-group mentoring model, was launched at Helsinki University. Programme lasted nine months and included training for facilitators and peer-group mentoring process for group participants. The research questions were a) how did the peer-group mentoring work at university context, and b) did the programme have effects on participants, and if so, what kind of effects? Data consisted of 12 interviews of facilitators, who participated to the training, and open-ended answers of 28 participants of peer-groups collected with online questionnaire. Data was analyzed using qualitative inductive content analysis. The results showed that peer-group mentoring supports university teachers' work in versatile ways. First, the most significant was, that participants of the groups represented different disciplines and departments. These heterogeneous groups together with confidential atmosphere promoted fruitful reflections, which helped participants to detect common factors of university teaching and fostered commitment to whole University community. Second, both group members and facilitators experienced participating the programme empowering, and the process strengthened and renewed their identity as university teachers. Third, participants adopted new teaching methods, which they could use with their students. Some facilitators even applied peer-mentoring to research or administrative work. To conclude, peer-group mentoring is excellent social practice, which supports informal and equal learning culture. It makes good use of academics' immense resource, and at the same time, strengthens the identity, self-confidence, and well-being of them.

Socioeconomic Status and Students' Prerequisites in Studies of the Social Sciences

Keywords: Higher education, Intelligence, Motivation, Social aspects of learning and teaching

Presenting Author:Heike Dietrich, Heidelberg University, Germany; **Co-Author:**Eric Klopp, Saarland University, Germany; **Co-Author:**Ying Zhang, saarland university, China; **Co-Author:**Roland Bruenken, Saarland University, Germany; **Co-Author:**Ulrike-Marie Krause, University of Oldenburg, Germany; **Co-Author:**Frank Spinath, Saarland University, Germany; **Co-Author:**Robin Stark, Saarland University, Germany; **Co-Author:**Birgit Spinath, Heidelberg University, Germany

Aim of the current study was to investigate the relationship between university students' socioeconomic status and the personal and situational prerequisites they bring to their studies of the social sciences. Often lacking previous evidence for the area of higher education, we reported results from secondary education. We then investigated the following question: Is social sciences students' socioeconomic status related to intelligence, school grades, achievement motivation, academic self-concept, study interest, the big five factors of personality, and hours of side jobs? To answer our research question, we drew on data from $N = 336$ students of psychology, sociology, and political science in their first semester as bachelor students. Results indicated a positive correlation of socioeconomic status with better school grades ($r = .35$), higher scores in extraversion ($r = .20$), and a negative correlation of socioeconomic status with hours in side jobs ($r = -.25$). Social sciences students' socioeconomic status was not related to intelligence, achievement motivation, academic self-concept, study interest, neuroticism, extraversion, agreeableness, or conscientiousness. Overall, our findings can be seen as meaningful challenges for higher education. We will discuss their implications as well as possible future directions. Additionally, our results suggest that a simple transfer of findings from secondary to tertiary education does not do justice to the complex relations of socioeconomic status with students' prerequisites.

Significant events and skills development in the first year of PhD doctoral students

Keywords: Competencies, Content analysis, Higher education, Researcher education

Presenting Author:Paula Mayoral, Ramon Llull University, Spain; **Co-Author:**Lorena Becerril, Blanquerna, Universitat Ramon Llull, Spain

The purpose of this paper is study the relation between significant events and the skills development of doctoral students starting their doctorate. We analysed the significant events (SE) experienced and skills developed in the first year of doctorate from the students' perspective and we try to find out the relationship between them. Participants were 14 first year doctoral students in Social Sciences from 3 Spanish universities, who answered a semi-structured interview to analyse those positive or negative events (SE) that have lived along the development of their first year of PhD and assess their impact. Results shown that related to the SE, the majority of them are positive, and the most predominant belong to researcher community, research process and scientific communication. Also, related to the Skills involved in the 1st year doctoral students, the majority of them are related to the abilities included in personal and professional management skills. And finally, about the relationship between significant events and skills developed in the 1st year PhD, all the significant events develop some skills and abilities. In fact, there are significant events related with more than one type of skills. Overall, results offer a complex interplay between the mainly experiences and the learning outcomes, the those positive or negative events (SE) and it could have implications for the design of training proposals during doctoral programs, specially thought the first year. **Keywords:** Content analysis, Researcher education, Competencies, Higher Education

Exploring pre-service primary teachers' perception of thinking skills

Keywords: Case studies, Content analysis, Higher education, Teacher Professional Development

Presenting Author:Manoli Pifarré Turmo, University of Lleida, Spain

Research in thinking skills highlights teachers' pedagogical beliefs and concepts about thinking skills influence their instructional practices (Li, 2016). As a result, pre-service teachers' cognition and attitudes are primordial in order to promote a thinking-skills educational system based on innovation and critical thinking. Therefore, it is crucial to research about teacher's conceptions of thinking skills and their attitudes towards implementing these skills in their teaching. Acknowledging these attitudes can help researchers and teachers to construct a better understanding of teacher actions for

developing students' thinking skills. Our paper pretends to contribute to this line of research by focusing on how pre-service teachers understand the concept of thinking skills and providing a base-line data from a sample gleaned from first-year education students. This information will allow teacher training stake-holders to reflect and identify the guiding principles to be introduced in their teaching training programs in order to help the future teachers to implement teaching thinking in their classrooms.

Session I 4

31 August 2017 12:00 - 13:30

Pinni B - B0039

Poster Presentation

Instructional Design

PO: Instructional Design

Keywords: Attitudes and beliefs, Citizenship education, Comprehension of text and graphics, Educational Psychology, Emotion and affect, Engineering, Experimental studies, Higher education, History, Instructional design, Learning analytics, Misconceptions, Multimedia learning, Primary education, Problem-based learning, Qualitative methods, Teaching / instruction, Video analysis

Interest group: SIG 06 - Instructional Design

Chairperson: Grete Arro, Tallinn University, Estonia

The impact of historical thinking on civic attitudes. Flemish case study migration history

Keywords: Attitudes and beliefs, Citizenship education, History, Instructional design

Presenting Author:Karel Van Nieuwenhuyse, KU Leuven, Belgium; **Co-Author:**Ellen Claes, KU Leuven - University of Leuven, Belgium

In history education, a field of tension exists between contradictory goals, as it is meant to impart moral values to young people, but at the same time has to teach them the ability to freely and autonomously reflect critically. Contrary to policy-makers, history educational scholars put the fostering of historical thinking to the fore in this respect, claiming this automatically contributes to civic behaviour. Since this assumption lacks empirical evidence, our pilot study examines the influence of a history lesson series about migration history (with a focus on fostering historical thinking) on aspects of students' civic attitudes: ethnocentrism and generalized trust. The lesson series were enrolled in three Flemish school 11th-12th grade classes, in 2014, during nine weeks. 64 students participated, and completed a pre- and post-test. A control group of 28 students completed the same tests, in which students' profile and aspects of students' civic knowledge were tested, via hierarchical classification, and judging statements. Data analysis was done via independent t-tests using SPSS software. Unexpected results show up for the course group: a significant increase of ethnocentrism (also when compared to the control group), and a significant decrease of generalized trust. The perceived possibility of them dating people from another ethnic background, by contrast, increases significantly. These results are explained and discussed, taking into account the nature of the questions and the lesson series. We also discuss the necessary balance between (meta)cognitive perspective taking and affective caring while fostering historical thinking and aiming for more open-mindedness to 'the other'.

Self-regulated learning in problem-based learning from the educator's perspective

Keywords: Misconceptions, Qualitative methods, Teaching / instruction, Problem-based learning

Presenting Author:Sanne Rovers, Maastricht University, Netherlands; **Co-Author:**Geraldine Clarebout, Maastricht University, Netherlands

After several decades of successful application at different universities across the world, the effectiveness of problem-based learning (PBL) seems to be diminishing. One of the reasons for this issue could reside in the educators, who may not fully understand the ideas behind the PBL model and what is expected from them in terms of their teaching. In this study, interviews will be conducted with educators at several levels of the problem-based curriculum, in order to assess the perceptions and expectations they have regarding the learning environment and responsibility of students' learning processes. It is hypothesized that there will be important differences between the educators' perceptions and expectations versus the original principles of PBL. Findings from this study could have important implications for future research and the design of interventions to improve or maintain the effectiveness of PBL.

Background Music – Stimulating Effect or Seductive Detail?

Keywords: Comprehension of text and graphics, Experimental studies, Instructional design, Multimedia learning

Presenting Author:Janina Lehmann, Ulm University, Germany; **Co-Author:**Tina Seufert, University of Ulm, Germany

Effects of learning with background music are discussed controversy. There seems to be a stimulation effect of listening to music fostering learning. However, background music provides information not being relevant for the learning task and can thereby be defined as a seductive detail hindering learning. To explain why some learners benefit from background music while others don't, specific learner's characteristics need to be considered. Therefore, this study investigates the influence of background music in interaction with the learner's extraversion level on learning outcomes. Extraversion moderates the

individually preferred level of arousal, getting important while learning with music. 50 students randomly learned a visual text while either listening to instrumental background music while learning or not. Additionally, participants were split into a low and a high extraversion group, depending on their results in an extraversion test. Results show no main effect for background music or extraversion on learning outcomes, but a significant interaction between these two factors. Highly extraverted learners showed no differences in learning outcomes between learning with or without background music, but low extraverted learners showed significantly better results while not listening to music. Compared to low extraverted learners, highly extraverted learners need a higher level of stimulation to be in the best state for learning, which can be exerted by background music. It seems like the positively stimulating and distractive characteristic are balanced for highly extraverted learners, while low extraverted learners are either more easily to distract, don't like this kind of stimulation or both.

Activation of Students' Prior Knowledge in Technology Education in Primary School

Keywords: Engineering, Experimental studies, Primary education, Teaching / instruction

Presenting Author:Dannie Wammes, Utrecht University, Netherlands; **Co-Author:**Liesbeth Kester, Utrecht University, Netherlands; **Co-Author:**Bert Slof, Utrecht University, Netherlands; **Co-Author:**Willemijn Schot, Utrecht University, Netherlands

This study looked at prior knowledge activation (PKA) while learning about a simple electrical (buzz-wire) and a mechanical (stairs-marble-track) problem. We expected using a bottom-up (hands-on) PKA strategy would be beneficial for pupils with low prior knowledge and that a top-down (draw and discuss relations) PKA approach would be more effective for pupils with higher prior knowledge. Due to the difference in perceptual cues about the functioning of system we also expected an interaction effect between PKA approach and problem-solving task; bottom-up would be more effective when more cues are available (stairs-marble-track) and top-down would be more effective when less cues are available (buzz-wire). A two by two factorial design with PKA strategy (bottom-up, top-down) and task (mechanical, electric) was used. Pupils (age 11, SD=0.84, N=180) were tested on their ability to solve a mechanical and an electric problem before (pre-test) and after (post-test) a lesson about these systems. Preliminary results confirm both our expectations. Using a bottom-up strategy was more effective for a) pupils with lower scores on the pre-test and b) solving mechanical problems. Using a top-down approach was especially beneficial for pupils with higher scores on pretest for the electric system.

Interaction-based Coding of Scaffolding

Keywords: Instructional design, Learning analytics, Video analysis, Problem-based learning

Presenting Author:Hanna Mach, Goethe-Universität Frankfurt, Germany; **Co-Author:**Rico Hermkes, Goethe-Universität Frankfurt, Germany; **Co-Author:**Gerhard Minnameier, Goethe-Universität Frankfurt, Germany

Scaffolding can be summarised as "tailored support", emphasising the necessity for teacher's behaviour to be adapted to the student's individual needs. Scaffolding is particularly required when students are stuck in their current understanding. In our video study, we wanted to investigate the quality of scaffolding by analysing teacher-student-interactions. For this, we developed a coding instrument conceptualising both sides of the interaction as variables: the student's task progress (*Student Level of Attainment*) and the teacher's support (*Teacher Strength of Intervention*). By relating both variables to each other, we devised rules for determining *contingency* as the quality of scaffolding, based on the "Contingent Shift Principle". Our methodology proves effective for discerning contingent from non-contingent interaction patterns (micro-scaffolds). In order to correlate contingent scaffolding with learning outcomes, we conducted an empirical study using a Pre-Post-Design, including a 1-year follow up. Inter-rater-reliabilities for each coding step as well as results of the empirical part of study are presented.

Is there an Interplay of Emotional Design and Learning with Inference Prompts?

Keywords: Educational Psychology, Emotion and affect, Higher education, Instructional design

Presenting Author:Sabrina Navratil, University of Mannheim, Germany; **Co-Author:**Tim Kühn, University of Mannheim, Germany; **Co-Author:**Steffi Heidig, Technical University of Dresden, Germany

Self-generated learning (SGL-) activities are one way to support learners' comprehension of new learning material. SGL activities, such as answering inference-prompts, foster learners to work more actively and intensively on learning materials, which in turn may result in deeper comprehension. One aspect that might affect the effectiveness of this learning strategy is the emotional state of learners. Emotional states can be induced through learning materials that consists of essential design elements such as color and shapes (Emotional Design). It is assumed that positive emotional states enhance intrinsic motivation and support the use of productive problem-solving and creative learning strategies. This in turn is supposed to be especially beneficial for self-generating tasks, such as answering inference-prompts. Contrary, negative emotional states seem to lead to rigid, analytical, and detail-oriented learning strategies that might be particularly good for already given information, such as text. This study aims to explore an interplay of learning with learning material (inference-prompts vs. no inference-prompts) and Emotional Design (positive vs. neutral vs. negative): Learners in a positive emotional state should benefit from learning with inference-prompts compared to no inference-prompts by showing better learning outcomes. Contrary, learners in a negative emotional state should benefit from learning without inference-prompts compared to inference-prompts. Learners in a neutral state should profit from learning with inference-prompts (but not in the same extent like learners in a positive emotional state) compared to no inference-prompts. Data collection is in progress. The results will be presented at the conference.

Session I 5

31 August 2017 12:00 - 13:30

Pinni B - B3109

Poster Presentation

Motivational, Social and Affective Processes

PO: Motivation

Keywords: Achievement, Cognitive skills, Developmental processes, E-learning / Online learning, Educational Psychology, Emotion and affect, Engineering, Goal orientation, Higher education, Intelligence, Motivation, Out-of-school learning, Parental involvement in learning, Self-regulation, Student learning, Vocational education

Interest group: SIG 08 - Motivation and Emotion

Chairperson: Yi-Jhen Wu, University of Bamberg, Germany

Mindset in Secondary Vocational Education and Training (VET)

Keywords: Educational Psychology, Intelligence, Motivation, Vocational education

Presenting Author: Jaap Glerum, UCR / Utrecht University, Netherlands; **Co-Author:** Sofie Loyens, University College Roosevelt, Netherlands; **Co-Author:** Remigius (Remy) Rikers, UCR / Utrecht University, Netherlands

Previous studies have shown that mindset plays a pivotal role in academic achievement. In particular, students' performance will improve when a student succeeds in developing a growth mindset, particularly in difficult courses and when they are underperforming. This study explores the role of mindset in Secondary Vocational Education and Training (VET). Participants were 1005 VET students attending nine different vocational programmes on three qualification levels in the Netherlands. They filled out an online questionnaire that was combined with information from the school administration system regarding demographical information and grades. Results shows that 13.9% of the participants have a fixed mindset, 47.3% a growth mindset, and 38.8 % a mixed mindset. Our findings indicate that VET students' mindset does not substantially differ from the mindsets that were found in other forms of education. However, a large majority of VET students does not have a growth mindset and hence there is still room to improve the mindset of these students to facilitate academic achievement.

Motivational commercials for framing learning: A large-scale goal-framing intervention

Keywords: E-learning / Online learning, Educational Psychology, Goal orientation, Motivation

Presenting Author: Nicholas Bovee, Kyushu Sangyo University, Japan; **Co-Author:** Luke K. Fryer, The University of Hong Kong, Hong Kong; **Co-Author:** Paul Ginns, University of Sydney, Australia

Research has consistently demonstrated that the quality of students' motivation is a far better predictor of future learning processes and outcomes than the quantity. While experimental research has suggested that the quality of student motivation can be manipulated for short tasks, intervening in student motivation on a broader scale has been pursued less often. The current study undertakes an intervention using of short motivational commercials to stimulate students' instrumental internally-regulated goals for learning English as a second language. An experimental research design was undertaken in a compulsory English language course at one Japanese university. Students (n=1957) were randomly divided into three conditions: 20 exposures to motivational commercials (designed to stimulate internally-regulated instrumental goals), (award winning) TV commercials or no exposure to any videos. Pre-post achievement, interest, utility-value and interest were measured. Students' internally and externally regulated goals were measured every two weeks. Construct validity and reliability of analysis of motivational measures have resulted in acceptable results. Preliminary difference testing suggested non-significant effects for the sample as a whole, but significant effects were observed for subgroups. Further analysis will focus on effects for meaningful subgroups of students who were particularly receptive to the intervention. Theoretical application for goal framing and practical implications for online learning and supporting classroom studies will be presented.

How do cognitive and emotive factors predict academic performance in secondary school children?

Keywords: Achievement, Cognitive skills, Emotion and affect, Student learning

Presenting Author: Enrica Donolato, University of Padova, Italy; **Co-Author:** David Giofrè, Liverpool John Moores University, United Kingdom; **Co-Author:** Irene C. Mammarella, University of Padova, Italy

Academic success is linked with important personal and everyday life outcomes. Several studies focused on the role of cognitive factors such as intelligence and working memory in predicting academic performance. There is also abundant evidence on the role of emotive aspects, and in particular anxiety, on school achievement. Finally, the role of personal factors, such as self-esteem and resilience, has also been noted. However, to the best of our knowledge, only few studies considered the joint role of these factors on academic achievement in children. In the present study, we 141 typically-development children attending sixth and eighth grades were presented with measures of WM, intelligence, anxiety, depression, self-esteem and resilience and academic achievement (including mathematics and reading measures). Results, using structural equation models showed that, for cognitive aspects, intelligence mediates the relationship between verbal and visuospatial WM and both mathematics and reading literacy. Moreover, risk and protective factors were highly correlated. Interestingly, risk factors only predicted mathematic literacy, while emotive protective factors only predicted reading literacy. Overall, the present model explained a large portion of the variance both in mathematics (i.e.,

.89%) and reading literacy (i.e., .73%). Both theoretical and practical implications will be finally discussed.

Self-Regulation and Wellbeing

Keywords: Achievement, Developmental processes, Goal orientation, Self-regulation

Presenting Author:Brigitte Rollett, University of Vienna, Austria; **Co-Author:**Vanessa Radl, Department of Applied Psychology: Health, Development, Enhancement and Intervention, University of Vienna, Austria; **Co-Author:**Helena Hartmann, Department of Applied Psychology: Health, Development, Enhancement and Intervention, University of Vienna, Austria; **Co-Author:**Benedikt Winter, Department of Applied Psychology: Health, Development, Enhancement and Intervention, University of Vienna, Austria

The aim of the study was to investigate the role significant precursors of general wellbeing play in fostering self-regulation (SR). As basis we chose Higgins' Self-Regulation-Focus-Theory (1997) which postulates a promotion-oriented (ProO) and a prevention-oriented (PreO) SR-focus, influencing how people pursue goals and the typical strategies they use. Method. We conducted an online study ($n = 1636$ university students). Instruments: *General Regulatory Focus Measure* (GRFM; Lockwood et al., 2002; scales: Promotion-Oriented, Prevention-Oriented) which measures SR on a strategic basis, *Berner Wellbeing Questionnaire* (BWQ; Grob et al., 1991, scales: Self-Worth, Positive Attitude towards Life, Enjoyment of Life, Depressive Mood), *Neo-Five-Factor-Inventory* (NEO-FFI; Borkenau & Ostendorf, 2008, scales: Extraversion, Agreeableness, Openness, Neuroticism, Conscientiousness).

Results: Regression-analysis showed that promotion- and prevention-orientation differ substantially on the BWQ dimensions: For a ProO-regulatory-focus, the following predictors evinced: Positive Attitude towards Life (p

Intra-individual variation in homework effort: Analyzing the effect of gender and conscientiousness

Keywords: Educational Psychology, Emotion and affect, Out-of-school learning, Parental involvement in learning

Presenting Author:Desiree Theis, German Institute for International Educational Research (DIPF), Germany; **Co-Author:**Brigitte Brisson, German Institute for International Educational Research (DIPF), Germany

One of the most discussed subjects in terms of school is homework. Teachers often argue that homework serves as a valuable tool for students to gather deep knowledge about given subjects and for themselves to evaluate students' learning process. Recent research indicates that homework effort and emotions significantly affect its efficacy. It is supposed that homework effort and emotions are not stable within individuals but fluctuate depending, for instance, on individual student characteristics and the characteristics of the homework assignment. However, research on the reasons for intra-individual variation in homework effort and emotions is still rare. On the inter-individual level, students' gender, personality traits, and parental support have been shown to predict homework effort and emotions. The present study aims to investigate fluctuation rates of homework effort and emotions within students during a period of three weeks. Parental support, gender, and conscientiousness will be assessed as predictors of intra-individual variations in homework effort and emotions. The experience sampling method (ESM) is used to assess data on students' homework effort and emotions right in the moment of the homework experience in a sample of 624 students in Grade 5. Time series analysis is used to assess intra-individual variations in homework effort and the influence of parental support, students' gender, and conscientiousness on such variations.

Intervening to promote engineering student success in technical, non-major, required barrier courses

Keywords: Achievement, Engineering, Higher education, Motivation

Presenting Author:Jenefer Husman, University of Oregon, United States; **Co-Author:**Katherine Nelson, Rowan University, United States; **Co-Author:**Kat Cheng, Arizona State University, United States

The current project examined university engineering students' motivation at the beginning of the semester (baseline) and at the end of the semester (final), and whether an intervention was beneficial for motivation development. Motivational variables included Future Time Perspective Connectedness (FTPC), Endogenous Perceptions of Instrumentality (PIEN), Utility Value (UV), Interest, and Belongingness (BEL). Students ($N = 257$) were randomly assigned to a control group or intervention group. Results indicated that engineering students who identified more with their engineering career at beginning of semester (baseline FTPC and BEL) viewed their non-major class (Introduction to Biology) as more instrumental for future goals during baseline (PIEN). However, this career identity was not associated with end of semester motivation in class (UV, Interest). Instead, both baseline and final PIEN were significantly positively associated with final UV and Interest. Interestingly, for engineering students taking a non-major course, PIEN, UV and Interest dropped over the semester (baseline vs. final) regardless of the intervention. Our findings imply the importance in sustaining motivation in engineering students when taking non-major courses.

Session I 6

31 August 2017 12:00 - 13:30

Main Building A - A06

Poster Presentation

Higher Education, Instructional Design, Learning and Social Interaction

PO: Argumentation, Dialogue and Reasoning

Keywords: Argumentation, Case studies, Collaborative Learning, Design based research, Doctoral education, Higher

education, Literacy, Metacognition, Mixed-method research, Qualitative methods, Quantitative methods, Reasoning, Researcher education, Science education, Secondary education, Student learning, Workplace learning

Interest group: SIG 16 - Metacognition, SIG 24 - Researcher Education and Careers, SIG 26 - Argumentation, Dialogue and Reasoning

Chairperson: Ani Henttonen, Sweden

Regulation of Collaboration: Regulatory Knowledge and Performance in Problem-based Learning

Keywords: Collaborative Learning, Higher education, Metacognition, Mixed-method research

Presenting Author:Jun Oshima, Shizuoka University, Japan; **Co-Author:**Ritsuko Oshima, Shizuoka University, Japan;

Co-Author:Takashi Shibata, Shizuoka University, Japan

We conducted a study by fusing the questionnaire and performance analysis approaches for elucidating the relationship between prior knowledge of collaboration and regulatory performance in collaborative learning. We first constructed four collaborative learning scenarios to ask students how they would behave in the situations presented and conducted it before their collaboration. We then used a CSCL system to support and record students' reflections on their regulatory performance. Online logs and field notes were used as process data. Among 188 university students participating in a project-based learning curriculum, 13 high-regulatory performance and 18 low-regulatory performance students were selected as a sample for the analysis. A t-test of questionnaire scores revealed that scores by high-performance students were significantly higher, suggesting that prior knowledge influences regulatory performance in collaborative learning. Case studies based on online logs and field notes revealed that students with high prior knowledge used facilitative co-regulation strategies to improve their group regulatory performance when perceiving a socio-emotional challenge, and that students with high prior knowledge used self-regulatory strategies when perceiving a socio-cognitive challenge.

Integrative possibilities in doctoral supervision: A four quadrant model

Keywords: Doctoral education, Higher education, Qualitative methods, Researcher education

Presenting Author:Kylie Shaw, SORTI, The University of Newcastle, Australia; **Presenting Author:**Allyson Holbrook, SORTI, The University of Newcastle, Australia

There is a dearth of research that addresses how doctoral supervisors perceive and articulate their instructional roles and breadth of responsibilities in light of new programs and changing sectoral expectations. This paper responds to the need for a model of doctoral supervision that can capture and represent the focus, range and complexity of instructional intentions, practices and possibilities. Building on the substantive literature on supervision, changing doctoral programs, and relatively new empirical findings about supervision and learning, the authors construct a holistic model of supervision ranging across micro-macro and product-person dimensions. The model is further explained and illustrated using four supervisor cases in Fine Art. Accommodating the roles and contribution of multiple actors, including supervisory teams, the model offers a heuristic to identify existing emphases, alignments and integrative possibilities within and across disciplines, programs and stages in candidature.

Instruction on disagreement resolution in reasoning about multiple documents

Keywords: Argumentation, Literacy, Reasoning, Science education

Presenting Author:Toshio Mochizuki, Senshu University, Japan; **Co-Author:**Clark Chinn, Rutgers University, United States; **Co-Author:**Etsuji Yamaguchi, Kobe University, Japan; **Co-Author:**Randi Zimmerman, Rutgers University Graduate School of Education, United States

The aim of this study is to develop instruction to enable students to learn to detect and analyze disagreements among multiple conflicting texts. We developed and investigated the effects three forms of instruction intended to promote better reasoning about disagreements in multiple document tasks. (1) Instruction focused on "Causal Analysis" (CA) directed students to analyze causal expressions in documents. (2) Instruction focused on "Disagreement Detection" (DD) taught students to identify disagreements among the causal relationships in addition to identifying causal expressions. (3) "Disagreement Explanation" (DE) instruction included the components of CA and DD but additionally taught students about common explanations for disagreement, such as having access to different evidence. Ninety-three Japanese students were trained under one of these three conditions in two weekly sessions and then in a third session wrote a comprehensive essay regarding a set of conflicting texts about dieting methods. The result showed that the students who received DD and DE instructions reached different conclusions from those who received only CA instruction. This indicates the effectiveness of training students to detect disagreements. This paper discusses the potential of DD and DE instructions which encourages students to reason more deeply about disagreements among conflicting information in multiple documents. We also discuss future needed directions to promote better reasoning about disagreements in multiple documents.

Is genetic engineering threatening my life? Fostering decision-making processes in risk perception

Keywords: Argumentation, Quantitative methods, Science education, Student learning

Presenting Author:Martina Heist, University Koblenz-Landau, Germany; **Co-Author:**Jochen Scheid, University Koblenz-Landau, Germany; **Co-Author:**Alexander Kauertz, University Koblenz-Landau, Germany; **Co-Author:**Sandra Nitz, University Koblenz-Landau, Germany

Today we live in a complex environment in which new technologies keep emerging, promising to simplify everyday life. But

some of these technologies seem to prompt negative feelings among the population, even though experts consider them to be harmless. At the same time, the perception of hazardousness of new technologies is not only influenced by our knowledge about these technical developments. In fact, quite a number of factors determine the individually perceived risk. The present study aims to investigate how personal opinions and values, personal characteristics like anxiety, or varying sources of information influence students' perception of risk in the field of Genetic Engineering (GE). How we arrive at specific perceptions is part of a decision-making-process. Within this process arguments are considered to come to a personal conclusion about whether a certain technology represents a possible threat for us. Based on this framework, we will examine if and how much individual risk perception of GE in students can be altered by a teaching unit that consists of an argumentation-training on the issue of GE in food production.

Prompting collaboration with scripts and architectural design in start-up companies

Keywords: Case studies, Collaborative Learning, Design based research, Workplace learning

Presenting Author: Arttu Mykkänen, University of Oulu, Finland; **Co-Author:** Piia Markkanen, University of Oulu, Finland, Finland; **Co-Author:** Aku Visuri, University of Oulu, Finland, Finland

Start-up companies might encounter challenges in their collaborative knowledge creation process. Reasons for these challenges may be a consequence of spatial limitations and undefined ways of collaboration. The objective of this research project is to analyse how to create a work environments that support innovation and collaborative knowledge creation in start-up companies. Through studying collaborative knowledge creation and architectural features from employee's perspective, it is possible to influence innovativeness of start-up companies. This proposal presents the current research project and further enlightens the development of upcoming phases based on the analysis of the collected data. Design based research is used to study prospects and challenges of working environments and these features are developed through concept design and pilot experiments in start-up company premises. A selection of different qualitative and quantitative methods are implemented to triangulate different aspects of employees' collaborative work and work environment.

Exploring dialogue transformation in hybrid classrooms

Keywords: Design based research, Mixed-method research, Reasoning, Secondary education

Presenting Author: Jo Inge Johansen Frøythog, University of Oslo, Norway

This poster reports on a PhD project that explores how dialogues are being transformed in hybrid classrooms. The project is part of a larger research collaboration, Digitalised Dialogues Across the Curriculum (DIDIAC), between the University of Oslo and the University of Cambridge, where design-based interventions are used to investigate how classroom dialogues and the use of digital technology come together to foster the development of 21st-century skills, particularly collaboration and critical thinking skills (evaluating and integrating information, forming ideas, and justifying and communicating in and across knowledge domains).

Teachers and students will use a microblogging tool, Talkwall, which was designed to facilitate classroom discussion. Talkwall provides new ways to construct, distribute, organise and integrate knowledge, both individually and collectively, in a safe, localised environment (Rasmussen & Hagen, 2015). Therefore, it has the potential to expand the dialogic space (Wegerif, 2007). This expanded space is also a hybrid space, in which the dynamics between oral, written and digital dialogues are played out between the participants.

Research questions

1. How are dialogues transformed when they fluctuate between the analogue and digital arenas of hybrid classrooms?
2. To what extent do these transformations change the preconditions for meaningful participation in joint knowledge construction?
3. To what extent do these transformations contribute to the development of critical thinking and collaboration skills? A combination of qualitative and quantitative methods will be used to investigate these questions on individual, social and cultural levels of analysis.

Session I 7

31 August 2017 12:00 - 13:30

Pinni B - B3118

Poster Presentation

Instructional Design

PO: Instructional Design and Reading Comprehension

Keywords: Achievement, Cognitive skills, Comprehension of text and graphics, Computer-assisted learning, Computer-supported collaborative learning, Educational Psychology, Experimental studies, Higher education, Instructional design, Knowledge creation, Mixed-method research, Multimedia learning, Pre-service teacher education, Reading comprehension, Secondary education, Self-regulation

Interest group: SIG 02 - Comprehension of Text and Graphics, SIG 06 - Instructional Design

Chairperson: Anne van Hoogmoed, University of Groningen, Netherlands

Relating information of different teacher knowledge components: Effects of writing tasks and prompts

Keywords: Comprehension of text and graphics, Instructional design, Pre-service teacher education, Reading comprehension

Presenting Author: Thomas Lehmann, University of Bremen, Germany; **Co-Author:** Benjamin Rott, University of Duisburg-Essen, Germany; **Co-Author:** Florian Schmidt-Borcherding, University of Bremen, Germany

This paper reports on an experiment that examined the effects of essay writing tasks and task-supplemental prompts on pre-service mathematics teachers' integration of information from multiple documents that pertain to the core components of their professional knowledge. The study rests on findings about the efficacy of argument tasks and prompts, as well as methodical approaches for assessing information integration in multiple-documents learning settings. Also, the study builds on teacher competence models that include three conceptually different knowledge components, that is, content knowledge (CK), general pedagogical knowledge (PK), and pedagogical content knowledge (PCK). Hence, unlike the material used in most prior multiple-documents studies, the documents used in the present research pertained to these components and, hence, originated from different domains. The CK text included subject-matter knowledge on mathematical proving. The PK text included conceptual educational knowledge about information processing and the design of lessons. The PCK text included knowledge about pupils' difficulties in mathematical reasoning and proving. $N=100$ pre-service teachers for mathematics in primary schools took part in a laboratory experiment. Depending on their experimental condition they received either an unspecific or an argument writing task (factor 1), and either task-supplemental prompts or no prompts (factor 2). Results of a category driven analysis of participants' essays suggest that pre-service teachers' construction of an integrated mental model across the core components of their professional knowledge can be enhanced by argument tasks and prompts. Within-domain knowledge acquisition was not interfered by stimulating integration processes. Results are discussed within the realm of multiple-text understanding.

Educating trainee teachers through video modeling to manage confirmation bias in decision making

Keywords: Educational Psychology, Higher education, Instructional design, Pre-service teacher education

Presenting Author: Suzan van Brussel, Avans University of Applied Sciences, Netherlands; **Co-Author:** Miranda Timmermans, Avans Hogeschool / Avans University of Applied Sciences, Netherlands; **Co-Author:** Peter Verkoeijen, Erasmus University Rotterdam, Netherlands; **Co-Author:** Fred Paas, Erasmus University Rotterdam/University of Wollongong, Netherlands

When people make judgments, they use mental shortcuts. These heuristics frequently yield accurate judgments but can give rise to systematic thinking errors of inductive reasoning known as cognitive biases (Nickerson, 1998; Tversky & Kahneman, 1974). A particularly pervasive bias is confirmation bias (Nickerson, 1998). This refers to the unconscious selectivity in the acquisition and use of evidence in the search for information. In primary school education, confirmation bias amongst teachers might have negative consequences for pupils. Hence, it is important to prevent confirmation bias in primary school teachers. To achieve this goal, instruction to *trainee teachers* should aim at reducing confirmation bias and helping them in making fair decisions in the classroom. Previous findings (e.g., Koriat et al., 1980; Lord et al., 1984; Morewedge et al., 2015) suggest that instruction based on the consider-the-opposite (COS) technique might be effective in preventing confirmation bias. Furthermore, findings from the instructional design literature (Van Gog & Rummel, 2010; Hoogerheide et al., 2014) suggest that video-based modeling may be suited to deliver a COS instruction. However, it is an open question whether a video-based modeling COS instruction should use authentic or general tasks. In the present study we address this question for trainee teachers by comparing an authentic video based modeling COS instruction to a more general video based modeling COS instruction. Based on the existing literature on CT (e.g., Abrami et al., 2015), we hypothesize that authentic instruction will produce the best performance on practiced final test items and non-practiced final test items.

Should pictures be drawn during a lesson or presented already-drawn?

Keywords: Comprehension of text and graphics, Experimental studies, Instructional design, Multimedia learning

Presenting Author: Leonora Coppens, Utrecht University, Netherlands; **Co-Author:** Liesbeth Kester, Utrecht University, Netherlands

Pictures are often used to accompany a verbal explanation. These pictures can be drawn during the explanation or presented already-drawn. There has been little research up to now into which of these methods is most effective. Investigating this can yield interesting results for education. In the current study, we let undergraduate students watch an illustrated narration about early embryonic development. The illustrations are either drawn during the lesson or presented already-drawn and there is a hand drawing or pointing at the pictures, or no visible hand. We measure retention of the presented information and collect interest ratings. The results will be discussed in light of Mayers' multimedia principles.

Poking the cognitive process of tracing in learning via think aloud.

Keywords: Achievement, Educational Psychology, Experimental studies, Instructional design

Presenting Author: Paul Ginns, University of Sydney, Australia; **Co-Author:** Michael Tang, University of Sydney, Australia; **Co-Author:** Michael Jacobson, University of Sydney, Australia

Based on empirical studies demonstrating pointing-based gestures may act to guide visual attention while learning (e.g. Dodd & Shumborski, 2009; Fischer & Hoellen, 2004), and experimental research inspired by Montessori's (1912) *sandpaper letters* (e.g. Kalenine, Pinet, & Gentaz, 2011), a series of studies (Aghostino et al., 2015; Hu et al., 2015; Ginns et al., 2015) have found explicit instructions to point and trace with the index finger enhances learning from worked examples across a range of mathematics topics. The current study extends research on tracing gestures to examine how tracing gestures affect cognitive processing and learning from expository text and diagrams drawn from the science curriculum. Primary school students ($n = 10$) were instructed to think aloud while studying a booklet followed by a poster on the water cycle; half of the participants traced out elements of the diagram while studying, while the other half were instructed not to gesture. Verbal protocol analysis (currently being performed) will be used to elucidate the effects of tracing while studying. Results and possible cognitive mechanisms will be presented at the conference.

Effects of modality of feedback presentation on post-feedback behavior in task-oriented reading

Keywords: Cognitive skills, Computer-assisted learning, Reading comprehension, Self-regulation

Presenting Author: Amelia Mana, University of Valencia, Spain; **Co-Author:** Vicenta Avila, University of Valencia / Interdisciplinary Research Structure for Reading Research (ERI Lectura), Spain; **Co-Author:** Eduardo Vidal-Abarca, Universidad de Valencia, Spain

We tested two different modalities of feedback presentation (oral and written-feedback) in a computer-based educational environment for 7th and 8th graders. We investigate to what extent the modality of presentation has an effect on the post-feedback behavior and on performance as well, in a task-oriented reading situation. Additionally, we are also interested in to test the role of general comprehension and working memory level of students. We expected that (a) oral feedback will benefit students (in post-feedback behavior and in performance) and that (b) this kind of feedback will be especially useful for less-skilled students in working memory. As this is an ongoing study, results will be presented at the conference.

Examining Collective Inquiry and Knowledge Advances in a Knowledge Building Environment

Keywords: Computer-supported collaborative learning, Mixed-method research, Secondary education, Knowledge creation

Presenting Author: Yuyao Tong, The University of Hong Kong, China

This paper examined the role of a designed computer-supported knowledge building environment on domain knowledge, nature of Knowledge Forum® (KF) contribution, and explanatory and collective inquiry in KF. Participants were forty Grade 9 students studied in a Chinese language and literature course in a Hong Kong secondary school. Students worked in a computer-supported knowledge building environment used Knowledge Forum® (KF), an online discussion platform, to engaged in the collaborative inquiry and pursued of idea improvement. Analyses indicated that there is a significantly pre-post improvement in domain knowledge; as well, students also viewed their experience in knowledge building classroom more positively in terms of collaboration and learning approaches. Correlation analysis suggested that KF participation, KF engagement, students' explanatory inquiry, views of collaboration and learning approaches were correlated. Furthermore, regression analysis showed that students' KF participation, rise-above efforts, and KB explanatory inquiry predicted students' domain understanding. Implications of examining the knowledge building environment on students' views on collaboration, approaches to learning and domain knowledge are discussed.

Session I 8

31 August 2017 12:00 - 13:30

Linna - K109

Poster Presentation

Educational Policy and Systems, Motivational, Social and Affective Processes

PO: Motivation and Educational Evaluation

Keywords: Assessment methods and tools, Attitudes and beliefs, Culture, Educational policy, Educational Psychology, Emotion and affect, Experimental studies, Goal orientation, Motivation, Motivation and emotion, Primary education, Quantitative methods, School effectiveness, Special education, Survey Research, Teaching / instruction

Interest group: SIG 08 - Motivation and Emotion, SIG 23 - Educational Evaluation, Accountability and School Improvement

Chairperson: Angelika Kullberg, University of Gothenburg, Sweden

"I don't feel alone": Young girls' emotional bonds with media

Keywords: Attitudes and beliefs, Culture, Primary education, Motivation and emotion

Presenting Author: Susan Beltman, Curtin University, Australia; **Presenting Author:** Madeleine Dobson, Curtin University, Australia

There are concerns regarding the use and impact of media in relation to adolescent girls and young women, but there is relatively little research focusing on the experiences and perceptions of young girls. This paper reports some of the findings of a larger, five phase, feminist, mixed research study in a small Australian school. Interviews with educators ($n=5$), parents ($n=7$) and young girls ($n=14$) were analysed using a phenomenological approach to elicit key themes for each group. Common and contrasting perspectives were then identified. Adults felt that media were powerful and pervasive but also expressed some reservations about the proliferation of media and the representations of girls and women. The adults set

boundaries and enabled various levels of access for the young girls who showed strong emotional and intellectual engagement with a variety of media. While further research is needed to examine children's views, the findings point to some recommendations for parents and educators as well as a broader conceptualisation of the position of media in our society.

Teachers' Emotions: lesson, student-group and teacher effects

Keywords: Emotion and affect, Quantitative methods, Teaching / instruction, Motivation and emotion

Presenting Author:Lars-Erik Malmberg, University of Oxford, United Kingdom; **Co-Author:**Reinhard Pekrun, Ludwig-Maximilians-Universität (LMU), Germany

Teaching can be an inspiring profession reflected in positive emotions and a sense of accomplishment. At the same time it can be a stressful profession, reflected in negative emotions and exhaustion. Teachers' emotions are associated with experiences in lessons, student groups, relations with colleagues and parents of students, and personal characteristics. Following Pekrun's (2006) control-value theory we posited that emotions would be related to situation-specific mastery experiences, student engagement in lessons, and teachers' trait characteristics. Going beyond previous studies of teachers' emotions we investigated situation-specific positive emotions (vitality and positive affect) and negative emotions (anxious and hostile affect) in 1055 lessons with 385 student groups of 43 teachers in England. We collected situation-specific measures of these variables toward the end of each lesson using an electronic questionnaire in handheld computers (Personal Digital Assistant). An a priori four-factor model was specified using two-level and three-level Bayesian structural equation models in Mplus: vitality (enthusiastic, energetic), positive affect (calm, relaxed), anxious affect (nervous, tense), and hostile affect (angry, frustrated). We included predictors at the lesson-level (situation-specific mastery experiences and perceived students' behavioural engagement and engagement with learning) and teacher level (teacher self-efficacy, gender, teacher experience, sense of accomplishment, and exhaustion). At the lesson-level vitality and positive affect were positively associated with mastery experiences and student engagement. Anxious and hostile affect were negative associated with mastery experiences and student engagement. At the teacher-level vitality and positive affect were associated with a sense of accomplishment.

The effect of praise by friends on intrinsic motivation

Keywords: Educational Psychology, Experimental studies, Goal orientation, Motivation

Presenting Author:Kyosuke Kakinuma, Doshisha University, Japan; **Co-Author:**Ayumi Tanaka, Doshisha University, Japan

Much research has demonstrated that people who receive ability-focused praise tend to hold to entity theory (a view of intelligence as a fixed trait), and their intrinsic motivation decreases. People who receive effort-focused praise hold to incremental theory (a view of intelligence as malleable), and their intrinsic motivation increases. However, these studies focused on praise by top-position individuals (e.g. teacher, parent, experimenter). The current research examined whether ability or effort praise by friends also affected intrinsic motivation. We used a friendship situation in which the students worked on the same task to measure motivation (e.g. students take the same tests in the classroom). Thus, participants and confederates worked on the same task, and confederates praised participants for their performance. Results suggested that effort praise could positively affect intrinsic motivation, although praise did not affect theories of intelligence. The finding partly supports the idea that praise by friends affects intrinsic motivation.

Emotion regulation and achievement emotions in elementary school children: longitudinal data

Keywords: Emotion and affect, Primary education, Quantitative methods, Motivation and emotion

Presenting Author:Daniela Raccanello, University of Verona, Italy; **Co-Author:**Margherita Brondino, University of Verona, Italy; **Co-Author:**Angelica Moè, University of Padova, Italy; **Co-Author:**Stephanie Lichtenfeld, Ludwig-Maximilians-Universität, Munich, Germany

The role played by achievement emotions in influencing students' wellbeing and performance is increasingly gathering attention within the psychological literature (Pekrun & Linnenbrink-Garcia, 2014). However, just a few studies have focused on how emotion regulation, one possible antecedent of achievement emotions, may affect achievement emotions over time within specific contexts. Therefore, our main aim was to examine how elementary school students' emotion regulation predicted achievement emotions across the elementary school years, examining also how achievement emotions changed over time. In the present study 308 Italian children were asked to complete two self-report instruments when attending second and fourth grade and one year later these two cohorts were again investigated. On both occasions students answered the "How I Feel" questionnaire (HIF, Walden, Harris, & Catron, 2003) to evaluate their emotion regulation abilities, and the "Achievement Emotions Questionnaire—Elementary School" (AEQ—ES, Lichtenfeld, Pekrun, Stupnisky, Reiss, & Murayama, 2012) to assess three emotions (enjoyment, anxiety, and boredom) within domains (Italian, mathematics). Results revealed decreases in positive emotions and increases in negative emotions over time. In addition, we found that emotion regulation abilities could play a role as antecedents of students' emotional experiences, as assumed by Pekrun's control-value theory (2006). Despite limitations, this knowledge could be useful in planning intervention programs to promote students' wellbeing and performance, focusing on emotion regulation as an important source of achievement emotions.

Distribution of resources: A quantitative study on logics of action within inclusive schools

Keywords: Educational policy, Primary education, Quantitative methods, Special education

Presenting Author:Jennifer Lambrecht, University of Potsdam, Germany; **Co-Author:**Stefanie Bosse, University of Potsdam, Germany; **Co-Author:**Thorsten Henke, University of Potsdam, Germany; **Co-Author:**Katja Bogda, Universität Potsdam, Germany; **Co-Author:**Nadine Spörer, University of Potsdam, Germany

As 167 state parties ratified the Convention on the Rights of Persons with Disabilities, they are to ensure that children with special educational needs (SEN) receive the support required to participate in the general educational system. Hence, in many countries educational politicians allocate additional resources to inclusive schools. When those resources are distributed within schools, the underlying logic of action might differ from the one intended and between schools. In our study we focused on the question to what extent underlying logics to distribute personnel resources differ between schools, even though they act under the same political conditions. The sample to address this question consisted of $N = 76$ primary schools, that received the same personnel quotas. In a standardized questionnaire, school principals reported for each class in their school (a) how many students with administrative relevant attributes (e.g., SEN) learned in a class and (b) how many recourses from specific personnel quotas were present in that class (e.g., two hours from quota for students with SEN). Underlying logics were assumed if significant relations between personnel quotas and students' attributes occurred. Preliminary analyses revealed high variation in the correlation coefficients between schools. Further analyses are being conducted to identify schools that use similar patterns of logics of actions.

The impact of evaluation context, motivation and social desirability on school self-evaluation data

Keywords: Assessment methods and tools, Educational policy, School effectiveness, Survey Research

Presenting Author:Jerich Faddar, University of Antwerp, Belgium; **Co-Author:**Jan Vanhoof, University of Antwerp, Belgium; **Co-Author:**Sven De Maeyer, University of Antwerp, Belgium

School self-evaluation (SSE), as a means to enhance educational has gained a prominent position in many education systems. An SSE process is characterised by collecting data on a school's functioning, where a judgement is made upon in order to take decisions within the framework of school development. These data are often collected by administering questionnaires among teachers working in the school. However, in order to obtain quality data it is vital that respondents are motivated to fill in the questionnaire, and avoid to respond socially desirable, both in a development or accountability evaluation context. This study aims to examine to what extent respondents' motivation and tendency towards socially desirable responding is affected by the evaluation context, and to what extent there is an impact on SSE results. An authentic SSE with a quasi-experimental design has been set up in an educational service organisation in Flanders (Belgium). Findings show that evaluation context has no significant impact. However, variance in respondents' motivation and tendency towards socially desirable responding has indeed an effect on SSE results. The paper discusses the findings for theory development within the field of SSE research and the implications for SSE practitioners.

Session I 9

31 August 2017 12:00 - 13:30

Main Building A - A08

Poster Presentation

Teaching and Teacher Education

PO: Teaching Approaches

Keywords: Attitudes and beliefs, Citizenship education, Cognitive skills, Collaborative Learning, Competencies, Higher education, Interdisciplinary, Knowledge creation, Metacognition, Mixed-method research, Pre-service teacher education, Qualitative methods, Reflection, Teacher Effectiveness, Teacher Professional Development, Teaching / instruction, Teaching approaches, Video analysis

Interest group: SIG 11 - Teaching and Teacher Education

Chairperson: Ann-Carita Evaldsson, Uppsala University, Sweden

Linking the unlinkable – transdisciplinary collaboration between universities and business

Keywords: Citizenship education, Collaborative Learning, Interdisciplinary, Knowledge creation

Presenting Author:Petra Biberhofer, Vienna University of Economics and Business, Austria; **Co-Author:**Claudia Lintner, Free University of Bolzano, Italy; **Co-Author:**Johanna Bernhardt, Terra Institute, Italy; **Co-Author:**Marco Rieckmann, University of Vechta, Germany

Sustainable development needs the active participation and collaboration of many different actors in society. Clearly there is a need for new learning settings supporting solution strategies responding to current challenges manifested in ecological, social, political and financial crises. Transdisciplinary collaboration between universities and business enable both parties to respond to many challenges deriving from global transformation processes. Their potential to overcome the existing theory practice gap and promotion of sustainable innovations is an essential contribution for the transformation towards a sustainable society. The theoretical framework is built on the concepts of transdisciplinarity, transformative education, science-society interfaces and sustainability-driven entrepreneurship. The paper asks how education for sustainable development in general and for sustainability-driven entrepreneurship in particular can be fostered by creating and implementing innovative collaboration forms between universities and business. The empirical data is based on 75

qualitative semi-structured interviews conducted with entrepreneurs and university teachers. Three good practice examples of collaboration formats are discussed in detail. The findings illustrate different settings and key features applied by regional knowledge alliances of heterogeneous stakeholders. The experimental formats are oriented towards three core aspects of a transformative learning approach (1) demand driven integration of sustainability topics (2) innovative learning methods and (3) transdisciplinary learning spaces. Further it is explained how understanding, sharing and promoting those features can help to upscale collaboration strategies to a transnational scale. In sum, the paper provides valuable bridging strategies helpful for political and societal decision-making as it elaborates on mutual learning processes of rather detached worlds – universities and business.

The role of beliefs in teacher education. Reflecting on pedagogical beliefs

Keywords: Qualitative methods, Reflection, Teacher Effectiveness, Teacher Professional Development

Presenting Author: Eveline Christof, University of Innsbruck, Austria

This contribution will focus on the factor of teacher beliefs and their role in teacher education. Beliefs, attitudes or subjective theories play a key role in teachers' actions and their behavior in the classroom. Teacher training at the university is limited by breaking up these strong behavior-determining elements. This is the background for the unchanged passing of patterns about the structures of school in general and about teaching and learning in particular from one generation of teachers to the next. (cf. Blömeke 2004, Richardson 1996, Zeichner 1986) Professional teacher education has to provide different settings for teacher students to reflect upon their beliefs about school, teaching and learning. Reflection is a central topic at all teacher training institutions. Teacher training institutions developed different ideas and concepts in order to implement some forms of reflection in teacher education. (f.e. Rothers 2012, von Felten 2005, 2011) This contribution shows the implementation of a method which is experimentally applied in the field of teacher education at the University of Innsbruck to stimulate students' reflective competence. Moreover, first results of the application of the method are presented. Central research question: How can teacher students reflect upon their pedagogical beliefs during their teacher education studies to develop a professional self.

How do situated competences in classroom management develop over teacher education?

Keywords: Competencies, Higher education, Pre-service teacher education, Teacher Professional Development

Presenting Author: Bernadette Gold, University of Erfurt, Germany; **Co-Author:** Manfred Holodynski, University of Muenster, Germany

Classroom management problems are important stressors of beginning teachers and experienced teachers (Veenman, 1984), and student teachers claim to be ill-prepared for dealing with student misbehavior and inattention (Jones, 2006). Therefore, one important aim of teacher education should be a situated and practice-oriented preparation on classroom management. The aim of the present longitudinal study was to investigate whether professional vision and strategic knowledge of classroom management, as two situated and practice-relevant classroom management competences, develop over bachelor and master studies as well as over the practice phase in teacher education (the *Referendariat* in Germany).

193 primary student teachers participated in their first and their fifth or sixth bachelor semester. Further 102 primary student teachers from several German universities participated in their first and last master semester as well as at the end of their *Referendariat*.

Latent change analysis with respect to the *professional vision* of classroom management indicated a significant latent increase from the beginning to the end of the bachelor studies ($d = 0.39$) as well as from the beginning to the end of the master studies ($d = 0.68$). There was no significant latent change from the end of the master studies to the end of the *Referendariat*.

The *strategic knowledge* of classroom management did not significantly change during the university phase of teacher education. From the end of the master studies to the end of the practice phase a significant latent increase occurred ($d = 0.25$).

Teachers' Epistemic Cognition in Classroom Assessment

Keywords: Attitudes and beliefs, Cognitive skills, Metacognition, Teaching / instruction

Presenting Author: Helenrose Fives, Montclair State University, United States; **Co-Author:** Nicole Barnes, Montclair State University, United States; **Co-Author:** Michelle Buehl, George Mason University, United States; **Co-Author:** Julia Mascadri, Queensland University of Technology (QUT), Australia; **Co-Author:** Nathan Ziegler, South Dakota State University, United States

Teachers' epistemic cognition refers to the processes teachers engage in when they consider the nature of knowledge (its source, structure, certainty, and justification) for themselves as learners or for their students. In this theoretical essay we theorize a model of epistemic cognition that illustrates teachers' epistemic cognition when engaged in assessment tasks. To explicate the role of epistemic cognition in teaching, we present a hypothetical case of Dr. Jones, an educational psychology instructor, to illustrate how epistemic concerns manifest in assessment activities. We propose that our model adds to prior frameworks of epistemic cognition in four ways: First, we argue that the development of an epistemic aim for others actively requires (or should) the processes of epistemic cognition. Second, more attention needs to be given to the alignment of reliable processes with identified epistemic aims to produce the desired epistemic end. Third, in teachers'

practice the use of epistemic cognition is multifaceted and iterative. Fourth, scholars in this area need to find ways to make teachers' cognition visible to support their ability and willingness to critically reflect on epistemic issues in their practice. We close the proposal with conclusions and recommendations for further theory and research.

The impact of staged video vignettes on teachers' nonverbal classroom management knowledge

Keywords: Pre-service teacher education, Teacher Professional Development, Video analysis, Knowledge creation

Presenting Author: Julia Bönnte, University of Duisburg-Essen, Germany; **Presenting Author:** Rijana Nissing, University of Duisburg-Essen, Germany; **Co-Author:** Gerlinde Lenske, Universität Koblenz-Landau, Germany; **Co-Author:** Theresa Dicke, Australian Catholic University, Australia; **Co-Author:** Detlev Leutner, University of Duisburg-Essen, Germany

Due to a mounting teacher shortage and rising burnout rates, the importance of teacher training is increasingly recognized (Dicke, Elling, Schmeck, & Leutner, 2015; OECD, 2016). To improve teacher training, it is necessary to include pedagogical-psychological professional knowledge in regard to classroom management (CM). Indeed, Hattie (2009) reports a positive correlation between CM and students' achievement (Hattie, 2009). Furthermore, research has found a connection between teachers' perception of classroom management skills, occupational satisfaction and wellbeing (Dicke et al., 2014). One promising way to support the development of CM skills is the usage of staged video material based on authentic classroom situations. This is applied in our research project *Video-based educational material/classroom management*, part of the *Quality initiative in teacher training*. Particularly inexperienced teachers do not feel sufficiently prepared with regard to CM skills (Evertson & Weinstein, 2006). Hence, innovative educational material will already be applied during the course of studies to enable a more practice-related acquisition of CM knowledge. For this purpose, video examples of both, more and less successful classroom actions, will be employed. The effectiveness of the video material is going to be tested in comparative studies. After this, the developed vignettes will be provided on a video platform for the usage in university education as well as further and continuing education.

Need for Cognitive Closure of Student Teachers and Their Classroom Management Practice

Keywords: Cognitive skills, Mixed-method research, Pre-service teacher education, Teaching approaches

Presenting Author: Katerina Vlckova, Masaryk University, Czech Republic; **Presenting Author:** Katerina Lojdova, Masaryk University, Czech Republic; **Co-Author:** Jan Mares, Faculty of Education, Masaryk University, Brno, Czech Republic; **Co-Author:** Jan Sirucek, Faculty of Social Sciences, Masaryk University, Brno, Czech Republic

Classroom management (CM) can be viewed as a system of strategies employed by a teacher to influence the physical/social space of the classroom to foster an environment where learning can occur. One of the key individual characteristics influencing the teachers' CM strategies (CMS) is their need for cognitive closure (NFC) which can be defined as individual's motivation in information processing and judgement. The relation of NFC and CMS was investigated on a non-probability sample of student teachers in their first year in master study programme – in their long term practice in lower secondary schools. Data were collected by video-recordings of classes, interviews, diaries and questionnaires in a mixed methods design. Regarding questionnaires, CMS were measured by the adapted Behavior and Instructional Management Scale – BIMS (Martin & Sass, 2010). Need for cognitive closure was measured by the adapted Need for (Cognitive) Closure Scale – NFCS (Roets & Van Hiel, 2011; Czech version Širůček et al., 2014). Confirmatory factor analysis and reliability estimates supported the predicted structure of the two scales. NFC is reflected in the CMS of student teachers. Student teachers with higher NFC use more CMS focused on rules and leading the classroom. The higher the NFC is the more the student teachers prefer teaching in frontal settings, deviate less from their lesson plan; they have more strict requirements of student's discipline, and insist on students to follow the rules. These findings show that NFC plays an important role in teacher behaviour and should be therefore reflected in teacher education as well.

Session I 10

31 August 2017 12:00 - 13:30

Linna - K110

Roundtable

Educational Policy and Systems, Lifelong Learning

RT: Learning and Professional Development

Keywords: Case studies, Cooperative / collaborative learning, Educational policy, Interdisciplinary, Lifelong learning, Literacy, Motivation, Professions and applied sciences, School effectiveness, Teacher Professional Development, Workplace learning

Interest group: SIG 14 - Learning and Professional Development

Chairperson: Hua Loon Ling, The University of Hong Kong, Hong Kong

Designing a professional development programme on reading for beginning teachers

Keywords: Cooperative / collaborative learning, Literacy, Motivation, Teacher Professional Development

Presenting Author: Iris Vansteelandt, AP University College/Ghent University, Belgium; **Co-Author:** Hilde Van Keer, Ghent University, Belgium; **Co-Author:** Suzanne E. Mol, Leiden University, Netherlands

As reading is one of the most important skills in education that contributes to students' school success, this study focuses

on teachers' continuous professional development (CPD) on reading and reading promotion, hereby aiming at fostering students' autonomous reading motivation. Since the first years of teaching are determining for teachers' future career path, the present study focuses particularly on beginning teachers (BT). The present proposal is part of a quasi-experimental intervention study, studying the effectiveness of CPD for teachers and their students. The presentation will particularly zoom in on design principles for and the development of the CPD programme combining Desimone's framework for effective professional development (2009) with Self-Determination Theory (SDT) as fostering motivation is aimed at.

Training Reactions as Predictors of Autonomous and Controlled Motivation to Transfer

Keywords: Motivation, Professions and applied sciences, Workplace learning, Lifelong learning

Presenting Author: Andreas Gegenfurtner, Technische Hochschule Deggendorf, Germany; **Co-Author:** Karina Fisch, Technische Hochschule Deggendorf, Germany; **Co-Author:** Martina Reitmaier, Technische Hochschule Deggendorf, Germany

Previous training research conceptualized motivation to transfer as a one-dimensional construct that varies in amount (high versus low motivation), not in kind (different qualities of transfer motivation). In recent years, research groups started to re-conceptualize motivation to transfer as a two-dimensional construct: autonomous and controlled motivation to transfer. To date, still little is known about the predictors of autonomous and controlled motivation to transfer. The present study addresses this gap and examines the relative importance of six training reaction scales in predicting transfer motivation. In addition, the study examines the moderating effect of age, gender, and work experience on the reaction—motivation relationships. The study sample consisted of 64 training participants. Analyses include exploratory factor analysis and multivariate regression. Analyses are ongoing. The outcomes of the study will be discussed in terms of their significance for theory development and their practical implications for training evaluation.

Strengthening school resilience against corruption through integrity standards and involvement

Keywords: Case studies, Educational policy, Interdisciplinary, School effectiveness

Presenting Author: Mihaylo Milovanovitch, Center for Applied Policy, Austria; **Co-Author:** Tinde Kovac Cerovic, University of Belgrade, Hungary; **Co-Author:** Kate Lapham, Open Society Foundations, United States

The roundtable will offer insight into an evolving methodology for assessing integrity of the education systems and present findings gathered from four countries by now. The approach is rooted in the conceptual traditions of rational choice and crime opportunity theories, and of root cause analysis. The evidence collected in the course of research shows between-country similarities in the types, descriptions and underlying policy shortcomings of malpractice (integrity violations), despite the fact that the researched countries are different geographically, historically and regarding the structure of their education systems. The roundtable will provide a possibility to exchange hands-on experience from the audience, and finish with an overview of common integrity characteristics and how they interact with equity and quality of education.

Session I 11

31 August 2017 12:00 - 13:30

Main Building E - E301

Poster Presentation

Learning and Instructional Technology, Lifelong Learning, Teaching and Teacher Education

PO: Professional Development and Lifelong Learning

Keywords: Arts, Assessment methods and tools, Attitudes and beliefs, Case studies, Comparative studies, Design based research, E-learning / Online learning, Educational Psychology, Educational Technology, Higher education, Interdisciplinary, Lifelong learning, Pre-service teacher education, Professions and applied sciences, Student learning, Survey Research, Teacher Professional Development, Video analysis, Vocational education

Interest group: SIG 14 - Learning and Professional Development

Chairperson: Telle Hailikari, University of Helsinki, Finland

Comparison of Finnish and German teacher students' motivations for choosing teaching career

Keywords: Comparative studies, Higher education, Pre-service teacher education, Teacher Professional Development

Presenting Author: Christian Harteis, University of Paderborn, Germany; **Co-Author:** Jani Ursin, University of Jyväskylä, Finland; **Co-Author:** Katja Vähäsantanen, University of Jyväskylä, Finland; **Co-Author:** Michael Goller, University of Paderborn, Germany; **Co-Author:** Dagmar Festner, University of Paderborn, Germany

The entrance into teacher education programmes differs widely between Finland and Germany. Whereas Finnish universities apply strong selection, the access to most German teacher education programmes does not bear any serious barriers. The aim of the study is to explore Finnish and German undergraduate students' motivations for choosing teaching as a career. A questionnaire including the internationally validated FIT-Choice Scale instrument will be distributed to undergraduate students in a Finnish university ($N = 210$) and in a German university ($N = 170$). Data analyses will comprise CFA to check the translated instrument and ANOVAs (or non-parametric equivalents) to test the differences between Finland and Germany. The expected findings of the study will reveal if the differences in the access to teacher education programmes between these countries are congruent with differences in the motivations to become a teacher. As for educational significance, the study is to provide new information to support policy making in both target countries and

also universities' informed decision making regarding teacher training. A theoretical contribution of the study is that it will further validate the FIT-Choice instrument in a new country (Finland) from a comparative perspective.

Career guidance of students in secondary vocational education for life long learning

Keywords: Student learning, Survey Research, Vocational education, Lifelong learning

Presenting Author:Marinka Kuijpers, The Hague University of Applied Sciences, Netherlands

In order to deal with the effects of the changing demands on the labour market and emergence of an unpredictable career, individuals are expected to develop career competencies. Career competencies are developed in a learning environment that stimulates real-life experiences with work and a dialogue about these experiences. A professionalization program for teachers was developed aiming to help them to conduct a career dialogue. The development of the program was accompanied by research. We present results of research among 786 students on the research question: What is the change in career guidance conversation according to the students after professionalizing compared to the conversations before professionalization and what is the relation between career guidance by teachers and the development of career competencies in students? The results show that the guidance conversations after professionalization are in form and content more career related and that student developed various career competencies.

Computationally Enhanced Simulators of Professional Practice to Improve Proportional-Reasoning

Keywords: Design based research, Educational Technology, Higher education, Professions and applied sciences

Presenting Author:Ilana Dubovi, University of Haifa, Israel; **Co-Author:**Sharona T. Levy, University of Haifa, Faculty of Education, Israel; **Co-Author:**Efrat Dagan, University of Haifa, Israel

Proportion reasoning, which forms the basis for medication calculation, is vital for high quality care and patient safety. Therefore, we have designed Situated Medication Mathematics (siMMath) environment which support the learning of proportional reasoning through successively digital simulations- digitally simulated nursing objects and ratio-table. The study was a quasi-experimental controlled pre-test-intervention-post-test-design. Participants were nursing students (N=168): 72 students in comparison group who learned with a lecture based approach and 96 in experimental group who learned with siMMath environment. Main findings reveal that learning with siMMath is most efficient in understanding of intensive quantities – concentration and drip-rate, which demands formal operations, a multiplicative thinking. Moreover, we have shown that through situated simulations the abstract proportional reasoning can be enhanced.

Paramedics' technical/non-technical skills and the role of knowledge, self-assessment and attitude

Keywords: Assessment methods and tools, Attitudes and beliefs, Interdisciplinary, Video analysis

Presenting Author:Michael Scheumann, University of Regensburg, Germany; **Co-Author:**Helen Jossberger, University of Regensburg, Germany; **Co-Author:**Hans Gruber, University of Regensburg, Germany; **Co-Author:**Bernhard Graf, University Hospital Regensburg, Germany; **Co-Author:**York Zausig, University Hospital Regensburg, Germany

High quality cardiopulmonary resuscitation (CPR) is a key factor in improving cardiac arrest survival. Technical skills (TS; e.g. chest compression) and non-technical skills (NTS; e.g. team work) play a crucial role for patient's safety and care. The aim of the present study was to investigate TS and NTS of paramedics' CPR performance. 22 paramedics participated. Their CPR performance using a simulation mannequin was video-taped to analyse TS and NTS. In addition, prior knowledge, self-assessment and attitude regarding the role of NTS during CPR performance were assessed with a questionnaire. Data collection will be completed in January 2017. We expect that poor self-assessment leads to weaker CPR performance. A positive attitude towards NTS as well as prior knowledge about the importance of NTS is expected to lead to superior NTS performance. Poor NTS performance is expected to correlate with weak technical performance. The results of this study shed light on how technical and non-technical factors influence CPR performance. This research plays a role in the advancement of public good as it helps us to identify weaknesses in CPR that can be diminished in training.

How HE educators learn to teach Massive Open Online Courses. A case study

Keywords: Case studies, E-learning / Online learning, Teacher Professional Development, Lifelong learning

Presenting Author:Tina Papathoma, Open University, United Kingdom; **Co-Author:**Allison Littlejohn, Open University, United Kingdom; **Co-Author:**Rebecca Ferguson, The Open University, United Kingdom, United Kingdom

People working within HE institutions need to learn new forms of teaching and learning practice, to transform the ways they work. This study explores the types of knowledge gained by those working in HE when they teach massive open online courses (MOOCs). Data were gathered through a case study involving interviews with six people with teaching roles on one MOOC. Data analysis used Tynjälä's model of integrative pedagogy to identify the different types of theoretical, practical, sociocultural and self-regulative knowledge needed in order to teach in a MOOC. The analysis shows that individuals did not engage in formal training (theoretical knowledge); they learned by experience; by (re-)running the MOOC and from learners' feedback (practical knowledge). They also reflected on their learning experience, on their contact with different cultures, on engaging with ideas from other MOOCs and people (self-regulative knowledge). They worked collaboratively, sharing expertise, but sometimes found communication with colleagues was difficult (sociocultural knowledge). When they faced challenges they integrated theoretical, practical and self-regulative knowledge to solve problems (mediating processes).

Professional Development in Sculpting: Analysis of Social Interactions and Activities

Keywords: Arts, Educational Psychology, Professions and applied sciences, Lifelong learning

Presenting Author:Helen Jossberger, University of Regensburg, Germany; **Co-Author:**Linda Puppe, Universität Regensburg, Germany; **Co-Author:**Birgit Eiglsperger, University of Regensburg, Germany; **Co-Author:**Hans Gruber, University of Regensburg, Germany

The myth of the artist as a gifted genius goes way back and is still present today. Talent looms large in visual arts. Our theoretical starting point, however, is expertise research, in which talent plays hardly any significant role. Expertise is explained as the result of a long-term endeavour to advance accomplishments. The aim of the present study was to identify factors relevant for professional development in the domain of sculpting. 29 experts (sculptors with at least ten years of experience) and 24 semi-experts (university or academy students) participated in our survey study. A questionnaire was developed to examine the role of social interactions, artistic activities, and deliberate practice. The results reveal that colleagues were the most helpful persons for experts' professional development, while semi-experts identified classmates as the most important persons. Feedback about content specific elements related to their artworks was essential for experts' and semi-experts' professional development. Artistic activity was more individualistic for experts, while students emphasised the importance of collaborative work and exchange. The majority of participants tried to improve their skills continuously and they indicated to practice deliberately. The results shed light on professional development of artists and help us to better understand what factors are perceived to be relevant to advance. This knowledge is important to improve teaching in the domain of sculpting at academies and universities.

Session I 12

31 August 2017 12:00 - 13:30

Pinni A - A3103

ICT Demonstration

Learning and Instructional Technology

Get undergraduates off Facebook and into learning with game-based student response systems

Keywords: Assessment methods and tools, Educational Technology, Game-based learning, Higher education

Interest group: SIG 07 - Learning and Instruction with Computers

Chairperson: Eero Ropo, University of Tampere, Finland

In accordance with digital game-based learning principles, Game-based Student Response Systems (GSRS) can temporarily turn the classroom into a gameshow as they allow learners to use their mobile devices to individually answer questions, typically in multiple choice format, that are projected on a big screen. Learners' answers are collected automatically and are presented anonymously in the form of a histogram, after each question is answered. Incorporating GSRSs in education is potentially useful in instruction and learning because these tools have the potential to engage learners, and support both student learning and formative assessment. The first part of the ICT demonstration will focus on a specific GSRS, called Kahoot!, and will engage participants in playing a given game, taking the role of students, using their mobile devices. The second part will familiarize participants with the tool through step-by-step instructions on how they can create, edit, preview and test their own Kahoot! for any educational level. The third part will present findings from a study that assessed 33 undergraduate students' perceptions for the impact of the game-based response system on their engagement and learning. The fourth part will engage participants in a discussion on their experiences with similar tools or different tools for the same purpose to reflect on the tool's affordances and limitations for instruction and learning.

Get undergraduates off Facebook and into learning with game-based student response systems

Presenting Author:Iolie Nicolaidou, Cyprus University of Technology, Cyprus; **Co-Author:**Georgia Christou, Cyprus University of Technology, Cyprus

In accordance with digital game-based learning principles, Game-based Student Response Systems (GSRS) can temporarily turn the classroom into a gameshow as they allow learners to use their mobile devices to individually answer questions, typically in multiple choice format, that are projected on a big screen. Learners' answers are collected automatically and are presented anonymously in the form of a histogram, after each question is answered. Incorporating GSRSs in education is potentially useful in instruction and learning because these tools have the potential to engage learners, and support both student learning and formative assessment. The first part of the ICT demonstration will focus on a specific GSRS, called Kahoot!, and will engage participants in playing a given game, taking the role of students, using their mobile devices. The second part will familiarize participants with the tool through step-by-step instructions on how they can create, edit, preview and test their own Kahoot! for any educational level. The third part will present findings from a study that assessed 33 undergraduate students' perceptions for the impact of the game-based response system on their engagement and learning. The fourth part will engage participants in a discussion on their experiences with similar tools or different tools for the same purpose to reflect on the tool's affordances and limitations for instruction and learning.

Session I 13

31 August 2017 12:00 - 13:30

Pinni B - B4117

Workshop

Assuring assessment quality in higher professional education. Towards a successful strategy

Keywords: Assessment methods and tools, Educational policy, Higher education, Professions and applied sciences

Interest group: SIG 01 - Assessment and Evaluation

Chairperson: Thomas Martens, Medical School Hamburg, Germany

The quality of assessment is an important theme in higher professional education. To assure this quality, it is advisable to provide institutions with quality criteria and guidelines which support institutions in (re)writing a decentralized assessment plan. Until 2014, Zuyd University of Applied Sciences did not have a central vision on assessment. It was decided to formulate a first draft of this vision and corresponding guidelines which were validated by several important stakeholders: boards of examiners, teachers, assessment experts and peers. In total 15 guidelines were formulated: five guidelines on the scientific quality of assessment, five on the organizational quality and five on assessment literacy. Aim of the validation study was to investigate whether the defined guidelines were understandable, complete and usable. The feedback we received was immense. In total 856 comments were collected, analysed, clustered, and used for reformulating the guidelines. During the workshop participants are invited to discuss the assessment policy of Zuyd University. Our practice-based research study confirms that the implementation process of the central guidelines is very complex and unpredictable. In the workshop, we would like to discuss the implementation strategies. It aims to examine effective methods en strategies to implement a sustainable assessment policy in higher education. We hope that this contribution inspires other universities or educational institutions to validate central policy documents before implementing these within specific educational contexts.

Assuring assessment quality in higher professional education. Towards a successful strategy

Presenting Author: Anneriet Florack, Zuyd University of Applied Sciences, Netherlands; **Co-Author:** Dominique Sluijsmans, Zuyd University of Applied Sciences, Netherlands

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Session I 14

31 August 2017 12:00 - 13:30

Main Building C - C5

ICT Demonstration

Assessment and Evaluation

How to implement the observation strategies to raise the Quality of Early Childhood Education (ECEC)

Keywords: Assessment methods and tools, Cognitive development, Early childhood education, Social development

Interest group: SIG 05 - Learning and Development in Early Childhood

Chairperson: Robert Kordts-Freudinger, Paderborn University, Germany

Valid feedback is essential for the administrators, educators, parents and, of course, for children to be able to steer their development in a sustainable way. Key influential theorists such as Montessori, Piaget, Vygotsky, and others all used observations extensively to understand how children learn and use knowledge about children's learning to improve pedagogies and children's lives. However, most adults including teachers in the ECEC settings have not always observed children and tracked their growth. Based on the research and professional development programs conducted in Finland, Taiwan and Hong Kong with more than 100,000 observations, we found some relationships between young children's involvement, adaptation and agency in early childhood settings through systematic observations. We will introduce observation strategies with video clips and demonstrate our latest mobile application for observation for practitioners to contribute to a big data pool aimed to enhance the teaching quality in ECEC settings.

How to implement the observation strategies to raise the Quality of Early Childhood Education (ECEC)

Presenting Author:James Ko, The Education University of Hong Kong, Hong Kong; **Co-Author:**Jyrki Reunamo, University of Helsinki, Finland; **Co-Author:**Hui-Chun Lee, Tzu Chi University, Taiwan; **Co-Author:**Li-Chen Wang, Chang Gung University of Science and Technology, Taiwan; **Co-Author:**Hui-Hua Chen, National Dong Hwa University, Taiwan; **Co-Author:**Shu-Shuan Shih, Tzu Chi University, Taiwan

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Session I 15

31 August 2017 12:00 - 13:30

Pinni B - B3111

ICT Demonstration

Higher Education

Detection, coordination and reporting of individual student competency development with myCompetence

Keywords: Assessment methods and tools, Competencies, Goal orientation, Higher education

Interest group: SIG 04 - Higher Education

Chairperson: Angelica Moè, University of Padova, Italy

Program objectives are the key element of quality assurance measures at curriculum level as well as of the teaching and learning contract that exists between students and lecturers. Systematic measuring of how students meet the program objectives, as well as related feedback, are essential in promoting reflection on learning processes by (and between) students and instructors. On the other hand, such an assessment system, in particular where it concerns transferable skills, places high demands on an educational organization and its (technical) infrastructure.

The tool myCompetence was designed as a comprehensive quality development tool not only to facilitate the development of academic programs by heads of degree programs, module coordinators and lecturers, but also to encourage learners in making the best use of their learning environment and help them make the most of their learning processes.

myCompetence has three main functions: It coordinates the allocation of 'assessment events' between modules and actors (*coordinating function*), it records individual forms of competency (*measuring function*) and it provides the actors, especially learners, with valuable feedback on their skills development throughout the course of a program (*feedback and reporting function*). It can be used not only by the heads of study programs, module coordinators and lecturers to develop academic programs but can also help learners to fully exploit their learning environment and make the most of their learning processes.

Detection, coordination and reporting of individual student competency development with myCompetence

Presenting Author:Claude Mueller, Zurich University of Applied Sciences, Switzerland; **Presenting Author:**Jakob Ott, Zurich University of Applied Sciences, Switzerland; **Co-Author:**Jennifer Erlemann, ZHAW School of Management and Law, Germany

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processes.

Session I 16

31 August 2017 12:00 - 13:30

Main Building A - A34

Workshop

Higher Education

Teachers' Perceptions on Assessment in Higher Professional Education.

Keywords: Assessment methods and tools, Attitudes and beliefs, Competencies, Higher education

Interest group: SIG 01 - Assessment and Evaluation

Chairperson: Joana Pipa, University of Lisbon, Portugal

This workshop will present and enable participants to engage with research. The research focusses on teachers' perceptions on assessing the development that students make in Higher Education on their path to becoming junior professionals integrating 21st century skills. The research was carried out through the use of a questionnaire. Since assessment steers students' professional learning, it is important to design quality assessments that are well-aligned with professional goals. If this is not the case, the form of the assessment itself generally dominates and can lead to undesirable learning strategies on the part of students. This however imposes high demands on the assessment-literacy of teachers. They are responsible for the design of assessment methods that measure professional learning. The aim of this workshop is twofold; Firstly to present a study on the perceptions of Higher Education teachers regarding professional assessment. For this purpose, a questionnaire was developed. The study revealed that teachers need to develop their skills regarding new assessment methods. The second goal of this workshop is to discuss some content of the questionnaire for validity purposes in small groups. The workshop will end with recommendations on how the questionnaire may help teacher teams within their organizations when setting up a professional development plan.

Teachers' Perceptions on Assessment in Higher Professional Education.

Presenting Author: Dorien Gerards, Zuyd University of Applied Sciences, Netherlands; **Co-Author:** Dominique Sluijsmans, Zuyd University of Applied Sciences, Netherlands

This workshop will present and enable participants to engage with research. The research focusses on teachers' perceptions on assessing the development that students make in Higher Education on their path to becoming junior professionals integrating 21st century skills. The research was carried out through the use of a questionnaire. Since assessment steers students' professional learning, it is important to design quality assessments that are well-aligned with professional goals. If this is not the case, the form of the assessment itself generally dominates and can lead to undesirable learning strategies on the part of students. This however imposes high demands on the assessment-literacy of teachers. They are responsible for the design of assessment methods that measure professional learning. The aim of this workshop is twofold; Firstly to present a study on the perceptions of Higher Education teachers regarding professional assessment. For this purpose, a questionnaire was developed. The study revealed that teachers need to develop their skills regarding new assessment methods. The second goal of this workshop is to discuss some content of the questionnaire for validity purposes in small groups. The workshop will end with recommendations on how the questionnaire may help teacher teams within their organizations when setting up a professional development plan.

Session I 17

31 August 2017 12:00 - 13:30

Main Building A - A07

ICT Demonstration

Learning and Instructional Technology

Recording, visualising and analysing web based learning processes with the ScreenAlytics software

Keywords: Assessment methods and tools, Learning analytics, Psychometrics, Video analysis

Interest group: SIG 27 - Online Measures of Learning Processes

Chairperson: Triinu Kärbla, University of Tartu, Estonia

Research on learning needs to investigate not only the outcomes of learning but especially the learning processes in order to gain insights into underlying mechanisms and promote the construction and verification of theories of learning. Meaningful data that describes this learning process is an indispensable prerequisite to do so. One reasonable way to get process data in web based learning environments is recording the screens of the learners and analyse it regarding behaviour and events that the researcher is interested in. Commonly used software packages like Camtasia record the learners' screens as pixel based videos (e.g. mov, mpeg). A huge disadvantage of this approach is that we lose meaningful information by translating actually inherent events to pixels. In consequence, extensive manual coding is needed make that pixel data meaningful again (e.g. did a learner use a specific instructional support system?).

Instead of recording pixels, we propose to record time-stamped event information (mouse clicks and movements, scrolling, keystrokes, etc.) that reflects the entire observable interaction between the learner and the learning environment. This leads to a quantitative representation of the interaction that can either be simulated in order to get a video-like replay, or can be subject to a variety of other visualisations (e.g. heatmaps) and statistical analysis (e.g. machine-learning algorithms). We developed a software called "ScreenAlytics" that can be used to easily record, visualise and export this data in web-based learning environments. This demonstration introduces the approach, explains the software and give examples of possible applications.

Recording, visualising and analysing web based learning processes with the ScreenAlytics software

Presenting Author:Markus Hörmann, Technical University of Munich (TUM), Germany; **Co-Author:**Maria Bannert, Technical University of Munich (TUM), Germany

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Session I 18

31 August 2017 12:00 - 13:30

Main Building D - D12

ICT Demonstration

Learning and Instructional Technology

Smart Learning Paths - Using Artificial Intelligence To Provide Individual Support in eLearning

Keywords: Computer-assisted learning, E-learning / Online learning, Informal learning, Learning analytics

Interest group: SIG 07 - Learning and Instruction with Computers

Chairperson: Jingjing Sun, University of Montana, United States

Supporting the learning process with machine learning and artificial intelligence represents the next phase of online learning. A learning environment, which adapts to the needs of the learner is be able to offer individualised scaffolding for every learner. This may help solve problems of drop-out rates and loss of motivation, which disturb learners in many online courses.

This ICT demonstration will introduce the participants to using a personal learning environment, which applies learning analytics and artificial intelligence to give personalized suggestions for each learner. The demonstration will walk the participants through a session in which they get acquainted with how an intelligent learning environment may help the teacher and learners in online learning settings. Participants will get familiar with learning paths, automatically created quizzes and learning analytics. After this demonstration the participants will be able to understand how the current level of development in artificial intelligence may be used to support learning and instruction.

The demonstration will be done in CLANED (<http://app.claned.com>) learning environment, which aids students to set, evaluate and achieve their learning goals. Support is given in the form of recommended activities that form a learner's learning path to her goal. Natural language processing is used to provide automatically created quizzes from text materials, and to provide analytics about learning. The user is thus given personalized feedback and recommendations how to adjust studying according to individual progress.

Smart Learning Paths - Using Artificial Intelligence To Provide Individual Support in eLearning

Presenting Author:Topi Litmanen, Claned Group, Finland; **Presenting Author:**Miska Noponen, Claned Group, Finland;

Co-Author:Ilkka Autio, Claned Group, Finland

Supporting the learning process with machine learning and artificial intelligence represents the next phase of online learning. A learning environment, which adapts to the needs of the learner is be able to offer individualised scaffolding for every learner. This may help solve problems of drop-out rates and loss of motivation, which disturb learners in many online courses.

This ICT demonstration will introduce the participants to using a personal learning environment, which applies learning analytics and artificial intelligence to give personalized suggestions for each learner. The demonstration will walk the

participants through a session in which they get acquainted with how an intelligent learning environment may help the teacher and learners in online learning settings. Participants will get familiar with learning paths, automatically created quizzes and learning analytics. After this demonstration the participants will be able to understand how the current level of development in artificial intelligence may be used to support learning and instruction.

The demonstration will be done in CLANED (<http://app.claned.com>) learning environment, which aids students to set, evaluate and achieve their learning goals. Support is given in the form of recommended activities that form a learner's learning path to her goal. Natural language processing is used to provide automatically created quizzes from text materials, and to provide analytics about learning. The user is thus given personalized feedback and recommendations how to adjust studying according to individual progress.

Session I 19

31 August 2017 12:00 - 13:30

Main Building A - A35

ICT Demonstration

Teaching and Teacher Education

The British Education Research Tool (BERTiE)

Keywords: Educational Technology, Teacher Effectiveness, Teacher Professional Development, Technology

Interest group: SIG 11 - Teaching and Teacher Education

Chairperson: Gabriela González Ocampo, Ramon Llull University, Spain

The British Education Research Tool (BERTiE) is being developed by the Bath Spa Institute for Education in light of government priorities regarding professional development identified in both the DfE consultation '*A World Class Teaching Profession*' (2015) and the English education white paper '*Educational Excellence Everywhere*' (2016). We have responded to this call to support teachers' practice and enhance their knowledge by building this online platform which allows easy access to evidence-based education research and facilitates opportunities for knowledge transfer afforded by online and mobile technologies. BERTiE is a web-crawler that only searches pre-defined websites which have been curated through academic moderation. Current and future Teachers will benefit from searching education research, policy and comment while being confident that their results have assured academic rigour guaranteed through the curation process. The Institute for Education is deploying BERTiE during 2016/17 as a research tool for trainee teachers to enrich their experience and embed research in their work across schools, colleges and universities. In this demonstration, we will explore how BERTiE works and could evolve further to support teachers in the field and enhance wider teaching and learning. We will also discuss to what extent government policy in England - which suggests the need for such a tool - correlates to the wider international political context, as well as to what extent BERTiE might be an applicable tool for educators on a global scale. Participants will be able to view and engage with BERTiE and engage in discussion of its potential future applications.

The British Education Research Tool (BERTiE)

Presenting Author: Kate Reynolds, Bath Spa University, United Kingdom

The British Education Research Tool (BERTiE) is being developed by the Bath Spa Institute for Education in light of government priorities regarding professional development identified in both the DfE consultation '*A World Class Teaching Profession*' (2015) and the English education white paper '*Educational Excellence Everywhere*' (2016). We have responded to this call to support teachers' practice and enhance their knowledge by building this online platform which allows easy access to evidence-based education research and facilitates opportunities for knowledge transfer afforded by online and mobile technologies. BERTiE is a web-crawler that only searches pre-defined websites which have been curated through academic moderation. Current and future Teachers will benefit from searching education research, policy and comment while being confident that their results have assured academic rigour guaranteed through the curation process. The Institute for Education is deploying BERTiE during 2016/17 as a research tool for trainee teachers to enrich their experience and embed research in their work across schools, colleges and universities. In this demonstration, we will explore how BERTiE works and could evolve further to support teachers in the field and enhance wider teaching and learning. We will also discuss to what extent government policy in England - which suggests the need for such a tool - correlates to the wider international political context, as well as to what extent BERTiE might be an applicable tool for educators on a global scale. Participants will be able to view and engage with BERTiE and engage in discussion of its potential future applications.

Session I 20

31 August 2017 12:00 - 13:30

Main Building A - A21

Workshop

Teaching and Teacher Education

Exploring, catching & creating: Making language awareness visible with linguistic reasoning

Keywords: Language (Foreign and second), Language (L1/Standard Language), Reasoning, Teaching approaches

Interest group: SIG 11 - Teaching and Teacher Education

Chairperson: Christian Brandmo, University of Oslo, Norway

Higher-order thinking has become a fundamental skill in education. The challenge for teachers is to develop teaching materials that stimulate students' higher-order thinking skills and, for language teachers in particular, that stimulate students to think and reason about language more consciously and creatively. This workshop is intended to introduce the concepts of language awareness and linguistic reasoning in the context of language teaching. In order to facilitate the development of higher-order learning materials within the language subjects, we developed a framework that will make language awareness visible with linguistic reasoning. In doing so, we strive for enrichment of the subject matter content and provide tools to support teachers in the development and assessment of higher-order thinking exercises. The aim of this workshop is to present a research-based approach for integrating and stimulating higher-order thinking skills within the language subjects in secondary school. Through a combination of hands-on group activities with innovative materials and discussion, workshop participants will develop a more in-depth insight into the above-mentioned concepts and gain practical knowledge on how to use the framework in order to stimulate higher-order thinking in the language classroom. This workshop draws on findings resulting from L1/L2 teachers' experiences in a professional learning community (PLC). In this PLC teachers developed, tested and evaluated a pedagogy for language education based on the framework. In this workshop we will also discuss students' learning outcomes with the use of an assessment tool.

Exploring, catching & creating: Making language awareness visible with linguistic reasoning

Presenting Author: Ellen van den Broek, Radboud University Nijmegen, Netherlands; **Presenting Author:** Roy Dielemans, Radboud University Nijmegen, Netherlands

Higher-order thinking has become a fundamental skill in education. The challenge for teachers is to develop teaching materials that stimulate students' higher-order thinking skills and, for language teachers in particular, that stimulate students to think and reason about language more consciously and creatively. This workshop is intended to introduce the concepts of language awareness and linguistic reasoning in the context of language teaching. In order to facilitate the development of higher-order learning materials within the language subjects, we developed a framework that will make language awareness visible with linguistic reasoning. In doing so, we strive for enrichment of the subject matter content and provide tools to support teachers in the development and assessment of higher-order thinking exercises. The aim of this workshop is to present a research-based approach for integrating and stimulating higher-order thinking skills within the language subjects in secondary school. Through a combination of hands-on group activities with innovative materials and discussion, workshop participants will develop a more in-depth insight into the above-mentioned concepts and gain practical knowledge on how to use the framework in order to stimulate higher-order thinking in the language classroom. This workshop draws on findings resulting from L1/L2 teachers' experiences in a professional learning community (PLC). In this PLC teachers developed, tested and evaluated a pedagogy for language education based on the framework. In this workshop we will also discuss students' learning outcomes with the use of an assessment tool.

Session I 21

31 August 2017 12:00 - 13:30

Pinni A - A3098

Workshop

Teaching and Teacher Education

Lesson Study as a Tool to Strengthen Teachers' Competencies as a Learning Professional

Keywords: Collaborative Learning, Secondary education, Teacher Professional Development, Teaching / instruction

Interest group: SIG 11 - Teaching and Teacher Education

Chairperson: Josepa Alemany-Costa, Spain

Lesson study is a collaboration-based teacher professional development approach that originated in Japan. Teachers collaboratively engage in research inside their classrooms using a design cycle: prepare and design lessons, perform the designed lesson *live* as a research lesson and evaluate them in order to feed into the next cycle. Great thought is devoted to predicting how the students may react based on the teaching behavior of the teacher. What sets Lesson Study apart from other professional development methods is the *live* research lesson, creating a unique learning opportunity for teachers. Lesson Study has hardly been explored on its effectiveness for teachers' professional development; effects are mostly reported based on self-reports. In this workshop the aim is to familiarize participants with the nuts and bolts of Lesson Study and how teachers' professional development is enhanced by use of Lesson Study. We will brief participants with a Lesson Study plan for a mathematics lesson. Participants will then be split up into the teachers who will be observing the *live* research lesson and into students to whom the *live* research lesson will be taught. The research lesson is given by a mathematics teacher. After this the post-lesson discussion is done, in which the participants who have observed in their teachers role share their experiences. The workshop ends with a reflection of all participants on their experiences. In the discussion, we will also go into the various contextual factors critical if Lesson Study is to become a sustained commitment in schools.

Lesson Study as a Tool to Strengthen Teachers' Competencies as a Learning Professional

Presenting Author: Sui Lin Goei, Windesheim University of Applied Sciences, Netherlands; **Co-Author:** Nellie Verhoef, ELAN, University of Twente, Netherlands; **Co-Author:** Siebrich De Vries, University of Groningen, Netherlands

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Session I 22

31 August 2017 12:00 - 13:30

Main Building C - C7

Workshop

Mixed methods in educational research

Keywords: Doctoral education, Mixed-method research, Qualitative methods, Quantitative methods

Interest group: SIG 17 - Methods in Learning Research

Chairperson: Mirjamaija Mikkila-Erdmann, University of Turku, Finland

In the workshop, participants learn how to build their own mixed methods designs for educational research. A mixed methods design is a design for a study that involves the integration of data from several sources. Examples include the integration of data obtained through different methods, or the integration of answers to separate, but related research questions. We will start by examining some real-life examples from the participants' research practice, and next discuss characteristics, opportunities and pitfalls of mixed methods research in education. Participants will apply a strategy for the design of mixed methods research, developed by the workshop leader, to examples from their own research practice. This strategy involves various specific purposes of mixing, each related to a specific stage in the research process, and classified into three overall purposes of mixing; a distinction between a point of extension and a point of integration; and a method of visualizing cases of mixing.

Mixed methods in educational research

Presenting Author: Judith Schoonenboom, University of Vienna, Austria

In the workshop, participants learn how to build their own mixed methods designs for educational research. A mixed methods design is a design for a study that involves the integration of data from several sources. Examples include the integration of data obtained through different methods, or the integration of answers to separate, but related research questions. We will start by examining some real-life examples from the participants' research practice, and next discuss characteristics, opportunities and pitfalls of mixed methods research in education. Participants will apply a strategy for the design of mixed methods research, developed by the workshop leader, to examples from their own research practice. This strategy involves various specific purposes of mixing, each related to a specific stage in the research process, and classified into three overall purposes of mixing; a distinction between a point of extension and a point of integration; and a method of visualizing cases of mixing.

Session I 23

31 August 2017 12:00 - 13:30

Pinni B - B3117

Workshop

Causal Inference in Educational Research: A discussion about Statistical Methods

Keywords: Design based research, Experimental studies, Quantitative methods, Quasi-experimental research

Interest group: SIG 18 - Educational Effectiveness

Chairperson: Martijn Meeter, VU University Amsterdam, Netherlands

Causal questions in education are extremely relevant. This kind of questions appears, for example, when we want to know what is the effect of a specific type of instruction or educational program. The gold standard to make causal inference are

randomized studies, but in many situations, for ethical or feasibility issues, it is not possible to do it. Quasi-experimental research allows us to overcome this limitation, through the use of statistical methods to control for confounding variables. In this workshop, we will analyze three techniques used in this framework: propensity score analysis, regression analysis and doubly robust estimation. Its advantages, differences and limitations will be discussed with real educational data examples in R and in SPSS.

Causal Inference in Educational Research: A discussion about Statistical Methods

Presenting Author:Valentina Giaconi, Universidad de Chile / Université Grenoble Alpes, France; **Co-Author:**Pascal Bressoux, Université Grenoble Alpes, France; **Co-Author:**Patricio Felmer, Universidad de Chile, Chile

Causal questions in education are extremely relevant. This kind of questions appears, for example, when we want to know what is the effect of a specific type of instruction or educational program. The gold standard to make causal inference are randomized studies, but in many situations, for ethical or feasibility issues, it is not possible to do it. Quasi-experimental research allows us to overcome this limitation, through the use of statistical methods to control for confounding variables. In this workshop, we will analyze three techniques used in this framework: propensity score analysis, regression analysis and doubly robust estimation. Its advantages, differences and limitations will be discussed with real educational data examples in R and in SPSS.

Session I 24

31 August 2017 12:00 - 13:30

Main Building A - A31

ICT Demonstration

Increasing Equity and Challenging Disadvantage

Keywords: Computer-assisted learning, Learning Technologies, Mathematics, Multimedia learning

Interest group: SIG 07 - Learning and Instruction with Computers

Chairperson: Michael Besser, Leuphana University of Lüneburg, Germany

Equity in learning at school in Luxembourg is heavily influenced by the country's multilingual tradition where two-thirds of students enrolling in schools at age four are more likely to struggle in learning, as they do not master any of the three languages actively used for instruction during compulsory education. In this session, participants will use their own mobile device or watch the demonstration to gain hands-on experience of exploring MathemaTIC, an innovative adaptive digital environment to enhance the learning of mathematics in a fairer manner. Created through a collaboration of expertise between Luxembourgish, French and Canadian practitioners, research, pedagogy and technology specialists, MathemaTIC enables primary school students to learn mathematics in German, French, Portuguese or English. Participants will try out the multilingual interactive, visual, audio and video mathematical items and receive real-time feedback on their progress and achievement of the modules. Their experience will feed into a discussion about the benefits of this digital environment in tackling inequity and disadvantages in learning, in particular to exchange views on the extent to which the multilingual items in this adaptive environment have so far served to directly motivate both students and teachers to view mathematic learning from another perspective and increase their chances of success.

Increasing Equity and Challenging Disadvantage

Presenting Author:Catalina Lomos, LISER - Luxembourg Institute for Socio Economic Research, Luxembourg; **Co-Author:**Amina Kafai-Afif, Agency for Development of Quality in Schools, Ministry of National Education, Children and Youth, Luxembourg, Luxembourg

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Session I 25

31 August 2017 12:00 - 13:30

Main Building E - E222

ICT Demonstration

Learning and Instructional Technology

Interactive Feedback about Instructional Quality: Easy Distribution and Usage Tracking

Keywords: Design based research, Educational Technology, In-service teacher education, Teacher Professional Development

Interest group:

Chairperson: David Galbraith, University of Southampton, United Kingdom

All over the world and every day researchers, school inspectors, principals and teachers themselves generate qualitative and quantitative data describing instructional quality. Although feeding back this information is valuable for school and teaching development, systematic implementation of instructional quality feedback is scarce in some countries and researchers are sceptical about the understanding and the usage of feedback through teachers. In our ICT-demonstration we want to show, that the “shiny” web application framework for R is a ideally suited tool to overcome both problems, hence it uses the widespread statistical language R to generate rich and powerful interactive web applications with no knowledge of HTML, CSS or JavaScript. So teachers can explore their feedback interactively by generating different plots of numerical data or displays of free text answers, whereby researchers can investigate the usage of this feedback applications via log data. Results of a design based research study with the shiny framework will be outlined.

Interactive Feedback about Instructional Quality: Easy Distribution and Usage Tracking

Presenting Author: Samuel Merk, University of Tübingen, Germany

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KEYNOTES - PART 2 1

31 August 2017 13:45 - 15:15

Main Building A - Main Auditorium

EARLI Keynote Session

Assessment and Evaluation

Changing Competence Needs and International Comparative Assessments

Keywords: Educational attainment, Educational policy, Secondary education, Survey Research

Interest group: SIG 01 - Assessment and Evaluation

Chairperson: Erno Lehtinen, University of Turku, Finland

Economic development presupposes high-quality education. Education makes it possible for individuals to find their place in the labour market and provides skills transferable to the rapidly changing needs of working life. Education also generates industrial and economic innovations. These two functions of education have been boosted by increasing international competition and automatization, which has largely replaced low-education jobs. However, the strengthening link between education and economy may pose a threat to the independence of the institution of education. Education is a value per se which does not need to be justified by economic gain or social equality. Essentially, education is about civilizing individuals and nations. When succesful in this, education also adds value to the other sectors of society, thereby contributing to overall well-being. In several countries, the current debate on education is dominated by the requirement for increased productivity and effectiveness. Education is expected to yield competences that are directly transferable to the needs of the labour market. Young people likewise appreciate the immediate benefits of education. At the same time, the civilizing function of education has been largely ignored. The threat is that schools produce competent and skilled people with, however, increasingly limited ability to understand other humans and their own humanity. International comparative assessments of educational achievement have attracted wide public interest. Primarily, the interest of both politicians and the media has lied in how countries have ranked in these assessments, whereas little attention has been paid to the reasons behind these rankings. The purpose of this presentation is to show, with the help of examples, how, for instance, PISA data can be used to analyze special characteristics of educational systems. Results of comparative assessments can be used to give political and pedagogical recommendations on how to implement long-term educational renovations. In the end, these results need to be interpreted within the cultural and historical context of each country.

Changing Competence Needs and International Comparative Assessments

Presenting Author: Jouni Välijärvi, University of Jyväskylä, Finland

Economic development presupposes high-quality education. Education makes it possible for individuals to find their place in the labour market and provides skills transferable to the rapidly changing needs of working life. Education also generates industrial and economic innovations. These two functions of education have been boosted by increasing international

competition and automatization, which has largely replaced low-education jobs. However, the strengthening link between education and economy may pose a threat to the independence of the institution of education. Education is a value per se which does not need to be justified by economic gain or social equality. Essentially, education is about civilizing individuals and nations. When successful in this, education also adds value to the other sectors of society, thereby contributing to overall well-being. In several countries, the current debate on education is dominated by the requirement for increased productivity and effectiveness. Education is expected to yield competences that are directly transferable to the needs of the labour market. Young people likewise appreciate the immediate benefits of education. At the same time, the civilizing function of education has been largely ignored. The threat is that schools produce competent and skilled people with, however, increasingly limited ability to understand other humans and their own humanity. International comparative assessments of educational achievement have attracted wide public interest. Primarily, the interest of both politicians and the media has lied in how countries have ranked in these assessments, whereas little attention has been paid to the reasons behind these rankings. The purpose of this presentation is to show, with the help of examples, how, for instance, PISA data can be used to analyze special characteristics of educational systems. Results of comparative assessments can be used to give political and pedagogical recommendations on how to implement long-term educational renovations. In the end, these results need to be interpreted within the cultural and historical context of each country.

KEYNOTES - PART 2 2

31 August 2017 13:45 - 15:15

Tampere Hall - Big Auditorium

EARLI Keynote Session

Teaching and Teacher Education

Moving Beyond Rhetoric: a Culture to Substantiate Research Based Teacher Education

Keywords: Action research, Professions and applied sciences, Researcher education, Teacher Professional Development

Interest group: SIG 11 - Teaching and Teacher Education

Chairperson: Marita Mäkinen, University of Tampere, Finland

European, as well as national steering documents, including Norwegian (Østern & Smith, 2012; Østern, 2016) call for a research based teacher education. Finland is, perhaps, the country that has most profoundly substantiated the concept (Niemi, Toom & Kallioniemi, 2012; Niemi & Nevgi, 2014; Hökkä & Eteläpelto, 2014; Sahlberg, 2014; Krokfors et al, 2015). It is, however, not always clear what is meant by a research based teacher education, or what the policy makers' intentions are when writing the documents. The danger is that the message rests in the rhetoric and is not being subjected to a profound analysis of the notion prior to being translated into practice.

In this presentation I will first argue that teacher education is a career long education, and it is time to move beyond the idea that teacher education is a synonym with initial teacher preparation for the profession. This view aligns with European documents (OECD, 2010; The Teaching Council, Ireland, 2011). Next I will explore who the teacher educators are, especially since in many contexts the practical component of initial teacher education is extended and school-based teacher educators play an increasingly important role in preparing new members of the teaching profession.

Against this backdrop, the main part of the presentation discusses the concepts of research-based teacher education, with a focus on consuming and producing research as an integrated part of a career-long teacher education. There is a need to go beyond the rhetoric and create a culture for research in teacher education at a national and at an institutional level by empowering all actors, teacher educators as well as students of teaching, to become research literate. I will also argue that practitioner research plays a central role in a research based teacher education and discuss the difficulties in legitimising this kind of research in the academic community. There are still several challenges to substantiate a research based teacher education that needs to be further explored in policy discussions as well as in research.

Moving Beyond Rhetoric: a Culture to Substantiate Research Based Teacher Education

Presenting Author: Kari Smith, Norwegian University of Science and Technology, Norway

European, as well as national steering documents, including Norwegian (Østern & Smith, 2012; Østern, 2016) call for a research based teacher education. Finland is, perhaps, the country that has most profoundly substantiated the concept (Niemi, Toom & Kallioniemi, 2012; Niemi & Nevgi, 2014; Hökkä & Eteläpelto, 2014; Sahlberg, 2014; Krokfors et al, 2015). It is, however, not always clear what is meant by a research based teacher education, or what the policy makers' intentions are when writing the documents. The danger is that the message rests in the rhetoric and is not being subjected to a profound analysis of the notion prior to being translated into practice.

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KEYNOTES - PART 2 3

31 August 2017 13:45 - 15:15
Tampere Hall - Small Auditorium
EARLI Keynote Session
Learning and Social Interaction

Promoting Adaptive Regulation: Progress, Challenges and Possibilities

Keywords: Collaborative Learning, Metacognition, Self-regulation, Social aspects of learning and teaching

Interest group: SIG 16 - Metacognition

Chairperson: Sanna Järvelä, University of Oulu, Finland

In the late 1990s and early 21st century, a handful of scholars began to define and explore three social forms of regulation including self-regulation, co-regulation and shared regulation.

Since that time, the field has rapidly burgeoned. This presentation will ground theory and research about social modes of regulation in their theoretical roots within educational psychology and the learning sciences identifying critical constructs underlying our perspectives. Winne & Hadwin's (1998) COPES model of self-regulated learning will be extended to explain adaptive regulation in collaboration. Finally a decade of research will be summarized to illuminate progress, challenges and possibilities facing the field as we strive to model, research, and apply adaptive regulation in the context of dynamic collaborative learning contexts.

Promoting Adaptive Regulation: Progress, Challenges and Possibilities

Presenting Author: Allyson Hadwin, University of Victoria, Canada

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Session J 1

31 August 2017 15:45 - 17:15
Main Building C - C6
Single Paper
Assessment and Evaluation

Assessment Methods and Tools

Keywords: Assessment methods and tools, Competencies, Comprehension of text and graphics, Educational Technology, Higher education, Primary education, Professions and applied sciences, Reading comprehension, Reflection, Student learning

Interest group: SIG 01 - Assessment and Evaluation

Chairperson: Marij Veldman, University of Groningen, Netherlands

Toward a better judgment of item relevance in progress testing.

Keywords: Assessment methods and tools, Higher education, Professions and applied sciences, Student learning

Presenting Author: Xandra Janssen-Brandt, Zuyd University of Applied Sciences, Netherlands; **Co-Author:** Dominique Sluijsmans, Zuyd University of Applied Sciences, Netherlands; **Co-Author:** Arno Muijtjens, Maastricht University, Netherlands

Items must be relevant to ensure item quality and test validity. As 'item relevance' is not operationalized yet, it is difficult to reach consensus agreement on it. A rubric was developed to help define item relevance. This study explores the influence of this rubric on the assessment of item relevance and on inter-rater agreement in particular. Members of the item review committee (RC) and students, teachers, and alumni (STA) reassessed the relevance of 50 previously used progress test (PT) items and decided about their inclusion using a 5-criteria rubric. Data were analyzed at item level using paired samples t-tests and Intraclass Correlation Coefficients (ICC) and at rater level in a generalizability (G) analysis per group. The proportion of items that the RC judged relevant enough to be included decreased substantially from 1.00 to 0.72 ($p < 0.001$). Agreement between the RC and STA was high, with an ICC of >0.7 across items. To achieve an acceptable inter-

rater reliability for relevance and inclusion, 6 members must serve on the RC. Use of the rubric results in a stricter evaluation of items' appropriateness for inclusion in the PT and facilitates agreement between the RC and other stakeholders. Hence, it may help increase the acceptability and validity of the PT.

Evaluating the Alignment of Examinations: The Student Perspective

Keywords: Assessment methods and tools, Educational Technology, Higher education, Student learning

Presenting Author: Tobias Halbherr, Swiss Federal Institute of Technology Zurich / ETH Zurich, Switzerland

Constructive alignment is a widely accepted good-practice framework that emphasizes the importance of examinations in teaching and learning. This study analyses data from over 34'000 examination evaluation questionnaires from more than 900 paper- and computer-based, for-credit examinations at a large European STEM university. Data was collected as part of the regular Student Evaluation of Teaching in the academic year 2015/2016. The questionnaire consists of 20 five point Likert-items. The Likert items are designed to assess student appraisals of alignment of teaching and examination, and other constructs such as test fairness, depth of learning approach, appropriate amount of time provided, expected grade, or overall satisfaction with the examination. In this study the collected student evaluation data is analysed to assess the relevance of alignment with regards to examination quality and student learning from the students point of view.

Development of rubrics to assess the reflective thinking of university students

Keywords: Assessment methods and tools, Competencies, Higher education, Reflection

Presenting Author: Patrick Lai, Hong Kong Polytechnic University, Hong Kong

Case-based learning packages were developed to raise awareness of first year university students of the need to develop generic attributes for their profession during their course of study. In order to assess the learning impact of these case-based packages on their learning, students were asked to write reflective journals to document their learning experiences. Rubrics were established to assess the degree of their reflection. Sample reflective journals completed by 41 university students who had previously worked through the packages in 4 academic departments were used as a basis for establishing the standards for the rubric. Extracts of students' reflective journals were used as illustration of each of the category in the rubric. The four-category scheme of non-reflection, understanding, reflection and critical reflection (Kember *et al.*, 2008) would be used as the foundation for developing the categories of the rubrics. The originality of this paper attempted to extend the assessment literature of generic attributes by developing rubrics to assess the reflective thinking of students having gone through case-based learning packages.

Analysis of the Comprehension Tasks of National Standardised Tests of Estonian Language

Keywords: Assessment methods and tools, Comprehension of text and graphics, Primary education, Reading comprehension

Presenting Author: Triinu Kärbla, University of Tartu, Estonia; **Co-Author:** Krista Uibu, University of Tartu, Estonia; **Co-Author:** Mairi Männamaa, University of Tartu, Estonia

Text comprehension is a complex process where low- and high-level skills are likely to interact. In this article the comprehension tasks of national standardised tests of Estonian language for Grade 6 in 2013–2015 are analysed to detect levels of text comprehension in standardised tests. We found that the comprehension tasks in standardised tests are mostly focused on factual knowledge. Furthermore, 76% of questions in the National standardised test in 2014 and 57.1% in 2015 consisted of tasks which measured children's ability to recall the details from the read or heard text. In 2013, there were 42.8% of tasks like this in national standardised test. We found only one task (in year 2013) which demanded the highest skills – implementing pre-knowledge into evaluation process. Thus, the tasks used in standardised test are not enough wide-ranging to find out students' skills at different levels of text comprehension. As long as national standardised tests consist mostly of tasks that require readers' memory, teachers also concentrate mainly on supporting students' lower-level text comprehension skills. Therefore, promoting the students' high-level skills may be insufficient. On the other hand, text comprehension is one of the most important competences students must acquire for successful academic and lifelong growth.

Session J 2

31 August 2017 15:45 - 17:15

Pinni B - B4116

Single Paper

Assessment and Evaluation, Instructional Design, Learning and Instructional Technology

Computer-Supported Collaborative Learning

Keywords: Communities of learners, Computer-supported collaborative learning, Conceptual change, Educational Technology, Inquiry learning, Learning Technologies, Mathematics, Primary education, Problem solving, Science education, Social interaction, Survey Research

Interest group: SIG 01 - Assessment and Evaluation, SIG 06 - Instructional Design, SIG 20 - Inquiry Learning, SIG 26 - Argumentation, Dialogue and Reasoning

Chairperson: Sindu George, Monash University, Australia

Scaffolding elementary school students' collaborative learning on tablets

Keywords: Computer-supported collaborative learning, Learning Technologies, Mathematics, Primary education

Presenting Author:Lara Johanna Schmitt, Saarland University, Germany; **Co-Author:**Armin Weinberger, Saarland University, Germany

Multi-touch interfaces allow for direct and simultaneous input by several co-present learners. Additional scaffolding may or may not be needed to ease or problematize tasks that involve intuitive bodily experiences. In this study, a tablet app ("Proportion") is supposed to enable two novices (about 10 years old) to collaboratively construct an understanding of proportional relations. In a 2x2 factorial design ($n = 162$), effects of facilitating strategy prompts (with / without) and problematizing verbalization prompts (with / without) regarding the variables task focus, emotions, quality of dialogue and learning gains have been investigated. While the strategy prompts did not have any significant influence, the verbalization prompts had versatile effects: On one hand, quality of talk was improved, on the other hand, task focus and emotions were negatively affected. Learning gains were limited to near transfer task types and comparable over conditions.

Development of the Collaborative Skills Questionnaire (ColSQ) – first results of a pilot study

Keywords: Computer-supported collaborative learning, Problem solving, Social interaction, Survey Research

Presenting Author:Anita Pásztor-Kovács, University of Szeged Doctoral School of Education, Hungary; **Presenting Author:**Attila Pásztor, MTA-SZTE Research Group on the Development of Competencies, Hungary

The aim of this research is to develop a new instrument called Collaborative Skills Questionnaire (ColSQ) for the effective investigation of the social component of Collaborative Problem Solving (ColPS) on individual level. Herewithin, the results of a pilot study are presented. The paper and pencil questionnaire was administered to 96 pupils from four 8th grade (age 14) classes in classroom context. Based on the theoretical model of ColPS by Hesse et al. (2016) we created 3 subscales, Participation (Partsc), Perspective taking (Perspsc) and Social regulation (Socregsc) with 10, 6 and 17 items assigned to 10 subskills. Participants had to rate on a 5-point scale how well the 33 statements described them. After removing 4 items the reliability (Cronbach's alpha) indexes are .91 for the entire ColSQ, .83 for Partsc, .68 for Perspsc and .80 for Socregsc. Principal Component Analyses with Varimax rotation resulted in a 2-factor solution on Partsc in consistence with its 2 subskills (factor loadings \geq .68; total variance explained=65.89%). On Perspsc 2 factors clearly represent the 2 subskills (factor loadings \geq .67; total variance explained=60.00%). Socregsc items compose 3 factors (factor loadings \geq .69; total variance explained=66.01%), one is completely, another one is in 2/3 part determined by a subskill. ColSQ and its subscales proved to be reliable, the notable congruence between the factor structure and the theoretical model indicates a promising but currently moderate level of construct validity. Further research is necessary for its increase with the inclusion of a greater sample and the application of confirmatory factor analyses.

Critique is good. Suggesting corrections is better: Sharing Peer Ideas during Inquiry Learning

Keywords: Computer-supported collaborative learning, Educational Technology, Inquiry learning, Science education

Presenting Author:Astrid Wichmann, Ruhr University Bochum, Germany; **Co-Author:**Camillia Matuk, New York University, United States; **Co-Author:**Elissa Sato, University of California-Berkeley, United States; **Co-Author:**Libby Gerard, University of California-Berkeley, United States; **Co-Author:**Jacquie Madhok, University of California-Berkeley, United States; **Co-Author:**Marcia Linn, University of California-Berkeley, United States

In this study, we explored the value of critique to support students in distinguishing between normative and non-normative ideas about energy. In a Web-based Inquiry Science Environment (WISE, Linn & Eylon, 2011), we scaffolded students' idea generation and sharing. In total, 132 students from five middle school classes were randomly assigned to one of two conditions where students either chose ideas they disagreed with (Critique condition) or agreed with (Agree condition). Open and closed response pre- and posttest items, embedded items, as well as students' reflections were analyzed. Results showed that through choosing opposing ideas, students were encouraged to make suggestions for corrections, yet through agreeing with ideas students were not. Furthermore, findings suggest that critique affected knowledge gain positively but only if students made suggestions for corrections.

Examining and Developing Epistemic Cognition in Computer-Supported Collaborative Knowledge Building

Keywords: Communities of learners, Computer-supported collaborative learning, Conceptual change, Inquiry learning

Presenting Author:Carol Chan, The University of Hong Kong, Hong Kong; **Co-Author:**Ivan Lam, Open University of Hong Kong, Hong Kong

This study investigated the role of knowledge building and Knowledge Forum®, a computer-supported collaborative learning environment in fostering epistemic and conceptual change. Participants were eighty 10th grade students studying electro-chemistry in two Hong Kong classrooms. Supported by Knowledge Forum, students engaged in knowledge-building inquiry posting questions, co-constructing explanations and they wrote reflective knowledge-building portfolios tracing their own trajectory of conceptual change and collective growth. Two conditions were included, knowledge building (KB) and knowledge building with epistemic scaffolds (KBS). Data included epistemic-belief questionnaires; conceptual-change tests and knowledge-forum portfolio. Quantitative analysis indicate both knowledge-building classes improved on post-test conceptual and epistemic-belief measures with stronger effects in KBS class. Qualitative analysis of knowledge-building portfolios identified six epistemic cognition processes grouped as (a) epistemic aims and goals; (b) evaluation of knowledge claims; and (c) creation and development of ideas. Analysis of portfolios showed increases of epistemic cognition indicating

growth over time. Hierarchical regression analyses show that epistemic cognition scores predict post-test conceptual scores over and above pre-conceptual scores; similarly, epistemic cognition scores predict post-test epistemic-belief scores over and above pre-test epistemic-belief scores. Implications of examining epistemic cognition in situated context and role of knowledge-building environment in epistemic and conceptual change are discussed.

Session J 3

31 August 2017 15:45 - 17:15

Linna - K103

Single Paper

Learning and Social Interaction, Motivational, Social and Affective Processes

Motivation and Emotion - B

Keywords: Collaborative Learning, Developmental processes, Emotion and affect, Higher education, Learning approaches, Mixed-method research, Motivation, Motivation and emotion, Peer interaction, Primary education, Science education, Self-regulation, Social aspects of learning and teaching

Interest group: SIG 08 - Motivation and Emotion

Chairperson: Meng-Jung Tsai, National Taiwan University of Science & Technology, Taiwan

Surface and Deep Learning, Problematic Internet Use, and Fear of Missing Out (FoMO)

Keywords: Learning approaches, Mixed-method research, Motivation, Peer interaction

Presenting Author: Dorit Alt, Kinneret College on the Sea of Galilee, Israel; **Co-Author:** Meyran Boniel-Nissim, Kinneret College on the Sea of Galilee, Israel

Despite increased interest in and writing about FoMO, very little is empirically known about the phenomenon and its correlates in the context of learning approaches. This exploratory study was aimed at revealing possible links between adolescents' deep and surface approaches to learning, Fear of Missing Out (FoMO), and Problematic Internet Use (PIU). Given the exploratory nature of this study, two statistical techniques were used: Structural Equation Modeling (SEM) and Smallest Space Analysis (SSA). Data were gathered from 216 adolescents, by three questionnaires: the Fear of Missing Out scale (FoMOs), Short Problematic Internet Use Test (SPIUT), and Student Process Questionnaire (R-SPQ-2F). The SSA results yielded a *simplex* projection. The projection has confirmed the two-factorial theoretical structure of deep and surface learning. Additional information provided by the SSA projection was that both PIU and FoMO factors were located in the *surface learning* area. Based on this analysis and the theoretical framework, SEM was deployed to discover possible links between the research factors. According to the path model results, the FoMO variable had a moderating role, impacting the relationship between the PIU and surface learning variables. Limitations, conclusions, and directions for further research are discussed.

Individual and group-level affective aspects of small group work in high school science.

Keywords: Collaborative Learning, Emotion and affect, Science education, Motivation and emotion

Presenting Author: Martina Nieswandt, University of Massachusetts Amherst, United States; **Co-Author:** Elizabeth McEneaney, University of Massachusetts Amherst, United States

Small group work is a major instructional strategy in many learning contexts. Activities done in small groups, grounded in a constructivist view of learning, offer a common means of teaching, yet guidance for teachers about how best to guide small group work remains scant. For adolescents in particular, the affective dimension of small group dynamics may play a substantial role in learning outcomes, and our study investigates (i) what aspects of affect (interest, emotions) can be observed during small group work, and (ii) whether there is such thing as group-level affect. Results indicate activity-specific links between expressed emotions (excitement, disgust) and triggers of interest (novelty, personal relevance) on the individual and the group level. Expression of negative emotions didn't lead to lack of interest; they were associated with observing science instead of doing science. Collectively maintained interest rarely guided progress on science content raising the question about other factors necessary for science content development during small group work, e.g., social/relational competencies.

Emotion regulation in primary school children: A systematic review

Keywords: Developmental processes, Emotion and affect, Primary education, Social aspects of learning and teaching

Presenting Author: Juliane Schlesier, University of Oldenburg, Germany; **Co-Author:** Barbara Moschner, Carl von Ossietzky Universität Oldenburg, Germany; **Co-Author:** Ingo Roden, Carl von Ossietzky University Oldenburg, Germany

In the past years, numerous studies investigated the meaning of social environment (especially family and peers) for the development of emotion regulation, including the milestones of development, diverse strategies, and cognitive as well as affective components of emotion regulation. Nevertheless, the role of the primary school as an institution for the development of emotion regulation has been widely disregarded, although most recent research had an explicit school or classroom setting. The purpose of this study is to perform a systematic review to investigate the role the primary school in any emotion regulation processes. After particular scoping research all studies of the research field have been collected from 18 appropriate search databases as Web of Science, SocINDEX, JSTOR and ERIC, obtaining 3472 results. Furthermore, main scope was limited by in- and exclusion-criteria of a PICO-table (population, language, setting, topic,

study design and relevance) to a number of 21 relevant papers that had been published between 2011 and 2016. Findings show that the papers are classified in three different groups of study designs: long-term interventions, longitudinal studies without intervention and cross-sectional studies. Since the established programs as SEL or TFGA have larger, significant effects than widely unknown programs, it seems advisable to apply and refine established programs. Further results for the three different approaches will be presented at the conference.

The Interplay of Motivational Regulation and Social Support for Successful Academic Learning

Keywords: Higher education, Motivation, Self-regulation, Motivation and emotion

Presenting Author: Thomas Martens, Medical School Hamburg, Germany

This study invests the interplay of motivational regulation and social support for academic learning. Especially, social support is known as an important resource for coping with academic stress. So the key research question was: can academic motivation successfully be regulated without social support? As theoretical background for motivational regulation serves the Integrated Model of Learning and Action (IMLA) that defines three main phases of learning: the motivation phase, the intention phase and the volition phase. 257 students from two private universities in Germany were asked with an online questionnaire that covers most scales regarding the IMLA and an additional scale for social support. In a 2-step-analysis process based on IRT methods five typical motivational profiles can be identified: pragmatic, anxious, self-determined, negative and strategic. The social support scale was analysed with a latent class analysis and resulted in two profiles: low and high social support. Associating both results show that especially the very motivated students (self-determined) have high social support whereas the low motivated students (anxious and negative) have just low social support. It can be stated that successful motivational regulation is always accompanied by social support. Further studies have to prove if social support is always necessary or if motivational regulation also enables to find or recreate social support.

Session J 4

31 August 2017 15:45 - 17:15

Pinni B - B1096

Single Paper

Higher Education

Higher Education - M

Keywords: Artificial intelligence, Assessment methods and tools, Cognitive skills, Competencies, E-learning / Online learning, Educational Technology, Higher education, Motivation, Problem solving, Professions and applied sciences, Qualitative methods, Student learning, Teacher Professional Development

Interest group: SIG 04 - Higher Education

Chairperson: Dominique Rauch, German Institute for International Educational Research (DIPF), Germany

Practically Oriented Modelling and Validation of Competency Frameworks

Keywords: Competencies, Higher education, Professions and applied sciences, Qualitative methods

Presenting Author: Alexander Baumgartner, ZHAW School of Management and Law, Switzerland; **Co-Author:** Claude Müller Werder, ZHAW School of Management and Law, Switzerland

A competency framework is a matrix defining competency-oriented objectives for study programs. Simply put, it is designed to highlight what students are supposed to be able to do after they complete their studies. Competency frameworks form the basis for a differentiated assessment of students' professional, methodological, and social competence and self-competence, which in turn contributes towards the continuous improvement of study programs. Based on input from internal stakeholders (Center for Innovative Teaching and Learning: educational perspective, heads of degree programs: academic/university perspective) a specific target structure was designed for eight Bachelor's and eight Master's degree programs in the discipline Business Studies and geared towards "typical" future work scenarios of graduates. A total of 39 guided interviews were conducted to validate these documents from external stakeholders (employers: entrepreneurial perspective, graduates: student perspective), after the competency frameworks were refined and finalized.

Integrated authentic assessment design for motivation and quality learning

Keywords: Assessment methods and tools, Higher education, Motivation, Student learning

Presenting Author: Graham Hendry, University of Sydney, Australia; **Co-Author:** Elise Baker, The University of Sydney, Australia; **Co-Author:** Michael McDonnell, The University of Sydney, Australia

As teachers in higher education often the greatest challenge in our role is engaging our students. We want our students to be positively motivated to master the material of our disciplines and professions. However, despite several well-researched educational psychology theories of learners' motivational processes, recommendations for everyday practice in higher education are generally not well articulated. We already know for example that assessment 'drives learning', but this over-used phrase has almost lost its meaning, and some assessment may 'drive' students in the wrong direction. In this presentation we present evidence of the effectiveness of authentic assessment design for motivating students to achieve high quality, desirable learning outcomes. Authentic assessments are based on real-world professional scenarios and/or discipline practices. Students are engaged by such assessments because they perceive them as being relevant to the

study of a discipline and/or their future careers. We report learning outcomes data and the results of two qualitative case studies of authentic assessment design: from a Health Professional program and an Arts and Social Sciences program. We integrate theories of learners' motivational processes, including goal and self-determination theory, and the concepts of personal interest and self-efficacy to explain our results. By combining diverse theoretical perspectives with qualitative case data, we articulate key features of authentic assessment design. Faced with the challenge of motivating and engaging our students, we argue that by changing the design of assessment to make it more authentic, students' intrinsic motivation for learning is enhanced and quality learning outcomes are achieved.

Understanding the underpinnings of complex problem solving in a higher-education setting

Keywords: Artificial intelligence, Cognitive skills, Higher education, Problem solving

Presenting Author: Mariel Musso, CIIPME(CONICET)-UADE, Argentina; **Co-Author:** Pablo Gonzalez, UADE University, Argentina; **Co-Author:** Maida Mustafic, University of Luxembourg, Luxembourg; **Co-Author:** Samuel Greiff, University of Luxembourg, Luxembourg; **Co-Author:** Eduardo C. Cascallar, KU Leuven, United States

In recent years, educational and cognitive research has emphasized the importance of cross-curricular skills such as complex problem solving (CPS) not only for success in the learning process, but also for success in current modern societies requiring these complex skills. This study utilized a machine-learning approach to develop models predicting the performance of first-year university students in several dimensions of CPS, examining the contribution of complex interactions of working memory, attention, perseverance, openness and background. Once these models were established, accurately describing each of the performance groups in three aspects of CPS (exploration strategies, knowledge acquisition phase, and knowledge application phase), differences between low and high performers in these CPS phases were studied for several variables which have been shown to have important effects in performance: cognitive (working memory, executive attention, operations reaction time, executive attention reaction time), motivational and self-regulation (perseverance, openness, subjective competence, task attraction), and background variables (levels of education of mother and father, SES indicators, and others). Results indicate specific effects that show the pattern of mediation of these various variables on CPS and its three aspects considered in the study. The contribution of the findings relate to cognitive theory and to possible educational interventions that take into account individual differences in approaching complex problem situations.

21st Century Skills in the Higher Education Development Projects

Keywords: E-learning / Online learning, Educational Technology, Higher education, Teacher Professional Development

Presenting Author: Mikko Vesisenaho, University of Jyväskylä, Finland; **Co-Author:** Tuula Nousiainen, University of Jyväskylä, Finland; **Co-Author:** Anne Virtanen, University of Jyväskylä, Finland; **Co-Author:** Janne Fagerlund, University of Jyväskylä, Finland; **Co-Author:** Jenni Rikala, University of Jyväskylä, Finland

A common claim is that higher education is easily behind when discussing the early adoption of new educational innovations. The higher education institutions are adhered to the earlier traditions in their teaching.

Our aim was to analyze and develop educational practices for higher education in this digital society. This work built on the concepts of cultural ecology and 21st century skills in relation to pedagogy. The specific objective of this study was to find out: How the 21st-century skills framework contents appear in higher education development projects?

As a focus group we had 12 educational development projects in a Finnish university focusing on 'eEducation' in 2014. The data for the study was focusing on a variety of the reporting documents and outcomes of the projects. The data was qualitatively analyzed using content analysis.

The most frequent codes were related to Tools for working, and as a part of ways of thinking Learning to learn and metacognition. Personal and social responsibility, including cultural awareness and competence were the rarest ones.

The focus on Learning to learn and metacognition is promising for educational development, also the focus on collaboration. But as the 21st century main matches were Tools for working: Information literacy and ICT literacy. This raises the question, is the development still tool oriented? An essential question is why creativity and innovation were in minor role as they could be highly relevant for the future living in the world as well.

Session J 5

31 August 2017 15:45 - 17:15

Virta - 113

Single Paper

Developmental Aspects of Instruction, Teaching and Teacher Education

Writing - B

Keywords: Achievement, Argumentation, Attitudes and beliefs, Early childhood education, Language (L1/Standard Language), Literacy, Primary education, Science education, Secondary education, Teaching / instruction, Writing / Literacy

Interest group: SIG 12 - Writing

Chairperson: Taiga Brahm, University of Tübingen, Germany

Children`s beliefs on leisure time writing: the pivotal role of motivation

Keywords: Attitudes and beliefs, Literacy, Primary education, Writing / Literacy

Presenting Author: Lisa Birnbaum, University of Erlangen-Nuremberg, Germany; **Co-Author:** Elisabeth M. Schüller, Leibniz-Institut für Bildungsverläufe (LIbBi) Bamberg, Germany; **Co-Author:** Stephan Kroener, Friedrich-Alexander-Universität Erlangen-Nürnberg (FAU), Germany

To acquire writing skills, children should write – not only write at school, but also in their leisure time. However, writing is also a cultural activity with value in itself. As there is a scarcity of research that investigates the whole bandwidth of determinants that predict leisure time writing in children, this has been the aim of the present study. Building on a prior qualitative study, eliciting the set of beliefs that may potentially determine leisure time writing and on two quantitative pilot studies, we asked 1109 third grade students (age $M = 8.7$ years, $SD = .63$) and their parents ($N = 1003$) to complete questionnaires on beliefs that may determine leisure time writing and on how much children write. Results provided evidence regarding invariance of the items across gender and mother's educational attainment. Moreover, in a structural equation model all predictors used in the study including motivation in action as a mediator explained a large proportion of variance in children's leisure time writing activities ($R^2 = .79$). The results are discussed with regard to how research on writing activities can be connected with research on writing achievement. Implications for families and teachers are considered.

Teaching Novice Middle School Writers to Construct and Critique Scientific Explanations

Keywords: Argumentation, Science education, Secondary education, Writing / Literacy

Presenting Author: Susan De La Paz, University of Maryland, United States; **Co-Author:** Daniel Levine, University of Maryland, United States

In the United States, the Next Generation Science Standards (NGSS) call for students to engage in scientific practices, such as constructing explanations and engaging in argumentation with evidence. While many studies in the science Education literature focus on engaging students in argumentation – on constructing, evaluating, and responding to scientific claims with evidence and reasoning (Berland & Hammer, 2012), much of this work focuses on oral discourse. In this study, we report on the effects of a cognitive apprenticeship designed to facilitate middle school students' efforts to construct and critique scientific explanations in writing using a single case design (multiple baseline design across classrooms) complimented by analyses of a counterbalanced transfer task that was administered before and after the study. Our results show positive effects on student learning on two writing tasks (one task was ongoing throughout data collection as part of the single case design and the other was a transfer task), which we disaggregate for three groups of learners, those who are: (a) proficient in both reading and writing, as measured by a high stakes standardized literacy test, (b) proficient in one but not both of the high stakes tests, and (c) below proficient on both the reading and writing assessments. Thus, we see initial evidence that young students can apply sophisticated criteria for evaluating the adequacy of their own written explanations as well as learn to construct causal explanations in science classes.

Writing Talk: Teacher Modelling of Metalinguistic Thinking about Writing

Keywords: Language (L1/Standard Language), Literacy, Teaching / instruction, Writing / Literacy

Presenting Author: Debra Myhill, University of Exeter, United Kingdom; **Co-Author:** Susan Jones, University of Exeter, United Kingdom; **Co-Author:** Helen Lines, University of Exeter, United Kingdom

The use of teacher modelling as a strategy for teaching writing has been a standard element in curriculum policy in many countries, for example, in the United States, England and Australia. Pedagogical guidance on teacher modelling of writing tends to emphasise teachers sharing their thinking and their composing decisions with young writers. Theoretically, teacher modelling draws on our understanding of metacognition, and particularly in relation to writing, self-regulation of the process of writing. However, the pedagogical and empirical attention has focused on strategic self-regulation and there is little that considers how teacher modelling can support writers in developing metalinguistic understanding about the textual choices they make as writers. Drawing on data from a three year longitudinal study, funded by the Economic and Social Research Council, this paper will consider *metalinguistic modelling*, where teachers model their thinking, as they write, aiming to help young writers understand the linguistic decision-making and the repertoire of choices available to them. The paper will outline the characteristics of effective and less effective teacher modelling of writing, and will develop and illustrate the new concept of 'metalinguistic modelling'.

Handwriting automaticity and writing instruction in Australian kindergarten: An exploratory study

Keywords: Achievement, Early childhood education, Teaching / instruction, Writing / Literacy

Presenting Author: Debora Valcan, Murdoch University, Australia; **Co-Author:** Anabela Malpique, Murdoch University, Australia / University of Lisbon, Portugal, Australia; **Co-Author:** Deborah Pino-Pasternak, Murdoch University, Australia

Abstract The present study examined the levels of handwriting automaticity at the end of kindergarten and the amount and type of writing instruction children experience before entering Year 1. The following questions were addressed in this study: (1) What level of handwriting automaticity do children exhibit at the end of kindergarten? (2) How much variation in writing automaticity is attributable to classrooms and schools? (3) What writing instruction do children experience at the end of kindergarten? (4) Are there associations between classroom writing instruction and children's level of handwriting automaticity? The current study involved 177 kindergarten children enrolled in 23 classrooms from seven public primary schools in Western Australia. Individual child level data (e.g., handwriting automaticity and word reading skills) were collected and teachers were asked to complete a survey assessing *the amount of time and types of writing activities developed in their classrooms (viz., teaching basic skills and teaching writing processes)*. *Hierarchical linear models were*

conducted to examine total variance attributable to child and classroom levels. Results showed a total variance of approximately 20% in children's handwriting automaticity attributable to differences among classrooms when gender and word-reading skills were controlled for. Large variability was noted in the amount and type of writing instruction reported by each participating teacher. Handwriting automaticity was associated with the teaching of revising strategies but not with the teaching of handwriting. Implications for writing development and writing instruction will be discussed.

Session J 6

31 August 2017 15:45 - 17:15

Pinni B - B4113

Single Paper

Motivational, Social and Affective Processes

Motivation and Achievement

Keywords: Achievement, Emotion and affect, Goal orientation, Mathematics, Meta-analysis, Motivation, Motivation and emotion, Primary education, Quantitative methods, Science education, Secondary education

Interest group: SIG 08 - Motivation and Emotion

Chairperson: Daniel Sommerhoff, Ludwig-Maximilians-Universität (LMU), Germany

Choice of STEM-Subjects for the Secondary School Leaving Examination - Determinants for Boys & Girls

Keywords: Achievement, Mathematics, Science education, Secondary education

Presenting Author: Nele Nicole Kampa, Leibniz Institute for Science and Mathematics Education (IPN), Germany; **Co-Author:** Sonja Krämer, Leibniz-Institute for Science and Mathematics Education (IPN), Germany; **Co-Author:** Bettina Hannover, Freie Universität Berlin, Germany

Students' STEM-related performances and academic choices in late secondary school channel their future choices of subject majors at university. In Germany, students have to choose at least one STEM-subject (mathematics, biology, physics, chemistry, or informatics) for their Secondary School Leaving Examination (*Abitur*). We examined what predicts students' choices among these options. Previous research found gender-related differences for academic choices and performances and influences of domain-specific abilities, expectations of success, attainment and utility values. We investigated whether these variables are differentially related to Abitur-exam choices of mathematics, biology or physics and students' performance in these exams and differences between boys and girls. We expected that performance outcomes are most strongly related to ability measures and subject choices to expectancy-value measures.

Our sample consisted of 3,639 13th graders who worked on achievement tests for science and mathematics, and on a questionnaire grasping science and mathematics self-concept, attainment and utility values. Consecutive logistic and linear regressions on Abitur-subject choice and performances in these exams showed differing predictors for mathematics, physics, and biology. We detected negative effects of math-related variables on the choice of biology and physics and vice versa. Subject choices were predicted by students' attainment values, while ability measures were better predictors of exam performance. Moreover, attainment values were more important for girls. Results imply the question whether the option to choose among different STEM-subjects encourages gender typed choices and enhances gender differences in performance outcomes – compared to a system where all students take the same exams, irrespective of personal (gendered) preferences.

Academic self-concept and its relationship with students' recovery after an achievement situation

Keywords: Achievement, Goal orientation, Motivation, Motivation and emotion

Presenting Author: Sigrid Wimmer, University of Graz, Austria; **Co-Author:** Helmut Lackner, Medical University of Graz, Austria; **Co-Author:** Manuela Paechter, University of Graz, Austria; **Co-Author:** Ilona Papousek, University of Graz, Austria

Students' acquire their academic self-concept via experiences and environmental feedback. Their self-concept is of importance concerning their performance, their approach towards achievement situations and their coping behavior. Coping includes the adjustment to a stressor and the adjustment after the stressful event has ended. The autonomous nervous system, which innervates the cardiovascular system, adjusts quickly to environmental demands. Markers of heart rate variability (HRV) index different processes, such as for sympathetic and parasympathetic tone. The present study investigated relationships between students' different types of self-concept and activity in sympathetic or parasympathetic nervous system after a real achievement situation in a university course. It was assumed, that different types of the self-concept are related to different coping processes observable in cardiovascular recovery. 69 students participated in the study. They all gave a presentation in a university course while their heart rate was recorded using portable ECG-devices. HRV data was analyzed calculating low frequency and high frequency variables. Results showed that the social self-concept was related to a still enhanced sympathetic tone after the presentation, indicating rather poor recovery. The absolute self-concept was related to rather efficient recovery after the achievement situation. It is assumed, that the social self-concept, which relies on comparison with others, contributes to misinterpretation of own abilities which may prevent efficient adjustment and leads to prolonged recovery. Absolute self-concept is a more general self-concept without a frame of reference. The lack of an external frame of reference may support the trust into one's own abilities.

The structure of math anxiety revisited: Incorporating psychological dimensions and setting factors

Keywords: Emotion and affect, Mathematics, Primary education, Quantitative methods

Presenting Author: Sofie Henschel, Humboldt Universität zu Berlin, Germany; **Co-Author:** Thorsten Roick, Senate Administration for Education, Youth, and Science, Berlin, Germany, Germany

We investigated the multidimensional structure of math anxiety and explored gender differences in the sub-dimensions of cognitive and affective math anxiety. In all, 368 elementary 4th grade students answered a questionnaire concerning their cognitive (worry) and affective (nervousness) math anxiety when dealing with mathematical problems in several settings (e.g., being evaluated by test or teacher, learning in class, studying individually, and applying mathematical concepts in everyday life). Testing alternative multidimensional models indicated a hierarchical structure of math anxiety. Specifically, a six-dimensional model with *math evaluation anxiety*, *math learning anxiety*, and *math application anxiety* originated from both cognitive and affective math anxiety at the second-order level. Girls reported higher math anxiety than boys, which was particularly pronounced in the total score of affective math anxiety and in high-stakes evaluation related settings. The gender differences in affective math evaluation anxiety also remained after controlling for mathematics performance, whereas gender gaps in all other sub-dimensions disappeared. Given that performance did not account for gender differences in affective math evaluation anxiety, future research needs to investigate whether and how environmental factors account for differences in particular in affective math anxiety concerning high stakes situations. Understanding how individual and environmental factors interact and relate to math anxiety sub-dimensions may help to design interventions in order to prevent and reduce cognitive and affective math anxiety in specific settings.

Relationships between school belonging and various student outcomes: A meta-analytic review.

Keywords: Achievement, Meta-analysis, Secondary education, Motivation and emotion

Presenting Author: Hanke Korpershoek, University of Groningen, Netherlands; **Co-Author:** Esther Canrinus, University of Agder, Norway; **Co-Author:** Marjon Fokkens-Bruinsma, University of Groningen, Netherlands; **Co-Author:** Hanke DeBoer, GION - University of Groningen, Netherlands

This meta-analysis examines the relation between students' sense of school belonging and their academic, motivational, social-emotional, and behavioural outcomes in secondary education. School belonging is defined by Goodenow (1993) as "the extent to which students feel personally accepted, respected, included, and supported by others in the school social environment" (p. 80). To further understand the size and direction (positive/negative) of the relationships between students' school belonging and these students' outcomes, the following research question is addressed: *To what extent is secondary school students' school belonging related to students' academic, motivational, social-emotional, and behavioural outcomes?* The meta-analysis includes 58 correlational studies, published in peer-reviewed journals between 2000 and 2015. Preliminary results reveal, on average, a small positive correlation with academic achievement. Small to moderate positive correlations are observed with the other student outcomes such as self-perceptions. A small negative correlation is observed with absence/drop-out rates. The results thus reveal that a sense of school belonging is an important factor in students' overall school functioning.

Session J 7

31 August 2017 15:45 - 17:15

Main Building A - A2A

Single Paper

Lifelong Learning, Motivational, Social and Affective Processes

Comprehension of Text and Graphics

Keywords: Argumentation, Attitudes and beliefs, Comprehension of text and graphics, Emotion and affect, Experimental studies, Literacy, Mixed-method research, Motivation, Reading comprehension, Secondary education, Self-regulation, Student learning, Technology

Interest group: SIG 02 - Comprehension of Text and Graphics

Chairperson: Marian Mahat, The University of Melbourne, Australia

Different wording in multiple documents: Helpful or harmful for individual learning?

Keywords: Comprehension of text and graphics, Experimental studies, Motivation, Reading comprehension

Presenting Author: Cornelia Schoor, University of Bamberg, Germany; **Co-Author:** Nadine Melzner, University of Bamberg, Germany; **Co-Author:** Cordula Artelt, Bamberg University, Germany

Prior research has shown that in collaborative learning with multiple documents, using different words for the same concept is helpful for learning. This is probably due to the fact that students discuss the meaning of the different words and thereby learn more than if they are provided with the same wording. Whether this is also the case for individual learning with multiple documents has not been researched yet. In contrast to collaborative learning, individual learners might be cognitively overloaded if different words for the same concept are used, which might actually hinder learning, or only benefit from different wording if they invest the effort to elaborate on the meaning of the words. In the present study, N = 104 university students took part in two conditions: They received two texts on depression either in the same wording or in different wording. In addition, cognitive load and motivation were measured. The results show a positive effect of different wording on learning outcome only for those students who were highly motivated. This result indicates that also in individual

learning, different wording might be helpful, but only if the students are willing to invest the effort that is necessary to benefit from it.

Identifying learner profiles in secondary school students' text-learning strategy use

Keywords: Comprehension of text and graphics, Secondary education, Self-regulation, Student learning

Presenting Author:Amélie Rogiers, Ghent University, Belgium; **Co-Author:**Emmelien Merchie, Ghent University, Belgium;

Co-Author:Hilde Van Keer, Ghent University, Belgium

As the knowledge in our information society continues to escalate, so do the demands for the efficient and effective use of text-learning strategies. This is especially true in secondary education, where students are progressively expected to independently obtain knowledge from texts. However, little information is available on (a) learner profiles in secondary education and (b) the relationship between possible learner profiles and student background characteristics (e.g., gender, reading ability, and home language). In this study, four distinct learner profiles (i.e., integrated strategy users, information organizers, mental learners, and memorizers) were identified and validated based on students' self-reported strategy use by means of hierarchical and k-means cluster analysis. Participants included 1931 Flemish (Belgium) secondary school students. Findings showed a significant relationship between learner profiles and gender, revealing that more girls were profiled as integrated strategy users and information organizers, whereas more boys were identified as mental learners or memorizers. No significant relationship between learner profiles and reading ability or home language was found. Important parallels can be drawn with prior research in primary education, allowing a more longitudinal design to investigate cluster stability and cluster movement over time. Furthermore, attention is once more drawn to providing more explicit strategy instruction at the beginning of secondary education to stimulate students integrated strategy use. Limitations and suggestions for further research are discussed.

Effects of domain-specific epistemic beliefs and prior attitudes on source rankings

Keywords: Attitudes and beliefs, Comprehension of text and graphics, Emotion and affect, Mixed-method research

Presenting Author:Saskia Brand-Gruwel, Open University of the Netherlands, Netherlands; **Co-Author:**Johan van Strien, Open University of the Netherlands, Netherlands; **Co-Author:**Sander Kurvers, Fontys University of Applied Sciences, Netherlands

The quality of information on the Internet varies greatly. This is particularly true for controversial socio-scientific topics, for which disagreement exists across sources. The challenge is to distinguish reliable sources from less reliable ones. This is affected by people's epistemic beliefs and prior attitudes. We investigated how source rankings differed as a function of both domain-specific epistemic beliefs and prior attitudes when students were confronted with controversial socio-scientific topics from two different domains. Sixty-nine participants were presented with six sources on both a Biology and Economics topic. For each topic, two sources came from universities, two were newspaper articles, and two were forum contributions. For each source type, one source was PRO, and the other CON. After reading, participants ranked the sources on how influential they were in forming their point of view. For both the most and least influential source, they had to write down their reasons. We found differences in source rankings between the Biology and Economics domain. Whereas in the 'hard' Biology domain, the most trustworthy sources were seen as most influential and the least trustworthy as least influential, in the 'soft' Economics domain no such consistent pattern was found. Epistemic beliefs did not affect source rankings, and for both domains reasons behind rankings were predominantly based on content. However, prior attitudes led to biased rankings, particularly for the Economics domain. These results are in line with previous studies showing the biasing effects of prior attitudes on source evaluation.

Students analyzing multimodal meaning-making in digital videos

Keywords: Argumentation, Comprehension of text and graphics, Literacy, Technology

Presenting Author:Carita Kiili, University of Oslo, Norway; **Co-Author:**Blaine Smith, University of Miami, United States;

Co-Author:Miika Marttunen, University of Jyväskylä, Finland

The present study examines upper secondary school students' (n=180) skills in analyzing multimodal means used in a persuasive digital video. It also explores how gender, and self-reported language arts and health science grades predicted students' success in analyzing a digital multimodal video. Students were asked to analyze a YouTube video where two comedians demonstrated how important it is to vaccinate a child. From students' answers, we analyzed how well they were able to specify multimodal means (e.g., visuals, auditory, gestures, movement, gesture, and text) and explain how the means contributed to the argumentation of the video. A little less than a third of students were able to connect the multimodal means to argumentation in the video. Therefore, instruction should not only explicitly teach students to read different modes but also how modes are used for argumentative purposes. Male and female students performed equally well in the multimodal analysis task ($t=1.238$; $p=.217$). Regression analysis showed that the language arts and health science grades were only able to predict 9% of students' performance ($F[2.157]=8.721$; $p<0.001$). This implies that students' abilities to analyze multimodal meaning making may be related to their informal literacy practices. In order to become critical readers, student need support to develop the ability to recognize how different modes are used in creating persuasive messages, as well as how they generatively work together to create that messages.

Session J 8

Higher Education - D

Keywords: Case studies, Higher education, Motivation, Motivation and emotion, Peer interaction, Self-efficacy, Social aspects of learning and teaching, Social interaction, Synergies between learning - teaching and research, Teacher Professional Development, Teaching approaches

Interest group: SIG 04 - Higher Education

Chairperson: Claudia Krille, Goethe-Universität Frankfurt, Germany

Identification of Teaching Needs for Mid-Career and Senior Professors in Higher Education

Keywords: Case studies, Higher education, Teacher Professional Development, Teaching approaches

Presenting Author: Heather Kanuka, University of Alberta, Canada; **Co-Author:** Jason Holmes, The University of Alberta, Canada; **Co-Author:** Summer Cowley, The University of Alberta, Canada

Using multiple case study methods, the purpose of this multi-year study was to gain insights into (a) providing teaching development activities and resources that increases mid-career and senior professor participation and (b) determine whether the information provided is used in their teaching. To achieve the objectives semi-structured interviews were conducted with Deans, Directors and Heads (n=95) to identify teaching needs and high priority areas. Using the findings from the interviews, resources and activities in the teaching unit were implemented and assessed over a five-year period. At the conclusion of year five, a survey using Kirkpatrick's (2007) four-level evaluation model was sent to mid-career and senior professors (n=93). The survey results revealed that: 85% of respondents stated they enjoyed attending the sessions, 88% were satisfied with the programming and services and believed they increased their pedagogical knowledge, 72% attempted to change teaching practices as a result of the teaching unit's services and of those who made changes 98% stated they continue to incorporate these changes in their teaching. Participation of mid-career and senior professors in teaching unit services also increased from 2.4% to 34% over the five-years of this study. The findings of this study are encouraging on a number of fronts. The most striking and positive finding is that a large majority of mid-career and senior professors strongly believe in the importance of improving their teaching practices. Additionally, mid-career and senior professors also appreciated the ability to connect with colleagues across campus.

The development of self-efficacy and situational interest during a simulation of decision-making

Keywords: Higher education, Motivation, Self-efficacy, Motivation and emotion

Presenting Author: Dorothy Duchatelet, University of Antwerp, Belgium; **Co-Author:** Pieter Spooren, University of Antwerp, Belgium; **Co-Author:** Peter Bursens, University of Antwerp, Belgium; **Co-Author:** Vincent Donche, University of Antwerp, Belgium; **Co-Author:** David Gijbels, University of Antwerp, Belgium

Teachers of political science have been using simulations of decision-making as a teaching method for quite some time. Moreover, over the past years, research on their effects has also increased. However, it seems current research struggles to illuminate significant learning outcomes. This study aims to explore the development of affective learning outcomes during the simulation process. More specifically, the development of students' self-efficacy and students' situational interest for negotiating is explored. Data from 84 undergraduate and graduate students was collected during a four-day Model United Nations-simulation. Self-efficacy and situational interest, both for negotiating, were collected across 12 points in time. Data were analysed by means of longitudinal analysis via the SAS PROC MIXED procedure. After controlling for a number of student background variables, results showed a statistically significant upward linear trend for self-efficacy and a statistically significant U-curved trend for situational interest. Results serve further theory building on the effects of simulations of decision-making in general and confirm students benefit from simulations.

PORT program: An initiative to enhance university teachers' practice

Keywords: Higher education, Peer interaction, Synergies between learning - teaching and research, Teacher Professional Development

Presenting Author: Sharon Herkes, University of Sydney, Australia; **Co-Author:** Hilary Lloyd, University of Sydney, Australia; **Co-Author:** Graham Hendry, University of Sydney, Australia; **Co-Author:** Manjula Sharma, University of Sydney, Australia; **Co-Author:** Vicky Tzioumis, University of Sydney, Australia; **Co-Author:** Helen Georgiou, University of Wollongong, Australia

Supporting university teachers to enhance their teaching practice has the potential benefit of enabling quality student learning and improving graduate outcomes. Previous research has shown that peer review of teaching, in which a teacher receives constructive feedback from a colleague about their performance, can lead to improvements in teaching practice. Previous research has also shown that teachers who engage in observing (watching) a colleague teaching well (without necessarily giving this colleague feedback) can also learn how to enhance their practice. However we know very little about the combined benefits of supporting the same teacher in an integrated way through both approaches. In this symposium presentation we describe the design of a professional development program called the Peer Observation and Review of Teaching (PORT) program, which uses both peer review and observation in an integrated design of reflective-practice activities to enhance teachers' practice in a faculty of Science in a large Australian university. We report the results of a

research project conducted to evaluate the PORT program that addresses key questions of whether (1) university teachers' practice was enhanced and improvements sustained as a result of participating in the program, and (2) the program can be self-sustaining. We argue that properly sponsored, the PORT program can become a self-sustaining community-of-practice model for improving university education.

A study of academics' perceptions of knowledge sharing on teaching and research

Keywords: Higher education, Social aspects of learning and teaching, Social interaction, Teacher Professional Development

Presenting Author: Tracy Zou, The University of Hong Kong, Hong Kong

Knowledge sharing has been found to be beneficial to many organisations and institutions including universities. However, academics' perceptions and intentions to share knowledge have not been fully understood. Although academics are knowledge workers and naturally familiar with knowledge sharing activities, the increasingly competitive environment and a stronger measured culture in the higher education sector might decrease one's intention to share knowledge with colleagues. This study aims to investigate academics' perceptions of knowledge sharing in two core aspects of their work: research and teaching. A mixed method was adopted consisting of semi-structured interviews and a questionnaire survey. Both the qualitative and quantitative data consistently show that all participants enjoyed knowledge sharing with their colleagues in a general sense. Knowledge sharing on good teaching and learning practices was perceived by more participants as important than knowledge sharing on research. However, nearly half of the participants did not feel that their work environment supported knowledge sharing in research or teaching. The results implied that more initiatives would be needed to encourage and recognise knowledge sharing from the university level especially in the teaching and learning aspects.

Session J 9

31 August 2017 15:45 - 17:15

Main Building A - A3

Single Paper

Teaching and Teacher Education

Teaching and Teacher Education - C

Keywords: Achievement, Attitudes and beliefs, Developmental processes, Educational policy, In-service teacher education, Out-of-school learning, Pre-service teacher education, Quantitative methods, Reasoning, Reflection, Secondary education, Teacher Professional Development, Teaching / instruction, Video analysis

Interest group: SIG 11 - Teaching and Teacher Education

Chairperson: Dagmar Festner, University of Paderborn, Germany

Stakeholders' perceptions on in-service training in Mongolia

Keywords: Developmental processes, Educational policy, In-service teacher education, Quantitative methods

Presenting Author: Davaajav Purevjav, University of Szeged, Hungary; **Co-Author:** Edit Katalin Molnar, Szeged University, Hungary

While the necessity of in-service teacher training (IST) is not debated, there exist different views on its objectives and forms, influenced by cultural, policy and practical considerations. Unidentified differences in the views of participants, trainers, and employers may harm the effectiveness and efficiency of any training program. This paper reports on survey data from a needs assessment study for Mongolian IST. It aims to compare the views of six different stakeholder groups (teachers; national and local trainers; senior advisor teachers; and school directors and managers) regarding areas of professional development. A questionnaire was developed and administered to a sample of 940 educational professionals. It was based on a list of teacher knowledge components often included in national standards. The items of this list were then rated by participants on five point Likert scales in response to questions ranging from the estimation of present teacher knowledge levels to changes of teaching behaviour following formal IST training. Based on the results of factor analyses, comparable index variables were created for each question. ANOVAs showed significant differences between the stakeholder groups on these indexes. The findings highlight issues policy makers and trainers should consider when planning general (non-subject specific) IST curricula.

Spotlight on professional development: What kinds of teachers benefit most from a PD workshop?

Keywords: Attitudes and beliefs, In-service teacher education, Teacher Professional Development, Teaching / instruction

Presenting Author: Michael Besser, Leuphana University of Lüneburg, Germany; **Co-Author:** Anna-Theresia Decker, Goethe-University Frankfurt, Germany; **Co-Author:** Dominik Leiss, Leuphana University of Lüneburg, Germany; **Co-Author:** Mareike Kunter, Goethe-Universität Frankfurt, Germany

In this study we investigated how teachers' individual prerequisites and their cognitive engagement during a professional development (PD) workshop affect changes in their beliefs and instructional behavior. Drawing on the models of Dole & Sinatra (1998), Gregoire (2003), and Kunter et al. (2013), we assumed that teachers with higher personal resources, e.g. time, would appraise a PD workshop as challenging instead of threatening. This in turn should lead to deeper cognitive engagement. In addition, we assumed that higher cognitive engagement would lead to a more pronounced change in

beliefs and better implementation of the workshop content in teachers' instruction. We tested these assumptions on a sample of 66 secondary school teachers who participated in a PD workshop on competence-based instruction in mathematics. Before the workshop teachers reported on Likert-type scales on their resources (time and personal relevance of the workshop content) and their appraisal, during the workshop on their cognitive engagement and after the workshop on their implementation of the workshop content in their instruction. Teachers' beliefs and instructional behavior were assessed before and after the workshop. Linear regression and correlation analyses revealed that teachers with higher personal resources were more likely to appraise the workshop as challenging, which in turn was positively related to their cognitive engagement. Teachers' cognitive engagement explained the changes in their beliefs and instructional behavior and was positively related to subsequent implementation of the workshop content. Altogether, our results show that teachers are learners with individual prerequisites which determine the success of their professional development.

Measuring the Instructional Quality of Private Tutoring Lessons and its Effects on Students' Grades

Keywords: Achievement, Out-of-school learning, Secondary education, Teaching / instruction

Presenting Author:Karin Guill, Leibniz Institute for Science and Mathematics Education, Germany; **Co-Author:**Oliver Lüdtke, Leibniz Institute for Science and Mathematics Education and Centre for International Student Assessment, Germany; **Co-Author:**Olaf Koeller, Leibniz Institute for Science and Mathematics Education, Germany

In addition to mainstream education many students attend private supplementary tutoring. Students invest a lot of time and parents a lot of money on these additional lessons. However, research on the effects of private tutoring on student achievement shows mixed results. Therefore, more detailed analyses are necessary showing under which conditions private tutoring improves school achievement. The framework for out-of-school learning environments of the German National Educational Panel Study (NEPS) differentiates between the dimensions of structure, challenge and support in private tutoring to describe the instructional quality of private tutoring lessons. To evaluate this framework, we used data from a NEPS student cohort in Grade 10. Confirmatory factor analyses showed a sufficient fit of the model to private tutoring lessons in mathematics and English. The instructional dimensions were in part weakly negatively related to the students' prior achievement and in part positively related to the tutors' formal qualification. When controlling for mid-year grades, gender, academic self-concept, academic track and tutoring intensity we found no effect of any dimension of instructional quality on the students' year-end grades in mathematics.

Using learning journals for monitoring student learning processes in the context of video analysis

Keywords: Pre-service teacher education, Reasoning, Reflection, Video analysis

Presenting Author:Sandro Biaggi, Zurich University of Teacher Education, Switzerland; **Co-Author:**Kathrin Krammer, University of Teacher Education Lucerne, Switzerland; **Co-Author:**Isabelle Hugener, University of Teacher Education Lucerne (PH Luzern), Switzerland

Professional vision, defined as the ability to notice and interpret classroom situations, is considered to be an important prerequisite for effective teaching. Although a continuously growing body of studies show that classroom videos can be a powerful tool for promoting (pre-service) teachers' professional vision, only scant research has been carried out on the processes of learning with videos so far. Against this background we conducted an intervention study, in the course of which we were able to foster the professional vision of pre-service teachers through video analysis. With the intention of obtaining a better understanding of the participating students' learning processes, a complementary learning journal was implemented. The students were asked to consolidate their findings from the preceding video analysis and to formulate pedagogical ideas that were to be put into practice in their own teaching. Besides, they were expected to give reasons for the significance of their reflections and teaching ideas by drawing on their theoretical knowledge. For monitoring the development of the students' professional vision, we are currently analysing their learning journal entries. Our content analyses focus on the type and the accuracy of the students' reflections as well as on their ability to provide theory-based reasons for the teaching ideas they proposed. Overall, our results provide new insights into the learning processes that occur when classroom videos are used for fostering pre-service teachers' professional vision. This is why the project is of importance both for research and for teacher education.

Session J 10

31 August 2017 15:45 - 17:15

Virta - 114

Single Paper

Instructional Design, Learning and Instructional Technology

Comprehension of Text and Graphics - C

Keywords: Comprehension of text and graphics, Computer-assisted learning, E-learning / Online learning, Educational Psychology, Instructional design, Learning and developmental difficulties, Multimedia learning, Primary education

Interest group: SIG 02 - Comprehension of Text and Graphics

Chairperson: Charlotte Larmuseau, KU LEUVEN, Belgium

Impact of pacing and cognitive style on learning with dynamic and non-dynamic visualizations

Keywords: Comprehension of text and graphics, Educational Psychology, Instructional design, Multimedia learning

Presenting Author:Marta Koć-Januchta, University of Duisburg-Essen, Germany; **Co-Author:**Tim Hoeffler, Leibniz Institute for Science and Mathematics Education (IPN), Germany; **Co-Author:**Helmut Precht, Institut für Biochemie und Biologie, Germany; **Co-Author:**Detlev Leutner, University of Duisburg-Essen, Germany

The aim of this study was to investigate the role of visual/ verbal cognitive style and learner/ system control in dynamic and non-dynamic multimedia learning environments. A group of 235 students learned from a computer-based animation or a series of static pictures with spoken explanatory text with or without the possibility to pause, to play, or to fast-forward/ rewind the learning environment (self-paced vs. system-paced). It turned out that animations provided better results on learning outcome than static pictures regardless of cognitive style and type of pacing. Participants also obtained better results when learning with the system-paced environment than with the self-paced one. A significant triple interaction of cognitive style, type of pacing, and type of visualization showed that highly developed visualizers learned poorer with self-paced static pictures than with system-paced static pictures. Additionally, less developed visualizers outperformed highly developed visualizers when learning with self-paced static pictures. No significant interaction effects were found regarding verbal cognitive style.

Multimedia Learning in Children with Dyslexia

Keywords: Comprehension of text and graphics, Learning and developmental difficulties, Primary education, Multimedia learning

Presenting Author:Carolien A. N. Knoop-van Campen, Radboud University Nijmegen, Netherlands; **Co-Author:**Eliane Segers, Radboud University Nijmegen / University of Twente, Netherlands; **Co-Author:**Ludo Verhoeven, Radboud University Nijmegen, Netherlands

The Cognitive Theory of Multimedia Learning predicts modality and redundancy effects. Spoken texts with pictures have often been shown to have a larger learning effect than written texts with pictures. However, this modality effect tends to reverse on the long term. This long-term effect has not been studied regarding the redundancy effect (i.e. presenting identical information in different multimedia forms simultaneously). The modality and redundancy effect in multimedia learning are based on optimal use of working memory capacities. Children with dyslexia have lower working memory capacities but often are still provided with multimedia to support their reading. Multimedia learning may thus differ in this group. We compared learning gains of 26 children with and 38 without dyslexia (age 11) who were presented with different types of learner-paced multimedia lessons. We assessed both quantity and quality of learning directly after studying and after one week. Modality and redundancy effects were found with regard to the amount of time children with dyslexia spent in different conditions, but not for typical readers or for learning gain in both groups. Children with dyslexia spent more time learning in the text-condition, than in the audio- or text&audio-condition. We can conclude that in a user-paced multimedia learning environment, it is more efficient to provide information in an auditory way or with auditory support to children with dyslexia, but not necessary for typical readers.

Prompting and Time of Testing in Learning with Animations Compared to Static Pictures

Keywords: Comprehension of text and graphics, Computer-assisted learning, Instructional design, Multimedia learning

Presenting Author:Tim Kühn, University of Mannheim, Germany; **Co-Author:**Sabrina Navratil, University of Mannheim, Germany; **Co-Author:**Stefan Münzer, Universität Mannheim, Germany

Animations can possess an informational advantage compared to static pictures. This informational advantage was assured for the used animations of the current study. Thereby, it was investigated whether the corresponding informational disadvantage of static pictures can be compensated by prompting learners to actively engage with the instructional material. Moreover, it was examined whether this engagement would lead to a better lasting knowledge representation, particularly for learners with static pictures, since they are supposed to engage more deeply with the prompts. To test this, a 2x2x2 Between-Subjects-Design with visualization format (static picture vs. animation), prompts (absent vs. present) and time of testing (immediate vs. after one week) as independent variables was used ($N = 263$). Results revealed that participants performed better in the knowledge test when learning with animations compared to learning with static pictures. Moreover, participants remembered the content better when tested immediately than when tested after one week. Others than expected, providing prompts did not compensate the performance of learners receiving static pictures, irrespective of time of testing. When analysing the answers to the prompts, results showed that learners with animations were better able to correctly answer the prompts than learners with static pictures. Moreover, the performance in answering the prompts mediated the differences in the knowledge test between animations compared to static pictures. In a follow-up study, it might be reasonable to investigate the impact of conveying prerequisite knowledge for answering such prompts, and whether this might especially help learners with static pictures.

Mixed camera angles viewpoints improve learning medical hand procedure from video in nurse training

Keywords: Comprehension of text and graphics, E-learning / Online learning, Educational Psychology, Instructional design

Presenting Author:Jean-Michel Boucheix, University of Dijon, LEAD-CNRS, France; **Co-Author:**Perrine Gauthier, University of Dijon, LEAD-CNRS, France; **Co-Author:**Jean-Baptiste Fontaine, University of Dijon, LEAD-CNRS, France; **Co-Author:**Sandrine Jaffaux, IFSI Dijon, France

Few previous research showed that camera viewpoints differences played a role in learning hand procedures from videos. However, learning videos on hand procedures showing only single viewpoints have been investigated, for example face to face vs. over the shoulder views. Further, the effect of seeing the human model's face and the effect of showing hand

actions have also been studied. The results of these research are not always consistent. The goal of the present research was to investigate the effect of mixed camera viewpoints on learning a medical hand procedure from a video. Within a pretest-posttest paradigm, 43 students from a French institute of nursing education had to learn a complex hand procedure from a video showing an expert nursing teacher who installed an indwelling catheter in a closed system. Three videos conditions were compared showing the hand procedure respectively from (i) a face to face view (FtF), an over-the shoulder view (OtS) and (iii) an alternation of face to face and over the shoulder views (MixW). The students were randomly assigned (N =10-11) to one of four groups: the three experimental viewing conditions (FtF, OsS, MixW) and a control condition, without video. Pre and post-test consisted in the demonstration of the hand procedure in a full scale simulation room fully equipped. Results showed that learners in the mixed viewpoint (MixW) group performed better than the other groups (FtF, OsS, MixW and control condition). Learners in the FtF and OsS groups had better scores than learners in the control group.

Session J 11

31 August 2017 15:45 - 17:15

Main Building A - A05

Single Paper

Cognitive Science, Learning and Instructional Technology, Learning and Social Interaction

Learning and Development in Early Childhood - C

Keywords: Comprehension of text and graphics, Early childhood education, Experimental studies, Learning Technologies, Literacy, Mathematics, Motivation, Primary education, Problem solving, Quasi-experimental research, Reasoning, Self-regulation, Social aspects of learning and teaching, Technology

Interest group: SIG 05 - Learning and Development in Early Childhood

Chairperson: Susanne Lajoie, McGill University, Canada

Development of spatial reasoning in Chilean 2nd graders: effects of in-class intervention

Keywords: Mathematics, Primary education, Quasi-experimental research, Reasoning

Presenting Author: Carolina Araya, Pontificia Universidad Católica de Chile, Chile

Abstract During last decades a growing body of knowledge has renewed and increased the interest in the development of spatial reasoning. That because spatial reasoning predicts success in the fields of science, technology, engineering and mathematics. From a pedagogical perspective, different studies have shown a consistent correlation between spatial skills and early mathematics performance. However, there are few studies available regarding causal effects between spatial reasoning and mathematical skills and their findings are inconsistent. The objective of this research was to design and evaluate the effects of an intervention to develop and strengthen spatial reasoning in second-grade students. Also, the research wanted to contribute to existing literature, by identifying underlying mechanisms that predict spatial and mathematical abilities. For this purpose, variables associated with spatial reasoning were measured during training sessions, such as the use of spatial language and gestures. The research design was quasi-experimental and mixed design (between-within subjects). Two Chilean urban schools with two parallel 2nd grade class participated. In each school, one classroom was assigned to experimental condition and the other one, to control condition. Both schools attend students from low-middle SES. The classrooms grouped 126 students. 47% of students were female. 50% of students belong to experimental condition. Preliminary results show a positive effect of training in some spatial skills and visual-spatial memory. However, there isn't clear causal effect of spatial training over mathematic performance. Path analysis showed interesting mediator roles between spatial reasoning, spatial language, and gestures.

Kindergarteners' Reading Behaviors with Multimodal Digital Texts and Comprehension Outcomes

Keywords: Comprehension of text and graphics, Early childhood education, Literacy, Technology

Presenting Author: X. Christine Wang, State University of New York at Buffalo, United States; **Co-Author:** Tanya Christ, Oakland University, United States

Grounded in transactional reading and new literacies theories, this study examined 55 U.S. kindergartners' (ages 5-6) multimodal digital text reading behaviors (reading mode, reading sequence, use of congruent hotspots, use of incongruent hotspots, use of prompted hotspots, use of unprompted hotspots, multiple uses of hotspots, layering use of modalities, rereading words, rereading pages, and spontaneous use of comprehension-monitoring strategies), and how these related to their comprehension outcomes (unprompted retelling, prompted retelling, inference/critical-thinking responses, vocabulary meaning derivations, connections, and strategic use of app book affordances). Pre-testing included Concepts About Print and listening comprehension. Kindergarteners' app book reading behaviors and comprehension outcomes were individually tested 6 times across the school-year with novel app books, yielding 318 test sessions (some missing data). Each test session was video-recorded and coded by two coders with high inter-rater reliability. A multivariate, mixed-response model was used for analysis. Findings showed that using the "read to me" mode, listening to the text read aloud, using unprompted congruent hotspots, and strategic use of app book affordances were all linked to better comprehension outcomes; however, differential outcomes were found by books. Implications include addressing these skills through reading instruction, and selecting texts that have features that align with learning objectives.

Using a robot in a dynamic testing setting: examining series completion performance

Keywords: Experimental studies, Learning Technologies, Problem solving, Reasoning

Presenting Author:Merel Bakker, KU Leuven - University of Leuven, Belgium; **Co-Author:**Wilma Resing, University of Leiden, Netherlands

Robots are increasingly becoming integrated in our society and show potential for being used in educational context. Young children are able to learn from a robot in several cognitive domains, such as science, language, and mathematics. We examined the use of a robot as a mediation tool in a dynamic testing setting. The dynamic testing approach involved the provision of feedback and training during testing. The robot we utilised was an animated, table top robot. We examined the effectiveness of dynamic testing with graduated prompts and scaffolding provided by the robot. The study employed a pre-test post-test control-group design with two training sessions. A dynamic visual-spatial task was used that consisted of series completion items. The robot was programmed to provide verbal and non-verbal feedback and prompts regarding children's solutions during the two training sessions. Finding revealed that trained children showed greater improvement in reasoning accuracy than children in the control group. Results are discussed with regard to the theoretical and educational implications of using a robot as a mediation tool.

Autonomy support and its associations with child individual characteristics and relational processes

Keywords: Early childhood education, Motivation, Self-regulation, Social aspects of learning and teaching

Presenting Author:Marina Lemos, University of Porto, Portugal; **Co-Author:**Joana Cadima, University of Porto, Portugal; **Co-Author:**Tiago Ferreira, University of Porto, Portugal; **Co-Author:**Teresa Leal, University of Porto, Portugal; **Co-Author:**Karine Verschueren, KU Leuven, Belgium

This study looks at the levels of autonomy support provided in early childhood classrooms from socially disadvantaged areas in Portugal. Specifically, we examine child individual contributors, namely language and self-regulation skills, to the levels of autonomy support provided by the teacher, and investigate the associations between autonomy support and other relational processes such as closeness and conflict. Participants were 43 preschool teachers (100% women) and 187 children (49% boys; $M=4.95$ years). Autonomy support was assessed using the Teacher as Social Context Questionnaire (TASC; Wellborn, Connell, Skinner, & Pierson, 1991). Children were assessed at the beginning of the year with a self-regulation and vocabulary measure. At the middle of the school year, teachers reported on levels of closeness and conflict. Multilevel analyses indicated that vocabulary made a positive significant contribution to the levels of autonomy support. In addition, conflict was negatively related to autonomy support at both dyadic and classroom levels, suggesting that higher levels of conflictual relationships were associated with lower levels of autonomy support. Findings have important implications for understanding the contributors of autonomy support.

Session J 12

31 August 2017 15:45 - 17:15

Main Building C - C8

Single Paper

Teaching and Teacher Education

Teaching and Teacher Education - D

Keywords: Action research, At-risk students, Attitudes and beliefs, Developmental processes, Educational Technology, Mixed-method research, Quasi-experimental research, Reading comprehension, Self-regulation, Student learning, Synergies between learning - teaching and research, Teacher Effectiveness, Teacher Professional Development, Video analysis

Interest group: SIG 11 - Teaching and Teacher Education

Chairperson: Ulrich Riegel, University of Siegen, Germany

Simulation-based self-regulation with real actors: A tool to foster teachers' professionalism

Keywords: Mixed-method research, Quasi-experimental research, Self-regulation, Teacher Professional Development

Presenting Author:Bracha Kramarski, Bar-Ilan University, Israel; **Co-Author:**Yafitt Mordoff, Bar Ilan University, Israel

The proposed study suggests a model for enhancing the professional vision (PV) and self-regulation (SRL) of 120 math/science elementary school teachers, by implementing role-play training simulations performed by professional actors as students, and by participants as teachers/ live-audience. These simulations are innovative in the context of teacher education. The study examined whether helping teachers to apply SRL to the PV model in unique simulations supported with self-questions (SIM + SRL group) is more effective than PV training in a simulation alone (SIM group), as compared to a control group without PV and SRL. This study is useful for:

Q1. Developing PV (noticing, reasoning and predicting) for *lesson analysis* and *lesson design* expertise oriented to goals/strategies and active learning environments in the science/math domain;

Q2. Enhancing SRL regarding *metacognition*, *motivation* and *beliefs* that place the student pupil in the centrum of learning;

Q3. Developing *transfer* ability of PV and SRL expertise to real-time teaching settings *immediately* in class, and 3 months *later* to *lesson design* and *authentic teaching* oriented to goals/strategies and active learning environments

A mixed methods analysis indicated that the SIM+SRL group manifested the highest level on the PV and SRL dimensions as emerged in the video *lesson*, *designing lesson* and *actual real time* teaching. The SIM group improved achievements in some tested dimensions (e.g., noticing skills), while the control group's achievements were inferior to those of the two simulation groups. This study makes valuable theoretical, methodological, and practical contributions to developing teacher expertise .

Reading comprehension in socially and ethnically segregated classes: the role of teaching quality

Keywords: At-risk students, Reading comprehension, Teacher Effectiveness, Video analysis

Presenting Author: Lisa Dewulf, Ghent University, Belgium; **Co-Author:** Mieke Van Houtte, Ghent University, Belgium; **Co-Author:** Johan van Braak, Ghent University, Belgium

Students at risk are often overrepresented in socially and ethnically segregated schools. Often, they start with an educational delay and have less parental support, which make them more dependent of quality of education. Since quality of education depends in great measure upon the quality of teaching, it is crucial to gain insight in the quality of teaching in socially and ethnically segregated primary classes. This study examines six aspects of teaching quality ((1) safe and stimulating learning climate, (2) efficient classroom management, (3) clear instruction, (4) intensifying and activating the lesson, (5) adaptation of teaching, (6) teaching learning strategies). It is examined how student variables and teaching quality aspects relate to reading comprehension achievement. The results of a two-level analysis of data of 312 second grade students in 23 segregated classes in Flanders (Belgium) indicate differences between classes and students for reading comprehension. At the student level, students with a low educated mother perform significantly lower for reading comprehension, while girls perform better than boys. Students in classes with an average score (2.9 out of 4) for efficient classroom management and teaching learning strategies (1.6 out of 4) score better for reading comprehension. Students in classes with an average score for adaptation of teaching (1.6 out of 4) have poorer reading results. The educational significance of the research is discussed.

Fostering professional digital competence as transformative agency in teacher education

Keywords: Developmental processes, Educational Technology, Student learning, Teacher Professional Development

Presenting Author: Andreas Lund, University of Oslo, Norway; **Co-Author:** Jon Magne Vestøl, University of Oslo, Norway

This paper presentation examines how professional digital competence (PDC) is introduced, fostered and sustained in a five-year Master's program in teacher education in Norway. While professional digital competence lacks a firm base in teacher education and is only vaguely operationalized in school subjects ProTed – Norway's first center for excellence in education – has taken steps to integrate PDC into a Master's course as a unifying theme. Against the backdrop of ProTed's introduction of systematic efforts to make student teachers digitally competent designers of technology-rich environments we respond to the following research question: How can PDC be introduced, enacted and integrated in teacher education? Drawing on data from 2015 and 2017 in the form of digital traces from students' work in a Small Private Online Course (SPOC), seminar group observation and interviews involving students as well as course designers we have conducted interaction analysis encompassing both discourse and artifact levels within Vygotskian and neo-Vygotskian frameworks, focusing in particular on mediated action and transformative agency to identify students' perceptions of what PDC entails and how it is operationalized as well as conceptualized. We argue that student teachers' transformative reconfigurations of available cultural resources are vital for their professional development. We also briefly discuss how the SPOC experience involves research-based teacher education and argue that student centered transformative activity yields important quality indicators for rapidly developing technology-rich learning environments. The presentation suggests a way of approaching the role of transformation in technology supported teacher education on actor, program, and institutional levels.

The potential of disability arts and life stories in teacher professional development for inclusion

Keywords: Action research, Attitudes and beliefs, Synergies between learning - teaching and research, Teacher Professional Development

Presenting Author: Simoni Symeonidou, University of Cyprus, Cyprus

The present paper presents the findings of two action research projects which took place in [name of country]. A professional development programme was developed in collaboration with a working group of teachers in two schools. The programme raised disability equality issues through disabled people's accounts and materials, and explored how teachers could use this kind of material in their own teaching. One of the themes that emerged from the analytical process of the constant comparative analysis was that teachers were influenced by the material and used it to promote disability equality education. The discussion raises important issues about the power of disabled people's narratives and arts to change teachers' stereotypic understandings of disability, and discusses the dimensions of professional development programmes which can make this feasible. It also addresses the significance of the study in theory and practice by presenting a theoretical model, and examples of innovative teaching practices.

Session J 13

31 August 2017 15:45 - 17:15

Main Building C - C5

Educational Evaluation

Keywords: Assessment methods and tools, Competencies, Educational policy, Educational Psychology, Motivation, Psychometrics, Quantitative methods, Reading comprehension, School effectiveness, Secondary education, Survey Research, Teacher Effectiveness

Interest group: SIG 23 - Educational Evaluation, Accountability and School Improvement

Chairperson: Deborah Pino-Pasternak, Murdoch University, Australia

Discriminant validity in educational research: Problems and solutions

Keywords: Assessment methods and tools, Psychometrics, Quantitative methods, Survey Research

Presenting Author:Carla Bohndick, University of Koblenz-Landau, Germany; **Co-Author:**Frederic Hilkenmeier, HS Fresenius, Hamburg, Germany; **Co-Author:**Thomas Bohndick, Landau, Germany; **Co-Author:**Johanna Hilkenmeier, Hamburg, Germany

Discriminant validity empirically assesses whether a construct in question can be meaningfully differentiated from other constructs. Therefore, testing whether a construct does not correlate too highly with measures from which it is supposed to differ as a prerequisite for conducting further analyses has been advocated for decades. This is especially true for the development of multi-dimensional scales. Discriminant validity between these subscales is needed to demonstrate not only conceptual, but empirical distinctness among them. However, relevant information on discriminant validity is often missing from scale-development and research articles alike. This leaves researchers and practitioners interested in using a certain instrument in a precarious situation: They do not know beforehand whether constructs or subdimensions adequately discriminate from each other and thus whether they can use these instruments in the intended way and have confidence in the subsequent findings. Following the Fornell-Larcker criterion, which states that discriminant validity is given if each construct's average variance extracted is greater than its shared variance with any other latent construct, we propose estimating these parameters by using nothing but the most commonly reported statistics: the Cronbach's alpha coefficient and the correlation matrix between the manifest composite scores of the constructs in question. A simulation-study demonstrates the usefulness of this "manifest Fornell-Larcker criterion" in providing an easily assessable method for vetting existing measurement instruments, whereas a systematic review as well as an empirical example shows the necessity to do so even for established and frequently used instruments.

Effectiveness of schools and teachers: can value added indicators inform us about this?

Keywords: Competencies, Reading comprehension, School effectiveness, Teacher Effectiveness

Presenting Author:Liliana Silva, University of Bologna, Italy; **Co-Author:**Alessandra Rosa, Alma Mater Studiorum Università di Bologna, Italy; **Co-Author:**Maria Lucia Giovannini, Alma Mater Studiorum Università di Bologna, Italy

In a context of increasing school autonomy, heavy cuts of resources and increased emphasis on accountability in education, and problems related to measuring the effectiveness of education systems, schools and teachers have been placed at the center the international scientific debate and the policies implemented in various countries. Value added indicators are considered. The selected sample was composed of 12 institutes and 36 classes (three for each institution), for over 700 students. Main findings are: a) both at institutional level and at the class level, the measures and effectiveness ranking based on VA indicators differ significantly from those based on raw scores; b) in each of the three years in question, the "class-effect" is greater than all "school-effect"; c) analysis of the behavior of a diachronical perspective VA indicators, made possible by the adoption of a longitudinal design, shows a strong discontinuity / instability among the measures observed - at school and class level - at the end of each of the three years of the study. This leads us to reflect on assumptions and objectives of the effectiveness reporting systems in schools, the models and data analysis procedures, the possible uses of results by the stakeholders involved.

How retention affects students' motivation: A longitudinal study over 3 years of secondary school

Keywords: Educational Psychology, Motivation, Quantitative methods, Secondary education

Presenting Author:Julia Kretschmann, University of Potsdam, Germany; **Co-Author:**Miriam Vock, Universität Potsdam, Germany; **Co-Author:**Oliver Lüdtke, Leibniz Institute for Science and Mathematics Education (IPN), Germany; **Co-Author:**Malte Jansen, German Institute for International Educational Research (DIPF), Germany; **Co-Author:**Anna Gronostaj, Die Deutsche Schulakademie, Germany

Previous research on the effects of grade retention on student development has generated ambiguous results, particularly in terms of motivational outcomes. It has been shown that findings are highly dependent on the quality of the design of the given study. Based on longitudinal data of $N = 3,288$ German students, we examined differences in students' academic self-concept, scholarly interests, learning motivation and achievement motivation over 3 years of secondary school between students being retained in the sixth grade ($n = 61$) and students of the same age being promoted annually. To account for confounding we applied full matching on baseline measures in the dependent variables and various other covariates that are assumed to be associated with the risk of retention (e.g. cognitive abilities, academic performance, and family background variables). Results reveal a high decline in students' academic self-concept, interests and learning motivation during the last months in the initial class, just before retention. Negative effects were still significant after 1 year,

but had diminished 2 years after grade repetition.

School self-evaluation: does respondents' motivation and item complexity predict missing item data?

Keywords: Assessment methods and tools, Educational policy, School effectiveness, Survey Research

Presenting Author: Jerich Faddar, University of Antwerp, Belgium; **Co-Author:** Jan Vanhoof, University of Antwerp, Belgium; **Co-Author:** Sven De Maeyer, University of Antwerp, Belgium

School self-evaluation (SSE) as a means to safeguard and improve schools' quality has gained more attention in the last decades. During an SSE process data on a school's functioning are often collected by means of administering questionnaires among teaching staff. To gather as much information as possible, it is vital that respondents answer all items of interest. When respondents drop out for an item or a series of items, this is referred to as item nonresponse and this may lead to distorted results. This study aims to explore to what extent item nonresponse occurs in the context of SSE, and to what extent respondents' motivation and items' complexity predict the likelihood that an item or a series of items remains unanswered. An authentic self-evaluation in an educational service organisation in Flanders (Belgium) is set up, where 378 teachers participated in the study. Results show that respondents have an item nonresponse rate of 14.48 % on average. Cross classified multilevel analyses show that respondents' motivation and items' complexity indeed predict item nonresponse. Implications of these findings for instrument developers and SSE practice are discussed.

Session J 14

31 August 2017 15:45 - 17:15

Main Building D - D13

Single Paper

Cognitive Science, Culture, Morality, Religion and Education, Instructional Design

Learning and Teaching in Culturally Diverse Settings

Keywords: Bilingual education, Competencies, Educational Psychology, Language (Foreign and second), Language (L1/Standard Language), Multicultural education, Primary education, Quasi-experimental research, Reading comprehension, Second language acquisition, Teaching approaches

Interest group: SIG 21 - Learning and Teaching in Culturally Diverse Settings

Chairperson: Susan Jones, University of Exeter, United Kingdom

Promoting intercultural competence: Results from interventions and implications for teacher training

Keywords: Language (Foreign and second), Quasi-experimental research, Teaching approaches, Multicultural education

Presenting Author: Vera Busse, Carl von Ossietzky Universität Oldenburg, Germany; **Co-Author:** Ulrike-Marie Krause, University of Oldenburg, Germany

Promoting positive attitudes towards cultural diversity and fostering intercultural competence are key objectives in our increasingly globalised world and essential for the development of social cohesion. Intercultural competence requires the reflection on students' frames of reference and their ideas about normality. The article presents the results of a quasi-experimental intervention study with a 2x2 factorial design. We implemented a problem-based intercultural learning unit in four secondary schools (grades 9 to 12) and varied the teaching approach (analytical/affective-experiential) and the language of instruction (English/German). The learning unit covered six 45-minute lessons and was conducted in nine school courses ($n = 143$). Five additional school courses ($n = 66$) served as a control group. In all experimental groups, students engaged with critical incidents. These were either analysed (analytical focus) or acted out as role plays (affective-experiential focus). In addition, students analysed film clips (analytical focus) or participated in a simulation game (affective-experiential focus). Results indicate that the problem-based approach was successful as on average students in the experimental groups made better learning progress than students in the control group. Using a foreign language for teaching did not impair performance. Implications for teacher training are being discussed.

Learning to read in a foreign language: A longitudinal study of children from immigrant families

Keywords: Bilingual education, Language (Foreign and second), Reading comprehension, Second language acquisition

Presenting Author: Cíntia Ertel Silva, University of Luxembourg, Luxembourg; **Co-Author:** Ariana Loff, University of Luxembourg, FLSHASE, Luxembourg; **Co-Author:** Pascale Engel de Abreu, University of Luxembourg, Luxembourg

Purpose: Oral language skills in the first language (L1) are significant predictors of L1 reading in monolingual majority-culture children. Little is known about early predictors of reading in children from immigrant families who learn to read and write in a foreign language. This study explores longitudinally how L1 language skills relate to reading in a foreign language in a population of Portuguese-speaking language-minority children growing up in the multilingual country Luxembourg. **Method:** A sample of 66 Portuguese-speaking children, learning Luxembourgish (L2), German (L3) were followed from kindergarten (4-5 years old) to year 3 of primary. They completed multiple assessments of oral language in their L1 Portuguese, their L2 Luxembourgish and their L3 German. Written language (decoding and reading comprehension) was assessed in German in year 1, 2 and 3. **Results:** Preliminary results indicate that Luxembourgish and German lexical knowledge is strongly related in this population of Portuguese children. Both, Portuguese and Luxembourgish vocabulary

knowledge play a significant role in learning to reading in German. Importantly, Portuguese vocabulary knowledge accounted for a significant 10% of the unique variance in reading in German after controlling for Luxembourgish language skills. Conclusion: These findings provide evidence that L1 language skills play an important and specific role in the development of reading in a foreign language in children from immigrant families.

Does competent bilingualism entail advantages for the third language learning of immigrant students?

Keywords: Bilingual education, Competencies, Educational Psychology, Language (Foreign and second)

Presenting Author:Sebastian Kempert, University of Potsdam, Germany; **Co-Author:**Aileen Edele, Humboldt-University Berlin, Germany; **Co-Author:**Kristin Schotte, Humboldt-Universität zu Berlin, Germany

Competent bilingualism, i.e., high linguistic levels in two languages, is associated with a positive impact on the cognitive and linguistic development of individuals. Recent findings point to the relationship between bilingualism and the learning of a third language (L3). However, these findings largely rely on data from contexts with bilingual school systems. In the present study, we investigate whether bilingualism also presents a resource for L3 learning (in our case: English) of immigrant students who attend a monolingual school and have acquired another language than the school language in their family (L1). Using data from a large nationwide study in Germany (NEPS), we compare the L3-outcomes of monolingual tenth-graders (N=7961) with those of Russian-German (N=475) and Turkish-German (N=543) bilinguals. Cross-sectional analyses via multiple OLS-regressions reveal that competent bilingualism is associated with significant advantages in L3-learning of immigrant students compared to monolinguals after controlling for measures of SES, cultural capital, gender and age. However, the advantages are limited to the Russian-German bilinguals (with at least high proficiencies in L2). Additional analyses show that the level of L1 seems to play a subordinate role compared to the level in L2 (language of instruction) in explaining L3 outcomes.

Influences on Grade 3 students' reading: first language intertwined with sociocultural aspects

Keywords: Language (Foreign and second), Language (L1/Standard Language), Primary education, Reading comprehension

Presenting Author:Katharina Maitz, University of Graz, Austria; **Co-Author:**Lisa Paleczek, University of Graz, Austria; **Co-Author:**Susanne Seifert, University of Graz, Germany; **Co-Author:**Barbara Gasteiger-Klicpera, University of Graz, Austria

The successful acquisition of reading abilities, in particular reading comprehension abilities, is considered a basis for further education and for an active participation in society. Especially in Austria sociocultural factors such as parent's educational level, the number of books owned by a family, the socioeconomic status, and the child's first language are closely related to a child's educational success (Schreiner, 2012). Children with a first language different from German (L2 learners) are disadvantaged in the acquisition of reading abilities compared to children with German as a first language (L1 learners) (Breit, Bruneforth, & Schreiner, 2015). The present study investigated the interactions between reading comprehension, first language and sociocultural aspects in 745 Grade 3 students in Austria. A linear regression showed that reading comprehension is considerably affected by the child's first language (adjusted $R^2=0.117$; $\beta=-0.341$; $p<0.01$). Being an L2 learner is connected to poorer reading comprehension. Another linear regression, additionally containing sociocultural variables lead to a higher explanation of variance (adjusted $R^2=0.204$) and reduced the influence of the first language ($\beta=-0.199$; $p<0.01$) while showing the high influence of sociocultural aspects on reading comprehension ($\beta=0.335$; $p<0.01$). Hence, a given disadvantage of L2 learners is also considerably connected to sociocultural factors above and beyond the student's first language.

Session J 15

31 August 2017 15:45 - 17:15

Pinni B - B1100

Single Paper

Higher Education

Higher Education - G

Keywords: Achievement, Action research, At-risk students, Cooperative / collaborative learning, Educational policy, Higher education, Learning analytics, Learning approaches, Self-regulation, Social interaction, Student learning, Survey Research, Teacher Professional Development

Interest group: SIG 04 - Higher Education

Chairperson: Lennart Schalk, ETH Zurich, Switzerland

Student-Faculty Relationships in Higher Education

Keywords: Achievement, Higher education, Social interaction, Survey Research

Presenting Author:Ingrid Snijders, HZ University of Applied Sciences, Netherlands; **Co-Author:**Remigius (Remy) Rikers, UCR / Utrecht University, Netherlands; **Co-Author:**Lisette Wijnia, Erasmus University Rotterdam & University College Roosevelt, Netherlands; **Co-Author:**Sofie Loyens, University College Roosevelt, Netherlands

This study examined students' perceptions of the quality of the relationship students have with university faculty/staff (i.e., relationship quality), and its influence on student engagement and academic achievement. The aim of this study was to test a theoretical framework based on ideas derived from management-, and educational literature. Structural Equation

Modeling using AMOS was conducted to analyze survey data of 273 students from a Dutch university of applied sciences. Findings suggest relationship quality predicts student engagement. Contrary to previous research, in this study, student engagement did not influence academic achievement. This study provides empirical evidence for the importance of relationship quality in higher education.

Teaching portfolios and a competence framework aimed to build faculty teaching competencies

Keywords: Action research, Educational policy, Higher education, Teacher Professional Development

Presenting Author:Sofie Kobayashi, University of Copenhagen, Denmark; **Co-Author:**Jens Dolin, University of Copenhagen, Denmark

The University of Copenhagen has decided to introduce teaching portfolios and a competence framework as initiatives aimed to address the relatively low status of teaching compared to research. The two measures have been designed in a bottom-up process and are also backed by university leadership. This paper analyses drivers and barriers in achieving successful implementation of the two initiatives through an organisational action research project. Main drivers are recognition for the need to increase the status of teaching and needs for tools and space for reflecting on one's teaching, as well as a need for a common language and reference. Main barriers are scepticism towards the teaching portfolio for assessment of competencies, fear of extra work load, possible use as control measures, and fear that standards will narrow teaching development. In a research intensive university it is very difficult to give teaching a status similar to research. This research shows that by initiating discussions at all levels and in many fora at the university, the barriers and the support has come out in the open for a fruitful exchange of pros and cons and through this process the two fundamental measures have been accepted and approved by leadership and gained broad acceptance among faculty.

Exploring the change in university students' study-related exhaustion and regulation of learning

Keywords: At-risk students, Cooperative / collaborative learning, Higher education, Self-regulation

Presenting Author:Milla Räisänen, University of Helsinki, Finland; **Co-Author:**Liisa Postareff, University of Helsinki, Finland; **Co-Author:**Sari Lindblom, University of Helsinki, Finland

The aim of this longitudinal study is to explore the stability and change in university students' experienced study-related exhaustion and how these are related to the changes in self-regulation of learning, external regulation, lack of self-regulation and co-regulation of learning. Altogether 188 first-year students filled in a questionnaire and of these, 91 students participated in the follow-up study during their fourth study year and filled in the same questionnaire. The results showed that at a group-level study-related exhaustion increased during studying. However, the results showed large individual variation in the stability and change of study-related exhaustion, and three change groups were created: decrease, no or slight change and increase in study-related exhaustion. Differences in the change of regulation of learning were found between the change groups of study-related exhaustion. The increase in study-related exhaustion was positively related to the increase in lack of self-regulation whereas the decrease in study-related exhaustion was positively related to the increase in experiencing peer support as important in studying and asking help from peers in study-related problems. Interestingly, both the increase and decrease in study-related exhaustion were positively related to the increase in studying together with peers. The results revealed a complex interaction between the stability and change in experienced study-related exhaustion and the change in self-regulation, external regulation, lack of regulation and co-regulation of learning.

Combining student learning research and learning analytics to understand students' learning process

Keywords: Higher education, Learning analytics, Learning approaches, Student learning

Presenting Author:Carlos González-Ugalde, Pontificia Universidad Católica de Chile, Chile; **Co-Author:**Maximiliano Montenegro, Facultad de Educación. Pontificia Universidad Católica de Chile, Chile; **Co-Author:**Carolina Guzmán-Valenzuela, University of Chile, Chile; **Co-Author:**Sergio Celis, Facultad de Ciencias Físicas y Matemáticas. Universidad de Chile, Chile; **Co-Author:**Augusto Sandoval, Facultad de Ingeniería. Pontificia Universidad Católica de Chile, Chile; **Co-Author:**Dany López, Facultad de Educación. Pontificia Universidad Católica de Chile, Chile; **Co-Author:**Sergio Barrera, Facultad de Ciencias Físicas y Matemáticas. Universidad de Chile, Chile

This study aims to demonstrate how student learning research and learning analytics may be integrated to investigate students' learning processes. We employed a set of data from undergraduate education students to explore the potential of using both traditions in conjunction. We have explored students' approaches to learning through the LEARN questionnaire. Also, we have collected academic records, data on the interactions students have in relation to learning management systems (LMS), and their use of library resources. Cluster analysis showed three groups of students: a group adopting mainly a surface approach, a group with a deep approach and organized study, and a group of students presenting a surface approach and organised study. Also, results show that: a) Deep learning students use more the library (expected outcome); and b) Surface students tend to use more the communicative features of the LMS. Outcomes on surface learning students and their use of LMS are, somehow, contrary to what may be expected from surface learners, usually characterized as unengaged. These results open a debate on which are the most appropriate ways to investigate students' learning and in which ways a combination of research perspectives might allow us to triangulate and obtain a more holistic picture.

31 August 2017 15:45 - 17:15

Virta - 120

Single Paper

Teaching and Teacher Education

Teaching and Teacher Education - E

Keywords: Assessment methods and tools, Comparative studies, Early childhood education, Environmental education, In-service teacher education, Learning Technologies, Meta-analysis, Pre-service teacher education, Qualitative methods, Quantitative methods, Self-efficacy, Teacher Professional Development

Interest group: SIG 11 - Teaching and Teacher Education

Chairperson: Giuseppe Ritella, University of Helsinki, Finland

The Effects of Observational Learning in Teacher Education: a Meta-Analysis

Keywords: In-service teacher education, Learning Technologies, Meta-analysis, Pre-service teacher education

Presenting Author: Olga Chernikova, Ludwig Maximilian University, Germany; **Co-Author:** Karsten Stegmann, Ludwig-Maximilians-Universität (LMU), Germany; **Co-Author:** Jan-Willem Strijbos, University of Groningen, Netherlands

Observational learning is frequently used to facilitate various complex cognitive skills and abilities of teachers. This meta-analysis examines to what extent learning of teachers and teacher students is affected by observational learning compared to control conditions without exposition to models or examples. The meta-analysis of 15 articles comprising 19 independent comparisons was conducted to estimate the summary effect of observational learning on the acquisition of skills and knowledge in teacher education. Moderator analyses were applied to explore the role of the presentation format, type of scaffolding and type of outcome measure for the effectiveness of observational learning. In addition, recent methods to detect publication bias and questionable research practices were applied. The summary effect of observational learning compared to control conditions without exposition to models or examples in teacher education is strong ($g = 1.13$; $SE = 0.21$). The presentation format and type of outcome measure explained a significant portion of heterogeneity. Regardless of presentation format and type of outcome measure, however, all effect sizes were large ($g > 1.0$) and differed only slightly ($\max \Delta g = 0.23$). The type of scaffolding was a significant moderator. While no scaffolding resulted in $g = 0.85$ ($SE = 0.19$), continuous scaffolding was more than twice as effective ($g = 1.80$; $SE = 0.52$). No evidence for systematic publication bias or application of questionable research practices was found. The high heterogeneity ($SE = 0.52$) for observational learning with continuous scaffolding highlights the need of more systematic research regarding optimal scaffolding of observational learning.

Opportunities to analyze pupils' learning at campus: A key challenge in teacher education?

Keywords: Comparative studies, Pre-service teacher education, Qualitative methods, Quantitative methods

Presenting Author: Inga Staal Jensen, University of Oslo, Norway; **Co-Author:** Esther Canrinus, University of Agder, Norway; **Co-Author:** Kirsti Klette, University of Oslo, Norway; **Co-Author:** Karen Hammerness, American Museum of Natural History, United States

Scholars continuously argue that teacher preparation needs to be "grounded in practice" and that fieldwork and coursework should be closely connected. Studies suggest that there is a need to focus explicitly on giving teacher candidates opportunities within their preparation to observe and detect pupils' learning, in order to know how to teach. The field placement site in teacher education represents one important place to do so. However, the campus site of teacher education also needs to pay attention to the enactment of these practices. In this study, we thus aim to understand what characterizes the opportunities candidates have to analyze pupils' learning within their coursework at campus and how candidates perceive these opportunities. Based on observation and survey data from six and three teacher education programs respectively, we find that candidates had few opportunities to analyze pupils' learning. The opportunities we did observe, were often superficially investigating pupils' learning. Based on the survey, the candidates reported to have had some opportunities to analyze students' learning at the most. Combining our findings from both data sources, we thus find that there is a need to improve the extent to which candidates are offered opportunities to analyze pupils' learning, and we wonder whether there is an opportunity lost in teacher education.

Development of Environmental Citizenship and Leadership among Preschool Teachers

Keywords: Early childhood education, Environmental education, In-service teacher education, Teacher Professional Development

Presenting Author: Ornit Spektor-Levy, Bar-Ilan University, Israel; **Co-Author:** Anat Abramovich, Technion-Israel Institute of Technology, Israel

The challenge of Environmental education is to enhance students' motivation, self-confidence, and to turn ecological literacy into action for environmental citizenship. To this end, educators should make necessary efforts, starting in early educational frameworks. One way to succeed is to enhance pre-school teachers' environmental knowledge, sense of responsibility, leadership vision, and commitment to create a change in the community. To promote these issues, this study investigated the influence of 120-hours "Environmental Leadership Professional Development" program on preschool teachers. The program's aim is to enhance environmental awareness, thus developing environmental citizenship and leadership. The program offered experiential and reflective learning, meetings with environmental researchers and

educators, discussions, a course website, and most uniquely, an environmental venture exemplifying active environmental leadership and citizenship conducted by the teachers with their preschoolers and accompanied by intensive professional support. Twenty-three pre-school teachers agreed to participate in the study. Data sources included questionnaires presented before, immediately after, and one year after the program, and the portfolios documenting the venture's processes and outcomes. The qualitative evidence attests to affirmative change among the participants, who demonstrated personal growth and empowerment as educators and leaders, even a year after the program ended. The results indicate that the "Environmental Leadership Professional Development" program may serve as a professional development model for empowering teachers to become both environmental leaders and environmental citizen role models.

Competencies of pre-service primary school science teachers concerning formative assessment

Keywords: Assessment methods and tools, Pre-service teacher education, Self-efficacy, Teacher Professional Development

Presenting Author: Verena Zucker, University of Koblenz-Landau, Germany; **Co-Author:** Miriam Leuchter, University of Koblenz - Landau, Germany

Formative assessment is a prerequisite for scaffolding students' learning (Bell & Cowie, 2001; Decristan et al., 2015). Unfortunately, many teachers are not able to implement formative assessment in science instruction (e.g. Gotwals et al., 2015; Morrison & Lederman, 2003). Therefore, courses at university level should foster pre-service science teachers' competencies in diagnosing individual paths of learning and providing feedback to students. A key feature of assessing teachers' competencies is using videos as prompts. In this pilot study we developed a videobased tool focusing on noticing components of formative assessment in science instruction as well as self-efficacy beliefs. The tool contains four short teaching situations of different science topics with items on different levels of specificity. We tested whether a one- or a two-dimensional model of formative assessment fits the data and whether we can identify differences in self-efficacy beliefs depending on their focus. Preliminary results show that we can not identify a coherent model in the data and that the model is dependent on the specificity of the items. Moreover, participants' self-efficacy beliefs decreases from unspecific self-efficacy beliefs to specific self-efficacy beliefs.

Session J 17

31 August 2017 15:45 - 17:15

Pinni B - B3117

Single Paper

Assessment and Evaluation, Educational Policy and Systems, Teaching and Teacher Education

Educational Effectiveness

Keywords: Achievement, Economics of education, Educational policy, Interdisciplinary, Mathematics, Motivation and emotion, Numeracy, Quantitative methods, School effectiveness, Secondary data analysis, Secondary education, Teacher Effectiveness

Interest group: SIG 18 - Educational Effectiveness

Chairperson: Anna-Liisa Jõgi, Tallinn University, Estonia

Becoming Successful in Math - A Comparison Across European Countries

Keywords: Achievement, Mathematics, Secondary data analysis, Motivation and emotion

Presenting Author: Jelena Radisic, University of Oslo, Norway; **Co-Author:** Marina Videnović, Institute of Psychology, Faculty of Philosophy, University of Belgrade, Serbia; **Co-Author:** Aleksander Baucal, University of Belgrade, Serbia

Grounded in the previous work on the relationship between mathematics anxiety, self-related math beliefs, intrinsic motivation and students' performance in mathematics, current study examines factors at student and school level differentiating students with the optimal pattern of high math achievement and positive self-related math beliefs across 17 European regions using PISA 2012 data. Hierarchical cluster analysis with variables: math anxiety, students' achievement (measured as a score at PISA math literacy scale) and students' perception of mathematics efficacy, self-concept in mathematics and intrinsic motivation indicated differentiated student profiles across European regions. Among them profile of successful mathematics students (low math anxiety, high achievement and highly perceived mathematics efficacy, self-concept in mathematics and intrinsic motivation) was clearly distinguished. Level one analysis indicates differences in factors relevant for students succeeding in mathematics depending on whether their country score is above or below the OECD average or the country shows math anxiety levels above or below the OECD average. Student socio-economic background (ESCS) and experience with pure mathematics tasks are factors relevant across all countries. Results of the two-level HLM indicate differences in predictor significance across student and school levels. While ESCS remains significant predictor at both levels across countries, in countries with math achievement below the OECD average and above average math anxiety student oriented teacher practices are relevant only at the student level. In countries with high math achievement and low math anxiety only teacher support besides the ESCS remains relevant at both school and student levels, while other predictors vary.

Teacher self-efficacy in 32 OECD countries – teacher, classroom, principal and school effects

Keywords: Interdisciplinary, Quantitative methods, Secondary data analysis, Teacher Effectiveness

Presenting Author:Sina Fackler, University of Oxford, United Kingdom; **Co-Author:**Lars-Erik Malmberg, University of Oxford, United Kingdom; **Co-Author:**Pamela Sammons, University of Oxford, United Kingdom

Teacher self-efficacy (TSE) is specified as to which extent teachers believe in their own abilities to successfully teach students, although students might be difficult or unmotivated. It is supposed to be associated with the quality of teaching and is subdivided into three dimensions that reflect key aspects of the teachers work: TSE for student engagement (ETSE), instruction (ITSE) and classroom management (MTSE). In this study we used the second sweep of the Teaching and Learning International Survey (TALIS) carried out by the OECD in 2013. The sample consists of 104.358 teachers of upper secondary students, nested in 6.455 schools across 32 countries. Both, teachers and principals, filled in self-assessment questionnaires. We specified three-level structural equation models (MSEM) using MPlus to (1) take into account factors from the teacher (e.g., teaching experience), classroom (e.g., classroom climate) and school level (e.g., state vs. private school), (2) extend the previously emphasised North American context and (3) investigate jointly predictors that have been used in single studies so far and show the following results: Not all predictors seem to be equally associated with all three dimensions of TSE. Most differences seem to appear among the classroom characteristics with respect to the three dimensions of TSE. Most variance could be explained among teachers, least among schools. Accordingly, the school a teacher works in seems to make a big difference.

Decomposing the score gap between immigrant and native students in Finland

Keywords: Achievement, Economics of education, Educational policy, Secondary education

Presenting Author:Tanja Kirjavainen, National Audit Office of Finland, Finland; **Co-Author:**Jonna Pulkkinen, University of Jyväskylä, Finland

The aim of this study is to examine if the immigrant students are treated equally with the native students in the Finnish educational system and especially in basic education. In particular, we study the test score gap of native and immigrant students with PISA 2012 data along the whole distribution instead of the mean. The observed score gap was decomposed into effects caused by student and school characteristics, returns to these characteristics and unobservables using Juhn-Murphy-Pierce decomposition. The results indicated that immigrant students scored lower than native students along the whole distribution. Between first-generation immigrants and natives, the gap decreased steadily along the distribution and it was mostly explained by student background factors. The gap between second-generation immigrants and natives remained at the same level along the distribution. It was explained by both student background factors and returns. The share of returns was larger at the top of the distribution. The educational support provided in basic education seems to be fairly good for the weakest first-generation immigrants, since the return effect is higher for them than for natives. However, that is not the case for second generation immigrants since they encounter lower returns to background than natives.

The importance of pre-school and early learning for achievement. Findings from TIMSS 2015

Keywords: Numeracy, Quantitative methods, School effectiveness, Secondary data analysis

Presenting Author:Trude Nilsen, University of Oslo, Norway; **Co-Author:**Monica Melby-Lervaag, University of Oslo, Norway; **Co-Author:**Sigrid Blömeke, University of Oslo, Norway; **Co-Author:**Jan-Eric Gustafsson, University of Gothenburg, Sweden

A number of studies show that home learning environment (HLE) in terms of literacy habits at home affect literacy skills in school. However, fewer studies have examined the importance of numeracy habits at home for mathematics and science skills. Moreover, in Scandinavia not many have studied this, and results concerning HLE from other countries may not be generalizable since differences in socioeconomic status (SES) are much smaller compared with for instance US. Finally, an even larger research gap exists, internationally and in Scandinavia, when it comes to knowledge about how pre-school attendance affects performance in school when HLE and SES are controlled for. To close these gaps we used data from the international large-scale study TIMSS 2015 to investigate 1. whether early numeracy and literacy habits at home are related to student achievement in primary school when accounting for SES. 2. whether pre-school participation is related to achievement in school when accounting for SES and early numeracy and literacy habits at home. We used structural equation modeling to analyze data for Norwegian students in 5th grade (N=4329) The results show that literacy and numeracy habits at home is important for literacy and numeracy skills at the start of grade 1, and for performance in science and mathematics in grade 5. Moreover, pre-school participation contributes to Norwegian students' performance in school over and above HLE and numeracy and literacy habits at home. Pre-school participation may hence diminish inequalities created by differences in SES and HLE.

Session J 18

31 August 2017 15:45 - 17:15

Pinni A - A1081

Single Paper

Educational Policy and Systems, Learning and Social Interaction, Motivational, Social and Affective Processes

Methods in Learning Research

Keywords: Attitudes and beliefs, Communities of practice, Comparative studies, Design based research, Ethnography, Interdisciplinary, Learning analytics, Learning approaches, Mathematics, Motivation, Secondary data analysis, Self-

regulation, Social aspects of learning and teaching, Synergies between learning - teaching and research

Interest group: SIG 17 - Methods in Learning Research

Chairperson: Marije Lesterhuis, University of Antwerp, Belgium

A Systems Approach to Model the Complex, Dynamic Nature of Policy into Practice

Keywords: Communities of practice, Interdisciplinary, Secondary data analysis, Synergies between learning - teaching and research

Presenting Author: Pamela Paek, ACT, Inc., United States; **Co-Author:** Britte Cheng, SRI International, United States

This paper describes a systems perspective on PreK-16 education policies and practices around formative assessment in the United States, including key players, factors, interactions, and relationships that are currently not modeled or measured in US educational research. We describe a project that modeled a system of factors and stakeholders involved in formative assessment at the student, teacher, classroom, school, teacher professional learning community, district and macro-system levels (i.e., state and federal policy). Incorporating multi-level dynamics, the project focus is broader than what has conventionally been labeled “formative” (the moment-to-moment interaction of a teacher and student) and is based on system feedback loops involving evoking and interpreting evidence of student learning needs to make adjustments in components across the system. Drawing on a literature review and expert panels, a systems model of formative assessment model was developed to show how key players and factors simultaneously and dynamically interact in the classroom, in the school, within a school district and beyond. Unlike methods that account for nesting of educational levels, this computational model includes a larger number of variables than can be typically analyzed, given the sample required to achieve high statistical power. The model also supports monitoring changes over time, as opposed to a limited number of time points. And, the model represents cross-level relationships that have not yet been operationalized for educational research but are necessary to deeply explore how a policy is implemented.

The pattern of motivation and learning strategies in the East Asian countries from PISA 2012

Keywords: Comparative studies, Learning approaches, Motivation, Self-regulation

Presenting Author: Yi-Jhen Wu, University of Bamberg, Germany

The aim of this study was to investigate self-regulated learning process in the East Asian education system by using the 2012 Programme for International Student Assessment's (PISA) self-report on non-cognitive construct. Two essential characteristics in self-regulated theory are motivation and learning strategies, which were explored in this study. The relationship between intrinsic/ extrinsic motivation and the use of learning strategies was investigated through latent class analysis (LCA) and the new 3-step LCA approach in the 6 East Asian education systems-Shanghai, Singapore, Hong Kong, Taiwan, South Korea, and Macau. The results showed that among 7 East Asian education system, students reported greater use of control strategies. Furthermore, when students applied elaboration strategies, their intrinsic and extrinsic were significantly higher than memorization and control strategies. Between intrinsic and extrinsic motivation, intrinsic motivation had a relatively substantial effect on math performance when students applied elaboration strategies.

A Machine Learning Approach to Explore the Role of Non-Academic Factors in Mathematics Literacy

Keywords: Attitudes and beliefs, Learning analytics, Mathematics, Secondary data analysis

Presenting Author: Florence Gabriel, Flinders University, Australia; **Co-Author:** Jason Signolet, Data to Decisions CRC, Australia

Modern education research has access to huge volumes of data. Within these datasets lies the potential to greatly increase our understanding of how students learn. However, handling and analysing these often high dimensional datasets is a major challenge. Thanks to the proliferation of powerful computers, machine learning techniques offer us a solution. One problem that we have addressed in this way is how non-academic factors relate to mathematics literacy. Mathematics literacy is fast becoming an essential requirement in ever greater parts of day-to-day work and life. Understanding mathematics literacy requires an ability to look at many aspects of mathematics learning, such as demographics and psychological dispositions in an integrated way as part of the same system. Large-scale assessments such as the Programme for International Student Assessment (PISA) provide an accessible and large volume of coherent data, and this gives researchers the opportunity to employ data-driven approaches to gain an overview of the system. For these reasons, we have explored the relationships between psychological dispositions and mathematical literacy in Australian 15 year-olds using the PISA 2012 dataset. We have employed techniques and ideas from machine learning to search for non-linear relationships and novel interactions in this multi-dimensional dataset. Our results from this strongly data-driven approach re-affirm the primacy of mathematics self-efficacy and highlight potentially important complex interactions between mathematics self-efficacy, mathematics anxiety, and socio-economic status. We also demonstrate the utility of applying a data-centric approach to complex research questions.

Photo elicitation, observation and conversation in an ethnographic study of new learning spaces

Keywords: Design based research, Ethnography, Learning approaches, Social aspects of learning and teaching

Presenting Author: Clare Newton, The University of Melbourne, Australia

Ethnographic studies rely particularly on observation and conversation. When photo elicitation is added to the research methods, the focus shifts onto visual experience and understanding. This paper describes the ethnographic approaches used in a multi-year study of the occupation of new learning spaces developed in Australia as a result of unprecedented

school funding in response to the Global Financial Crisis. To ensure money was invested quickly, state governments were required to develop template designs that could be rolled out across many schools. This research focused on a template used within the state of Victoria that was designed to enable students and teachers to continue to deliver within classroom environments or to open up walls to team-teach using more student-focused, multi-modal approaches. The benefits of photo elicitation when working with school children was that the photographs by students became a starting point for conversations about their understanding and use of space.

Session J 19

31 August 2017 15:45 - 17:15

Pinni A - Paavo Koli

Single Paper

Instructional Design, Learning and Instructional Technology

Instructional Design - A

Keywords: Action research, Collaborative Learning, Computer-supported collaborative learning, Design based research, Educational Psychology, Environmental education, Experimental studies, Higher education, Instructional design, Learning analytics, Motivation and emotion, Multimedia learning, Primary education, Quasi-experimental research, Workplace learning

Interest group: SIG 06 - Instructional Design

Chairperson: Stefanie Rach, University of Paderborn, Germany

If you could see what I see: professional and interdisciplinary challenges in learning space design

Keywords: Action research, Design based research, Higher education, Workplace learning

Presenting Author: Pippa Yeoman, University of Sydney, Australia; **Co-Author:** Megan Phelps, University of Sydney, Australia

If we understand knowledge building to be an active and often collaborative endeavor, we might reasonably expect to see places of learning shaped to support this type of human activity. Quite often they are not - despite the best intentions of those who participate in their design. But spaces for learning are more than the designed environment, for they accommodate human activity that is subtly shaped by instructional and social organization as well. This paper reports on eight months of planning for the redevelopment of teaching spaces, in a local major university teaching hospital. Based on participant observation and interviews we note the challenges encountered by educators, architects, researchers and planners as they worked to balance complex and often competing concerns, including different ways of communicating and representing knowledge. We trace their efforts to ensure that learning theory informed both the final design, and the necessary planning for alterations in future teaching and learning practice. Interim analysis of the architectural plans clearly demonstrates that an underlying commitment to active, collaborative knowledge building has shaped their form. Moreover, their novelty has initiated rich conversations about the types of learning activity they will support.

Achievement emotions in multimedia learning: An application of Control-Value Theory

Keywords: Experimental studies, Instructional design, Motivation and emotion, Multimedia learning

Presenting Author: Lisa Stark, Saarland University, Germany; **Co-Author:** Babette Park, Saarland University, Germany; **Co-Author:** Roland Bruenken, Saarland University, Germany

The present study links the *Cognitive-Affective Theory of Learning with Media* (CATLM; Moreno, 2006) and Pekrun's (2006) *Control-Value Theory of Achievement Emotions* by investigating how multimedia instruction can influence achievement emotions and multimedia learning. Based on control-value theory, the present study was realized applying a 2x2-factorial design with manipulation of learner control (high vs. low control) and value induction (high vs. low value) before learning.

$N=148$ students (10th grade) were randomly assigned to one of the four groups learning with multimedia instruction. Results show a successful manipulation of learner control, which resulted in a higher perceived academic control, more positive achievement emotions during learning and a better learning outcome. Effects of the value induction were dependent from the learner control factor, indicating the postulated intertwining of both factors by control-value theory. Specifically, induction of a high task value in combination with high learner control resulted in highest rating of perceived task value, positive achievement emotions and best learning outcomes. In sum, achievement emotions play a crucial role in multimedia learning. Results support Control-Value Theory by Pekrun (2006), which can be considered as a useful conceptual framework for explaining instructional design effects on emotions and on multimedia learning.

Effects of text mining based grouping and representing on collaborative learning

Keywords: Computer-supported collaborative learning, Educational Psychology, Instructional design, Learning analytics

Presenting Author: Melanie Erkens, University of Duisburg-Essen, Germany; **Co-Author:** Daniel Bodemer, University of Duisburg-Essen, Germany

Successful collaborative learning requires learners to be aware of their learning partners' knowledge. Tools supporting such cognitive group awareness transform and visualize cognitive information to initiate and model desirable learning activities. Their disadvantage is that they rely on specifically created input representing knowledge challenging teachers to gain specific information before applying such tools in their classrooms. Consequently, it seems obvious to equip these

tools with text mining methods that can extract cognitive information (semi-)automated from text. Based on this, we designed a Grouping and Representing Tool (GRT) that especially supports the comparison between learners by emphasizing their heterogeneity. In order to investigate the impact of the tool on the implicit guidance of students we conducted two studies: The first study evaluated the GRT in a real classroom setting and showed that visual support during the collaboration can lead to better text modifications and higher convergence between learners than without support. Further qualitative analysis found indicators that the convergence may derive from a need to close knowledge gaps caused by comparisons of content- or partner-related information. Thus, we systematically varied both these components of visualisations in a second experiment. We could find no effects on learning outcomes, but a main effect of available partner-related information on the count of words in explanations indicating that visualisations of partners' knowledge gaps guide learners to give longer explanations. Overall, we can conclude from this work in progress that the GRT has a significant impact on communication behaviour through positively influencing self-regulation processes.

Effects of a preparation to learn design for primary school children: Does one design fit all?

Keywords: Collaborative Learning, Environmental education, Primary education, Quasi-experimental research

Presenting Author: Rachel Lam, ETH Zurich, Switzerland; **Co-Author:** Stephanie Herppich, University of Freiburg, Germany

We present the outcome measures of a class lesson on a topic in environmental education that used an instructional design based partly on the principles from the Preparation for Future Learning paradigm. We describe our design, which is grounded in a collaborative learning context, the specific lesson taken from a larger set of design experiments, the current findings, and future work. Our aim was to investigate how the nature of preparation for future learning from collaborating and then receiving instruction affects student acquisition of knowledge and problem solving performance. Results show that the design seems to work differently with our sample of primary school students relative to what other preparation for learning work suggests. Accordingly, we discuss our findings in the light of the particular conditions relevant to our study.

Session J 20

31 August 2017 15:45 - 17:15

Main Building A - A4

Single Paper

Motivational, Social and Affective Processes

Motivation and Emotion - E

Keywords: Case studies, Cognitive skills, Doctoral education, Emotion and affect, Higher education, Learning approaches, Lifelong learning, Motivation, Qualitative methods, Quasi-experimental research, Second language acquisition, Self-efficacy, Self-regulation, Student learning

Interest group: SIG 08 - Motivation and Emotion

Chairperson: Clas Olander, Malmö University, Sweden

Motivation to enrol in doctoral education: the case of part-time traditional doctoral education

Keywords: Case studies, Doctoral education, Motivation, Qualitative methods

Presenting Author: Mindel van de Laar, Maastricht University, Netherlands; **Co-Author:** Nathan Kably, Maastricht University, France; **Co-Author:** Carlos Cadena Gaitan, UNU-MERIT, Netherlands

Research on the motives behind undertaking doctoral education is very thin. Few studies have explored the reasons to embark on research degrees, and the methods used to create knowledge on the matter themselves are limited, consisting mainly in surveys and interviews. However, research on doctoral education is crucial for the optimal matching of the demand for research skills with the offer of research degrees, and the optimal design of research degrees curriculums. This paper investigates the motivations of working professionals and researchers, with full- or part-time jobs, to embark on doctoral studies, where employment is a requisite for eligibility. As a new addition to the literature, the authors argue for a distinction between motives for undertaking doctoral education and enabling factors (institutional and personal) required to actually be able to participate in doctoral education. Results indicate both motives (the acquisition of skills specific to the academia, career development, the desire to bridge policy with research, topic deepening, and the desire to give back to its country) and enabling factors (the flexibility of the 'dual career' nature of the programme, the synergy between work and the proposed research, and the international and multidisciplinary natures of the programme) are crucial in the decision to apply for doctoral education. The authors discuss the results of the study in the context of an evolving market for research education.

Self-regulated learning skill development differences in grade 5-8 Australian students

Keywords: Learning approaches, Motivation, Self-regulation, Lifelong learning

Presenting Author: Susan-Marie Harding, The University of Melbourne, Australia; **Co-Author:** Narelle English, The University of Melbourne, Australia; **Co-Author:** Nives Nibali, The University of Melbourne, Australia; **Co-Author:** BM Alom, The University of Melbourne, Australia; **Co-Author:** Lorraine Graham, The University of Melbourne, Australia; **Co-Author:** Patrick Griffin, The University of Melbourne, Australia

This paper describes the differences in students' ability to regulate their own learning depending on age and content ability,

within different subject areas. A 32 item psychometrically validated multiple choice questionnaire was completed by 3741 students from grades 5 to 8 in Australian classrooms. The multiple-choice self-report tool captured students self-regulated learning strategies and motivations with each response ranked according to a hierarchy of quality. The questionnaire was analysed using Masters partial credit extension to the Rasch model to estimate students' level of skill in regulating their own learning. Significant differences were found between ages, where surprisingly the grade 8 students reported to be less able to regulate their own learning compared to the younger students. This finding held for all subject areas; Reading, Numeracy and Problem Solving. In each cohort and overall, students with higher content ability were more able to regulate their own learning, however age related differences outweighed content level differences, resulting in reduced use of self-regulated learning strategies in the grade 7 students compared to those in grades 5 and 6, and in grade 8 students compared to grade 7's.

The effects of a partner reading intervention on self-efficacy and motivation among L2 learners

Keywords: Motivation, Quasi-experimental research, Second language acquisition, Self-efficacy

Presenting Author:Hanna Pöyliö, Niilo Mäki Institute, Finland; **Co-Author:**Annastiina Kettunen, Niilo Mäki Institute, Finland; **Co-Author:**Katja Korhonen, Niilo Mäki Institute, Finland; **Co-Author:**Adrienn Jalonen, Niilo Mäki Institute, Finland

In the present study 26 students (boys=12, girls=14) Finnish as a second language students from grade levels 3 to 5 (mean age=11,25 yrs, sd=0,95 yrs) participated in a partner reading intervention in spring 2016. Control group consisted total of 36 participants (boys=15, girls=20) from grade levels (mean age=11,18, sd=0,95). Control group did not receive the intervention during the research period. Trained volunteers met the students once a week for a 30 minute one-to-one reading session for 10 weeks. Session included reading age appropriate books. Volunteers were giving a training to different kinds of research-based techniques to explain the unfamiliar words that occurred during reading. They were advised to give positive feedback frequently when reading together. Students were interviewed before and after the intervention. Student evaluated their self-efficacy beliefs related to vocabulary learning and reading comprehension in scale 1 to 7. Students also evaluated how much time they spent reading books at home and how much they enjoyed it. The participants showed an increase in self-efficacy related to both vocabulary learning and reading comprehension and in enjoyment in book reading whereas the control group did not. Group comparisons showed no difference in pre and post measurement points between the groups. More detailed results will be analyzed and presented.

Predicting Creativity in high school students through difficulties in Emotion Regulation

Keywords: Cognitive skills, Emotion and affect, Higher education, Student learning

Presenting Author:Maryam Esmailinasab, Tarbiat Modares University, Iran; **Co-Author:**Alireza Moradi, Kharazmi University, Iran; **Co-Author:**Susan Salehi, Islamic Azad University, Iran

Creativity is one of the significant factors that determine mental and social development plus school and job achievement at different levels. Assessing effective factors on it is very important consequently. The purpose of the present study was to discover the predictive role of difficulties in emotion regulation on creativity in high school students. To peruse this goal a descriptive correlational methodology was used. The target statistical population was the students of district nine of Tehran. The sample included 150 high school students of (75 females, and 75 males) who were selected based on random cluster sampling. Data were collected using Emotion Regulation Questionnaire by John and Gross and Creativity Questionnaire by Abedi et al. The collected data were analyzed through a stepwise regression analysis. The analysis revealed that reappraisal as one of the defining factors of emotion regulation successfully predicted all the subcategories of creativity (originality, fluency, flexibility, elaboration), almost like suppression that as another emotion regulation factor predicted them all except originality at ($p < 0/01$). Based on the findings of the present study, there is strong relation between creativity and emotion regulation and training effective emotion regulation strategies can improve creativity in students. Key words: Difficulties in emotion regulation, Creativity, high school students

Session J 21

31 August 2017 15:45 - 17:15

Pinni B - B3107

Single Paper

Motivational, Social and Affective Processes

Motivation and Emotion - F

Keywords: At-risk students, Attitudes and beliefs, Emotion and affect, Goal orientation, Motivation, Motivation and emotion, Parental involvement in learning, Quantitative methods, School effectiveness, Secondary education, Teaching / instruction, Teaching approaches, Vocational education

Interest group: SIG 08 - Motivation and Emotion

Chairperson: Ladislao Salmeron, University of Valencia, Spain

Involving Parents in High School Math through Short Text Messages (SMS)

Keywords: At-risk students, Attitudes and beliefs, Parental involvement in learning, Motivation and emotion

Presenting Author:Miguel Nussbaum, Pontificia Universidad Católica de Chile, Chile; **Co-Author:**Macarena Santana, Pontificia Universidad Católica de Chile, Chile

The importance of the family in academic achievement is known. Using a series of short text messages (SMS), an intervention to involve parents in their students' math activities was developed for a vulnerable school. The results showed a significant improvement with parents who said that they explained the consequences of an action to their children, as well as those who said that they had a friendly relationship with their children. A simple invitation to get together with their child seems to awaken a dormant potential within parents that can have significant effects on academic achievement, even among high school students.

Students' well-being in innovative schools – individual, social, and school factors

Keywords: Emotion and affect, School effectiveness, Teaching / instruction, Motivation and emotion

Presenting Author: Michaela Glaeser-Zikuda, University of Erlangen-Nuremberg, Germany; **Co-Author:** Florian Hofmann, University of Erlangen-Nuremberg; Institute for Educational Science, Germany; **Co-Author:** Melanie Bonitz, University of Erlangen-Nuremberg; Institute for Educational Science, Germany; **Co-Author:** Nikoletta Lippert, University of Erlangen-Nuremberg; Institute of Educational Science, Germany

Students' well-being in school is crucial for students' learning; it includes cognitive and emotional aspects. Creating a positive atmosphere in schools and enhancing the quality of instruction are two main characteristics for innovation in school. Innovation defined as something new, promising, and an improvement of the existing conditions refers to content, actors/persons, and processes in schools (Holtappels, 2013). The aim of the study was to analyze individual and contextual determinants of secondary school students' well-being in more or less innovative schools. In total 1.077 8th grade students from 14 different German secondary schools (10 innovative schools) participated in the cross-sectional study based on a questionnaire. The average age of the students was 14 years old (SD = 2.07), 50 % of them were female. The study was part of a school development project focusing on innovative learning environments. Students' well-being was assessed with scales of Hascher (2003).

Further constructs on the individual level, related to social context and quality of school and instruction were measured with standardized scales. Descriptive, correlative, and multiple regression analyses were carried out. Interestingly, students' well-being in more and less innovative schools did not significantly differ. Although students in more innovative schools report on significantly higher levels of intrinsic learning motivation, self-determination, and social climate, as well as less instructional pressure. Main results, limitations and implications of the study will be discussed.

School-based interventions on motivation in secondary education: A study of the longitudinal effects

Keywords: At-risk students, Goal orientation, Motivation, Vocational education

Presenting Author: Arnout Prince, Inholland University of Applied Sciences, Netherlands; **Co-Author:** Alexander Minnaert, University of Groningen, Netherlands; **Co-Author:** Marie-Christine Opdenakker, University of Groningen, Netherlands

Studies show a decrease in students' motivation in secondary education. In this study we investigated whether we could stop this decline using two school-based interventions. Two groups of pre-vocational secondary education teachers were trained in either self-regulated strategy instruction, or behavioral consultation combined with strategy instruction. We tested the longitudinal effects of the two interventions were tested on students' goal orientations. The growth curves revealed different developments over time for the group that received the intervention combining teacher consultancy with strategy instruction on task orientation, ego-enhancing orientation and ego-defeating orientation as compared to the control group. For the strategy instruction only condition, no differences were found in the developments of students' goal orientations over time as compared to the control group. The outcomes suggest that combining the instruction of self-regulation strategies with teacher consultation on student problem-solving can stop the downward trend in student motivation, even on the long term.

Test anxiety in secondary education: development and effects of learning environment characteristics

Keywords: Quantitative methods, Secondary education, Teaching approaches, Motivation and emotion

Presenting Author: Marie-Christine Opdenakker, University of Groningen, Netherlands

Test anxiety (TA) is a widespread phenomenon in education with important adverse effects on academic performance. Research suggests that test anxiety (TA) plays an important role in students' learning and motivation: students with low TA engage in more cognition, use more cognitive strategies and are more likely to persist at learning. While theory/research focused on individual differences in motivation/TA, nowadays the interaction between the self and the classroom context receives more attention and evidence is found that the learning environment matters. However, studies on the development of TA and effects of contextual factors are scarce. In the current study, the development of 566 students' TA in 20 grade-7 secondary education classes (mathematics, English) was investigated and the link with learning environment characteristics (e.g., class type (homogeneous/heterogeneous), teacher's instructional and management/control behaviour) was explored. Self-determination theory was used as the encompassing framework and guided the selection of LE characteristics. Multilevel growth curve modeling was applied and attention was paid to the general development of TA and the deviation to this development at class and student level. Results reveal a general increase of TA over time, but also differences between classes and students within classes. In addition, important links with learning environment characteristics and interactions between learning environment characteristics and gender are found.

31 August 2017 15:45 - 17:15

Pinni B - B4117

Single Paper

Assessment and Evaluation, Learning and Instructional Technology

Metacognition - E

Keywords: Attitudes and beliefs, Comprehension of text and graphics, Computer-assisted learning, Educational Psychology, Metacognition, Motivation, Multimedia learning, Problem solving, Quantitative methods, Self-regulation

Interest group: SIG 16 - Metacognition

Chairperson: Christian Müller, Goethe-University Frankfurt, Germany

Which glasses do you wear? The relation between adaptability and epistemological beliefs in science

Keywords: Attitudes and beliefs, Educational Psychology, Metacognition, Quantitative methods

Presenting Author: Ronny Scherer, University of Oslo, Norway; **Co-Author:** Øystein Guttersrud, The Norwegian Centre for Science Education, Norway

Students are exposed to vast amounts of knowledge and evidence that might be complex and subject to change over time due to scientific progress. This exposure requires them to be adaptive, that is, to constantly adjust their thinking, behavior, and affect in order to successfully solve information-rich and knowledge-lean problems. The present study examines the extent to which students perceive their individual adaptability and how these perceptions relate to their epistemological beliefs (EB) about the "development of scientific knowledge". This aspect of EB stresses the tentative and developing nature of science. On the basis of a national large-scale data set of 1,662 Norwegian tenth-grade students, we estimated the correlations among two aspects of adaptability (i.e., cognitive-behavioral and affective adaptability) and beliefs about the development of scientific knowledge. Moving beyond the construct level or, more specifically, factor correlations, we tested the extent to which students' individually perceived adaptability had an impact on their responses to statements about their EB by means of moderated factor analysis. Our analyses revealed that adaptability was positively correlated with sophisticated rather than naïve EB in science. Furthermore, the EB scale functioned differently with respect to different levels of adaptability. The results of this study indicate that students perceive the development of scientific knowledge through the lenses of their adaptability.

Using implementation intentions to support self-regulation in multimedia learning

Keywords: Comprehension of text and graphics, Metacognition, Self-regulation, Multimedia learning

Presenting Author: Emely Hoch, Leibniz-Institut für Wissensmedien, Germany; **Co-Author:** Katharina Scheiter, Leibniz-Institut für Wissensmedien, Germany; **Co-Author:** Anne Schueler, Leibniz-Institut für Wissensmedien, Germany

Multimedia learning (i.e., learning with text and pictures) not only requires learners to use adequate cognitive strategies but they also have to control their motivation during learning. Therefore, sophisticated self-regulation of cognitive and motivational processes may impact learning outcome positively. In the reported study, self-regulatory processes were supported by the use of implementation intentions, that is, if-then-plans aimed at supporting goal-directed (learning) behavior tied to specific favorable opportunities. A control group without instruction and three experimental groups being instructed with implementation intentions relating either to invested effort, self-efficacy, or learning strategies, were compared ($N = 132$). In line with our hypotheses, results indicated that supporting learning strategies or invested effort increased learning outcome compared with the control group. However, against expectation implementation intentions relating to self-efficacy were not helpful or might even be harmful for learning. Over-confidence is discussed as a possible explanation.

Learning from problem-solving tasks: Effects of prior knowledge and degree of control

Keywords: Computer-assisted learning, Metacognition, Problem solving, Self-regulation

Presenting Author: Loredana Mihalca, Webster University Geneva, Switzerland; **Co-Author:** Christoph Mengelkamp, University of Würzburg, Germany

A possible explanation for why students do not benefit from learner-controlled instruction is that they are not able to accurately monitor their own performance. Low prior knowledge (LPK) students are more likely to perform poorly under learner control, not only because of their lack of prior knowledge, but also because of their inaccurate judgments about their own performance (e.g., Ease of Learning Judgments - EOLs; Retrospective Confidence Judgments - RCJs). The purpose of this study was to investigate whether and how prior knowledge affects the accuracy of metacognitive judgments made during learning, and how this accuracy moderates the effect of learner control on performance when solving genetics problems. One hundred sixty undergraduate students were randomly assigned amongst the conditions of a 2 (high prior knowledge - HPK vs. LPK) X 2 (full learner control - FLC vs. restricted learner control - RLC) between-subjects factorial design. Results will be available well before the conference, and discussed with regard to the effect of prior knowledge on monitoring accuracy and the interaction between monitoring accuracy and degree of learner control on performance. The results will provide insight into how prior knowledge affects monitoring accuracy in the context of self-regulated learning from problem-solving tasks.

Help-seeking assistance in ILE: effect on perceptions of help and use of learning aids

Keywords: Computer-assisted learning, Metacognition, Motivation, Self-regulation

Presenting Author:Nathalie Huet, University of Toulouse, France; **Co-Author:**Julie Mulet, Université Toulouse Jean-Jaurès, France; **Co-Author:**Jean-Christophe Sakdavong, Université Toulouse Jean-Jaurès, France

When students are learning with interactive learning environments (ILEs), they often use available learning aids in an unproductive way (Aleven et al., 2003). To foster help-seeking behavior, some researchers implement computerized metacognitive tutors. However, these tutors often fail to reduce help-seeking avoidance (Roll et al., 2011). We supposed that help-seeking perceptions as a threat for autonomy, or for self-esteem could explain the lack of help-avoidance reduction. To that end, we tested a metacognitive tutor designed to diagnose and reduce perceived threat related to help-seeking. This motivational-metacognitive tutor (MM Tutor) was compared to a neutral metacognitive tutor (M Tutor) and a no-tutor condition (control). We assessed the evolution of help-seeking perceptions, help-seeking behavior and learning performance from 212 university students who learn autonomously. As expected, our results showed a reduction of perceived threats related to help-seeking in the MM Tutor condition. However, there was no difference related to the use of aids and learning performance between experimental groups. This result raised the question of the application of models elaborated for a social learning context within a computerized context.

Session J 23

31 August 2017 15:45 - 17:15

Pinni B - B3116

Single Paper

Educational Policy and Systems, Teaching and Teacher Education

Teaching and Teacher Education - M

Keywords: Attitudes and beliefs, Competencies, Content analysis, Cultural diversity in school, Educational policy, Qualitative methods, Quantitative methods, Student learning, Survey Research, Teacher Effectiveness, Teaching / instruction

Interest group: SIG 11 - Teaching and Teacher Education

Chairperson: Sanne van der Ven, Utrecht University, Netherlands

A Salutogenic View of Teacher Attrition: Career Stories of Teachers who Left Teaching

Keywords: Content analysis, Educational policy, Qualitative methods, Teaching / instruction

Presenting Author:Hayuta Yinon, Oranim Academic College of Education, Israel; **Co-Author:**Lily Orland-Barak, University of Haifa, Israel

Many countries report on a high percentage of teachers who leave the profession before retirement. Most of the explanations, such as teacher burnout, adopt a pathogenic point of view which perceives attrition as a negative work outcome. In contrast, the qualitative project that this paper is based on, which aims at characterizing the career decision-making processes of 34 Israeli teachers over ten years, adopts a salutogenic perspective. This means viewing attrition as a career decision which reflects the meaning teachers attach to their work. Drawing on a model which identifies three orientations toward work (job, calling and career), this paper will describe career stories of teachers who left teaching in order to illustrate how their work orientation shaped their decision.

Student surveys as measures of instructional quality

Keywords: Quantitative methods, Student learning, Survey Research, Teacher Effectiveness

Presenting Author:Marte Blikstad-Balas, University of Oslo, Norway; **Presenting Author:**Kirsti Klette, University of Oslo, Norway; **Co-Author:**Astrid Roe, University of Oslo, Faculty of Education, Norway

There are multiple ways of assessing teacher quality; recently, student surveys have been introduced as one possible reliable measure. In the present study we use a validated survey (the Tripod Student Perception Survey) to investigate to what degree students can provide nuanced information about teachers' instructional quality. The sample includes students from mathematics classrooms ($n = 1125$) and language arts classrooms ($n = 1100$) from 49 Norwegian lower secondary schools (grade 8). By comparing how students assess their teachers in these two subjects, we have found a huge variation between classrooms and schools and a big variation between items in the ratings of each teacher. We identify that students are consequently more positive towards their teachers in mathematics, which is directly linked to the ways teachers enact their teaching - statistically significant differences in favor of mathematic teachers were found on several items. This difference between subjects reinforces the finding that this survey measures important factors concerning teaching quality rather than generic attitudes towards, for example, mathematics. We did not find any gender differences on any items, which is somewhat surprising. The present study shows the benefits of asking students specific questions about teaching - tailored to measure instructional quality - rather than general questions about school and subjects. A key contribution of the present study, that should be relevant for researchers and policymakers alike, is empirical data illustrating how detailed student surveys can provide targeted and nuanced information about the repertoire of teaching practices of a single teacher.

Impacts of teachers' expectation on student achievement

Keywords: Attitudes and beliefs, Competencies, Student learning, Teacher Effectiveness

Presenting Author:Lena Hollenstein, University of Teacher Education St.Gallen, Switzerland; **Co-Author:**Benita Affolter, University of Teacher Education St.Gallen, Switzerland; **Co-Author:**Christian Bruehwiler, University of Teacher Education St.Gallen, Switzerland

For academic learning processes to be effective, teachers' professional competence is essential. It is composed of cognitive abilities (professional knowledge) as well as professional convictions and values (e.g. teacher's beliefs). There are a few studies about teachers' professional competencies, especially about teachers' professional knowledge and its impact on instructional quality and/or students' achievement. Though as of today, there is less empirical evidence regarding the impact of non-cognitive aspects such as underlying beliefs. Teachers' expectation concerning students' achievement can be classified as a special form of teachers' beliefs. Thus expectations are belonging to the non-cognitive aspects of teachers' professional competence and are therefore important for instructional quality and students' achievement. Since Rosenthal and Jacobson investigated the Pygmalion effect in 1968, it has been replicated and confirmed by other authors. But we don't know how important it is in addition to the teacher' professional knowledge. Within the context of the longitudinal study *Outcomes of Teacher Education* (German: *Wirkungen der Lehrerbildung*, WiL), a Swiss extension of the international comparative study TEDS-M, we build on these assumptions and investigate the expectancy effect controlling for professional knowledge. The analyses are based on answers of 30 primary teachers and 548 students.

Differentiated instruction as philosophy and teaching approach: introducing the DI-QUEST instrument

Keywords: Cultural diversity in school, Quantitative methods, Teacher Effectiveness, Teaching / instruction

Presenting Author:Katrien Struyven, Vrije Universiteit Brussel, Belgium; **Co-Author:**Catherine Coubergs, Vrije Universiteit Brussel (VUB), Belgium; **Co-Author:**Júlia Grifol Freixenet, Vrije Universiteit Brussel (VUB), Belgium; **Co-Author:**Esther Gheysens, Vrije Universiteit Brussel (VUB), Belgium

Student diversity is a reality which teachers have to deal with on a daily basis. Differentiated instruction aims at meeting student differences in learning in order to provide all students with the best possible learning opportunities. This paper introduces the DI-QUEST, a 30-item survey intended to measure teachers' philosophy and practices of differentiated instruction. Two goals are central to this study: (1) to construct an instrument that allows for describing the philosophy and approaches to teaching of teachers who differentiate in their classrooms (DI-QUEST) and (2) to develop a model that allows to predict the extent to which teachers differentiate their practices (DI-QUEST-Model). The instrument was developed for both primary and secondary school teachers and administered to a group of 1,573 teachers from 94 different schools in Flanders, Belgium. An exploratory and confirmatory factor analysis was carried out to investigate the factor structure of the questionnaire. As a result, five factors were measured in the DI-QUEST. Two factors measured the teacher's philosophy, two factors measured the practical principals and the final factor covered three kinds of differences in learning, which can be taken into account (students' readiness, learning profile and interests). The DI-QUEST-model with the best parameters revealed four factors (both philosophical factors, namely growth mind set and ethical compass, and both practical approaches, called flexible grouping and output=input), which functioned as significant predictors of the fifth factor (differentiated instruction, which was an independent variable). Implications for schools, educators and researchers will be discussed, including the limitations.

Session J 24

31 August 2017 15:45 - 17:15

Pinni B - B0039

Single Paper

Assessment and Evaluation

Online Measures of Learning Processes

Keywords: Assessment methods and tools, At-risk students, Learning disabilities, Mathematics, Numeracy, Primary education, Reasoning, Secondary education

Interest group: SIG 27 - Online Measures of Learning Processes

Chairperson: Kerstin Helker, RWTH Aachen University, Germany

A computer-based assessment tool for early identification of chil-dren with maths difficulties

Keywords: Assessment methods and tools, At-risk students, Numeracy, Primary education

Presenting Author:Moritz Herzog, University of Duisburg-Essen, Germany; **Co-Author:**Antje Ehlert, University of Potsdam / University of Johannesburg, Germany; **Co-Author:**Annemarie Fritz-Stratmann, University of Duisburg-Essen, Germany

The individual differences of children entering school are of great predictive importance for their later success in school. For this reason the factors influencing early numerical abilities have been focused by scientists from the fields of maths education, neuroscience and psychology. Based on different theoretical approaches and among others, numerical concepts like number sense and counting abilities as well as neuronal systems of magnitude comparison abilities have been discussed. With knowledge of early predictors, at-risk children for maths difficulties can be identified already when they enter school. A neuroscience-based test (*Numeracy Screener*) and a computer-based test grounded on maths educational and psychological ideas (*MARKO-Screening*) have been developed and validated to detect such children. This

submission aims to investigate to what extent both tests identify the same children and faces the question, how the different theoretical backgrounds can be integrated. Results of a study with German first-graders ($N=139$) show mainly commonalities of the test results. Most children, who lacked important numerical concepts, performed also poorly in comparing magnitudes and most children well performing in the magnitude comparison tasks already had crucial concepts. A greater number of children with age-appropriate concept development scored poorly in the neuroscience-based test. Since neural reasons are very unlikely, poor abilities regarding working speed, motoric or number symbol knowledge are taken into account.

Identifying early difficulties in mathematics: eDia, the online diagnostic assessment tool

Keywords: Assessment methods and tools, Mathematics, Primary education, Reasoning

Presenting Author:Gyongyver Molnar, University of Szeged, Hungary; **Presenting Author:**Benő Csapó, University of Szeged, Hungary

In this paper, we examine the applicability of an online diagnostic assessment system in the field of mathematics administered to students at the beginning of schooling. Taking research results in developmental psychology and learning mathematics into account, we developed a three-dimensional model of mathematical knowledge that distinguishes: the direct curricular and subject aspects of mathematical knowledge (MD); the reasoning aspect of mathematical knowledge (MR); and mathematical literacy (ML). We empirically validated the three-dimensional model of mathematical knowledge based on research results collected among first graders with eDia, the Hungarian online diagnostic assessment system. The study sample was drawn from first graders (aged 6–7, $n=5115$). Testing took place in the computer labs at participating schools, using the available desktop computers and browsers installed. The internal consistency of the instrument was high both at the test ($\alpha=.942$) and subtest levels ($\alpha_{MD}=.89$; $\alpha_{MR}=.83$; $\alpha_{ML}=.89$). As within the three-dimensional model, significant and high correlations were found between the pairs of dimensions ($r_{MD_MR}=.685$, $r_{MD_ML}=.749$, $r_{ML_MR}=.634$, p

A mathematical screening for measuring basic skills in 5th and 6th grade

Keywords: Assessment methods and tools, At-risk students, Primary education, Secondary education

Presenting Author:Antje Ehlert, University of Potsdam / University of Johannesburg, Germany; **Co-Author:**Annemarie Fritz-Stratmann, University of Duisburg-Essen, Germany

Basic arithmetical competencies acquired in primary school are necessary prerequisites for the acquisition of mathematical competencies in secondary school (Duncan et al. 2007; Stevenson & Newman 1986), which build the foundation for a sustainable algebra understanding in higher grades. But empirical evidence of national and international educational studies shows that about 20 % of the 15 year old students in Germany have limited abilities in math (Frey et al., 2010). To tackle this problem a mathematical test package for end of 4th to beginning of 6th grade students has been developed. A screening evaluates whether difficulties within the following three mathematical areas can be observed: understanding of part-part-whole, of multiplication and division and of place-value-system. If students with difficulties are identified, a more detailed test is conducted in order to find out where exactly the difficulties are located. The test package is based on Item-Response-Theory and grounded on theoretical as well as on empirical evidence. We introduce the mathematical screening for measuring basic skills with a sample of primary school students ($N = 842$, 51 % girls). The 27 items are Rasch-scaled. A criterion-referenced norm (i.e. cut-off values) is established according to the German educational guidelines. The cut-off value is crucial to decide whether or not a detailed test is conducted. In the here presented sample 32 % of the students show difficulties in the three mathematical areas mentioned above. Our results imply a need for fostering that builds up profound prerequisites for further education and the job market.

CODY: A computer-based screening for mathematical learning disabilities in elementary school

Keywords: Assessment methods and tools, At-risk students, Learning disabilities, Primary education

Presenting Author:Joerg-Tobias Kuhn, University of Münster, Germany; **Co-Author:**Christin Schwenk, University of Münster, Germany; **Co-Author:**Julia Raddatz, University of Münster, Germany; **Co-Author:**Christian Dobel, University of Jena, Germany; **Co-Author:**Heinz Holling, University of Münster, Germany

Children with mathematical learning disabilities (MLD) display substantial deficits in arithmetic skills, which strongly affects their educational progress and mental health. This study evaluated a computer-based screening assessment (CODY) to identify elementary school children at risk for MLD (grades 2-4). Overall, $N = 1,175$ children participated in this study. The CODY assessment focuses on four domains: Core markers (dot enumeration, number and magnitude comparison), number processing (transcoding, number line task, number sets, missing number), calculation (addition, subtraction, multiplication), and working memory (visual matrix span). A confirmatory factor analysis revealed that the postulated structure showed a good fit. Retest reliability was good ($r_{tt} = .88$), correlations with two other standardized mathematics tests were high ($r = .68 - .74$). We also found that school grades ($r = .56$) as well as teacher judgements of MLD ($r = .48$) correlated strongly with CODY scores. Finally, ROC analyses indicated good classification accuracy with respect to MLD ($AUC = .846 - .893$). In conclusion, CODY is a simple, efficient assessment for elementary school children at risk for MLD.

Session J 25

31 August 2017 15:45 - 17:15

Argumentation

Keywords: Argumentation, Collaborative Learning, Computer-supported collaborative learning, Higher education, Mathematics, Mixed-method research, Peer interaction, Physical Sciences, Science education, Student learning, Teacher Professional Development, Writing / Literacy

Interest group: SIG 26 - Argumentation, Dialogue and Reasoning

Chairperson: Maria Tulis, University of Augsburg, Austria

The use of argument organiser in outlining physics content knowledge for teaching purposes

Keywords: Argumentation, Higher education, Physical Sciences, Student learning

Presenting Author: Maija Nousiainen, University of Helsinki, Finland

Argumentation in teaching and its centrality in higher education has been noted to be important. The logical order of presented content knowledge and soundness of reasoning are both essential parts of well-planned teaching. Even though coherent and sound argumentation is essential, even more important is the ability to reorganize the content structure for teaching purposes. This study investigates pre-service physics teachers' knowledge justification schemes (identification of content knowledge) and didactical schemes about four different topics on quantum physics. The data is collected from a physics teacher preparation course which attended N=16 pre-service physics teachers. The knowledge justification schemes and didactical schemes were evaluated and scored. The results suggest that successful identification of content knowledge is a prerequisite to produce qualified didactical scheme since the opposite never happens.

The role of peer feedback script on students argumentative essay writing and knowledge acquisition

Keywords: Argumentation, Collaborative Learning, Computer-supported collaborative learning, Peer interaction

Presenting Author: Omid Noroozi, Tarbiat Modares University, Iran; **Co-Author:** Javad Hatami, Tarbiat Modares University, Iran

Students often lack knowledge to write high-quality written argumentative essays in higher education. Furthermore, they often tend to ignore that content knowledge can be acquired through peer feedback process. This study investigates the extent to which students' argumentative essay writing and domain-specific knowledge acquisition can be improved using computer-supported peer feedback script. A pre-test, post-test design was used with students who were assigned to groups of three. They were asked to argue a controversial topic with the aim of exploring various perspectives, and the 'pros and cons' on the topic of 'Genetically Modified Organisms (GMOs)'. The results show that the peer feedback script can facilitate students' quality of written argumentative essays and their domain-specific knowledge gain. These findings are discussed and implications are presented.

Enhancing dialogic argumentation in teacher-orchestrated discussions in mathematics and physics

Keywords: Argumentation, Mathematics, Science education, Teacher Professional Development

Presenting Author: Sami Lehesvuori, University of Jyväskylä, Finland; **Co-Author:** Jenna Hiltunen, University of Jyväskylä, Finland; **Co-Author:** Markus Häikiöniemi, University of Jyväskylä, Finland; **Co-Author:** Kaisa Jokiranta, University of Jyväskylä, Finland; **Co-Author:** Pasi Nieminen, University of Jyväskylä, Finland; **Co-Author:** Jouni Viiri, University of Jyväskylä, Finland

This paper reports on teacher professional development program addressing dialogic argumentation. Argumentation skills are becoming more and more important in an increasingly polarized society. In this paper, the social aspect of argumentation, often neglected in mathematics and physics classrooms, is given a thorough consideration in the designed professional development program. The program includes versatile cooperation between scholars and participating teachers. Monthly recorded lessons related to the program include three phases: preactive (planning), interactive (teaching) and postactive (evaluating and reflecting). Six teachers, teaching both mathematics and physics in lower secondary schools, are involved in the program. The aim here is to find out whether and how is dialogicity present in teacher-orchestrated discussions in the beginning stage of the professional development program. Teacher-orchestrated whole class discussion are analysed by considering indicators finally constituting as an authoritative or dialogic episode. Whereas dialogicity is supported for instance through teacher open questioning and supportive feedback, prevailing authoritativeness results from closed questions and evaluative feedback. Video analysis on teacher-orchestrated discussions revealed varying starting points for teacher professional development and dialogic argumentation. While authoritativeness was still prevailing form of interaction, examples of successful dialogic episodes demonstrate how authentic student argumentation is possible even during whole-class discussions. Teacher reflections will be used to complement the interpretations from videos and to map possibilities and challenges coming along with dialogic argumentation. Implications for teaching and teacher education will be discussed.

Online written argumentation: Developmental features and classroom instruction

Keywords: Argumentation, Computer-supported collaborative learning, Mixed-method research, Writing / Literacy

Presenting Author: Stuart McNaughton, University of Auckland, New Zealand; **Presenting Author:** Naomi Rosedale, University of Auckland, New Zealand; **Co-Author:** Rebecca Jesson, University of Auckland, New Zealand

In this paper we draw from a study involving a 1:1 digital initiative in Auckland, New Zealand to consider teacher approaches to developing student argumentation skills in digital environments. We analyse data from seven schools (six primary and one secondary) including 36 teacher questionnaires, 18 classroom observations and 220 student discussion board posts. We draw across three sources to describe developmental progressions in student written argumentation from ages seven to seventeen and within an online context. A Kuhnian framework is employed for analysing dialogic argumentation development from single to integrative focus, incorporating additional dimensions to assess quality of coherence and accuracy. The presence of discourse features such as hyperlinks, emoticons and audience address are identified and discussed in relation to digitally based argumentation. Using examples of the four argumentation forms found in classrooms (coalescent, adversarial, dialogic and tutorial) we draw connections to student dialogic argumentation capability suggesting although students as young as seven shows evidence of perspective integration, there is a prevalence across ages of one-sided biases, weak warranting and limited agentic use of digital tools for inquiry and information verification. We propose ways dialogic argumentation offers potential for building critical thinking and perspective taking as important 21st century skills.

Session J 26

31 August 2017 15:45 - 17:15

Pinni B - B1097

Symposium

Students' perceptions of teaching quality: Core predictors and effects

Keywords: Motivation and emotion, Social interaction, Student learning, Teaching / instruction

Interest group: SIG 08 - Motivation and Emotion

Chairperson: Jennifer Igler, TU Dortmund University, Germany

Discussant: Anna-Katharina Praetorius, German Institute for International Educational Research (DIPF), Germany

Students' perceptions of teaching and instructional quality are a core topic of international relevance. As the recipients of instruction, student perception clearly plays an important role. More importantly, however, students' perceptions of teaching have predictive power on student performance outcomes. The fact that empirical investigations show low agreement of perceptions among students within classrooms raises significant questions. The aim of this symposium is to investigate the variability of students' perceptions, predictors and effects of students' perceptions on teaching quality. The symposium will start by identifying the high variability in students' perceptions, despite the fact that students were taught using the same standardized unit by the same teacher in secondary schools, and by analyzing the correlation between students' and observers' ratings. The second presentation examines individual characteristics as predictors for the variance in students' perceptions of teaching quality in elementary schools. The last two presentations investigate the effects of students' perceptions. The third talk presents the prediction of students' perceptions of the goal structure of a mathematics class as well as teacher support in secondary school for individual characteristics like self-efficacy. The last presentation focusses on how perceived interpersonal aspects, such as toughness, impact students' achievement goals in secondary school. The symposium brings together important lines of current research on teaching quality from different countries. Findings demonstrate that student perceptions of teaching quality are complex individual processes. The concluding discussion will focus on the relevance of the findings for further research as well as educational practice.

Variation in teaching quality ratings of the same teacher in different classes

Presenting Author: Benjamin Caspar Fauth, University of Tübingen, Germany; **Co-Author:** Christiane Bertram, University of Tübingen, Germany; **Co-Author:** Wolfgang Wagner, University Tuebingen, Germany; **Co-Author:** Ulrich Trautwein, University of Tübingen, Germany

Our study investigates variability in student and observer ratings of teaching quality. We examined a single teacher who taught the same standardized teaching unit to 30 different classes. Results show considerable variation in the ratings. We also find substantial correlations between both rater perspectives. The very same teaching unit presented by one teacher in different classes results in highly variable teaching quality. Quality ratings were also related to student learning during the unit. Both results indicate that the variance in quality ratings may indeed represent teaching quality. However, differences in these measures can obviously not simply be attributed to teacher quality. Accordingly, the use of such rating instruments in high-stakes teacher evaluation systems should be revised.

Individual predictors for students' perceptions of teaching quality

Presenting Author: Jennifer Igler, TU Dortmund University, Germany; **Co-Author:** Annika Ohle, TU Dortmund, Germany; **Co-Author:** Nele McElvany, TU Dortmund University, Germany

Students' perceptions of teaching quality are predictive for their learning outcomes (e.g., Kunter & Baumert, 2006), but they often vary substantially within classrooms. This internationally recognized issue raises the question, what factors cause these inter-individual differences. Criteria for teaching quality can be categorized by three dimensions: instructional supports, classroom organization, and emotional supports (Pianta & Hamre, 2009). Up to now there has been little research on variability of students' perceptions in elementary school and on the question which factors influence the variance. Therefore, the present study investigates students' perception of teaching quality and analyses demographic (*gender*,

migrant background), as well as cognitive (*cognitive capability*), motivational (*school pleasure*) and emotional (*relationship with teacher*) student characteristics as predictors for perceptual variances. The sample consisted of 635 fourth graders (50% female) from 33 classrooms, who were asked about their perceptions of teaching directly after an instructional unit. Students rated three criteria of teaching quality with five items each: *cognitive demand* of tasks, *classroom-disruptions*, and *motivational support* by teacher – thus covering aspects from all domains of teaching quality. Results from structural equation models taking into account the clustered data structure indicated that students' emotional characteristics predicted differences in perception of motivational support. Furthermore, students with high cognitive capabilities perceived less cognitive demand and fewer classroom disruptions. Students with high school pleasure also perceived less cognitive demand in the classroom. Demographic characteristics had no predictive power for the perceived teaching quality. These findings have important implications for further research as well as classroom practice.

Classroom goal structure and teacher support: Relations with emotional and motivational responses

Presenting Author:Einar Skaalvik, Norwegian Univ. of Science and Technology, Norway

The aim of this study was to analyze students' perceptions of the quality of the education indirectly. We explored how students' perceptions of the mathematics classroom goal structure and teacher support predicted students' mathematic self-efficacy, anxiety, intrinsic motivation, and learned helplessness. Thus, in this study a high quality math education was indicated by high student self-efficacy and intrinsic motivation as well as low degrees of anxiety and learned helplessness. Participants in the study were 880 Norwegian students in grades 5 to 10. We measured both learning and performance goal structures and students perception of both teacher emotional and instrumental support. Data were analyzed by means of structural equation modeling (SEM analysis) for latent variables. The results showed that a learning goal structure in the math classroom was positively related to students' perception of teacher support as well as to math self-efficacy whereas a performance goal structure was negatively related to teacher support. Furthermore, students' perception of teacher support was positively related to intrinsic motivation for mathematics and negatively related to anxiety and learned helplessness. Math self-efficacy was positively related to intrinsic motivation and negatively related to anxiety and helplessness. Thus, the mathematics classroom goal structure was indirectly related to student motivation, anxiety, and helplessness – mediated through teacher support and self-efficacy. The results strongly indicate that the mathematics classroom goal structure is a strong predictor of the quality of math education.

Interpersonal Characteristics of Teaching and Students' Achievement Goals

Presenting Author:Tim Mainhard, Utrecht University, Netherlands; **Co-Author:**Theo Wubbels, Utrecht University, Netherlands

Many have claimed, but only some have shown, that the social nature of teaching and classrooms are likely to have a direct effect on students' achievement goals. This study examined the extent to which Dutch secondary school students' (N = 2895) achievement goals were related to the interpersonal quality of teaching. Students' goals were examined in terms of individual student perceptions of their teacher and their teacher's general interpersonal disposition. Multivariate multilevel models were tested, specifying the student and the teacher level and using two achievement approach and two achievement avoidance goals as dependent variables. The most remarkably finding was that students who like a generally tough teacher (level 2 effect) better than their peers do (i.e., level 1 effect, students who report relatively high teacher communion) were more likely to report higher levels of approach goals. In particular when considering interpersonally more 'extreme' teacher dispositions effects on students' goals were considerable. Regarding students' goals, identifying teachers who generally convey low levels of interpersonal agency and/or communion seems worthwhile for practitioners. Also identifying students with more pronounced, interpersonally negative perceptions of their teachers may be valuable when targeting students' achievement goals.

Session J 27

31 August 2017 15:45 - 17:15

Linna - Väinö Linna (K104)

Invited Symposium

More = more? Methodological challenges of process measures

Keywords: Arts, E-learning / Online learning, Experimental studies, Learning analytics, Motivation and emotion, Multimedia learning, Professions and applied sciences, Quantitative methods, Self-regulation, Social interaction, Technology

Interest group: SIG 27 - Online Measures of Learning Processes

Chairperson: Ellen Kok, Utrecht University, Netherlands

Organiser: Halszka Maria Jarodzka, Open University of the Netherlands, Netherlands

Organiser: Ladislao Salmeron, University of Valencia, Spain

Discussant: Els Boshuizen, Open University of the Netherlands, Netherlands

Throughout the recent years, researchers have used process measures to study the processes of learning and expertise development. In this course, they found many opportunities these measures offer, but they also faced challenges. These include combining process measures of different granularities, synchronising measures, capturing the sequential nature of

learning processes and defining reasonable epochs for analyses. Often, these challenges go by unnoticed as there is hardly any room to discuss them in traditional empirical study papers. Due to this lack of exchange, researchers often have to re-invent the wheel. With this symposium, we want to address this lack and give the stage to those researchers, who have successfully faced such challenges across several studies. Four presenters will outline the routes they took in approaching process measures, which routes they had to discard and why and which challenges they still see as unsolved. Järvenoja and colleagues use video data, physiological data and situation-specific self-reports to investigate motivational and emotional aspects of regulated learning. Puurtinen uses eye tracking and performance to investigate the phenomenon of “looking ahead” in music reading. Van Laer and Elen use event sequence analysis on computer log files to investigate self-regulatory behaviour in an online learning environment. Scharinger used eye tracking and EEG to investigate working memory in multimedia environments. Finally, Boshuizen will discuss the importance of understanding the learning processes through process measures, but also the challenges it places on us as researchers and what routes we might pursue in the future to address these challenges.

Investigating “looking ahead” during music reading: Rethinks and realizations

Presenting Author:Marjaana Puurtinen, University of Turku, Finland

Music reading is an intriguing domain for investigating the development of visual-motor skills because of the temporal restrictions imposed upon the reading task: musicians constantly have to select what, when and for how long to target their gaze at *while proceeding within a given tempo*. When reading a musical score, the music reader’s gaze moves slightly ahead of the current point of performance, and this gap then allows the performer to prepare for the upcoming motoric responses. However, the interplay of factors involved in this “look-ahead” behavior is still not properly understood. This paper presents three studies that exemplify the steps we have taken in our work on this topic. We will point out how we have come to alter our views on how to best explain the various components affecting this specific act, and discuss how this rethinking has made us also to reconsider how we, in fact, should measure the “looking ahead” during music reading.

Measuring motivation and emotion regulation on-line

Presenting Author:Hanna Jarvenoja, University of Oulu, Finland; **Co-Author:**Sanna Järvelä, University of Oulu, Finland; **Co-Author:**Jonna Malmberg, University of Oulu, Finland; **Co-Author:**Kristiina Kurki, University of Oulu, Finland

In our research on self-regulated learning we have focused on situational and contextual variation of regulated learning to explain regulatory processes in social, interactive, and technology enriched learning. We have engaged in research that employs on-line measures and technological tools to conceptually and empirically capture multiple layers of regulated learning “on the fly” in social contexts. In this presentation we will describe the progress in our research about the *motivational and emotional aspects of regulated learning*. Analyzing on-line process data of regulated learning poses a variety of challenges, such as variation in the granularity of different data sources, problems that emerge when we are unable to control the complexity of different contextual and situational aspect of the real-life learning situations, or currently, the use of big data and learning analytics. In addition, there are features that are characteristic particularly for the research on motivation and emotions during the regulated learning process. Motivation and emotions are difficult to capture due to their invisible, silent and internal nature as against to the cognitive processes that are often more visible, easier to externalize, recognize and interpret. Still, motivation and emotions are critical for learning and achievement. This has let us to employ multiple process oriented methods that include both subjective and objective data sources including situation specific self-reports, video, and recently, also physiological data. We have gradually moved forward from in-depth case studies into attempts to develop a systematic, process oriented approach without losing the situated features of the regulated learning process.

Using Event Sequence Analysis to Uncover Self-Regulatory Behaviour: Towards Design Guidelines

Presenting Author:Jan Elen, KU Leuven, Belgium; **Co-Author:**Stijn Van Laer, KU Leuven, Belgium

The analysis of behavioural data provides new avenues for investigating the sequential nature of self-regulation. This contribution describes the data-driven approach used in a study that aimed to identify the relationship between learners’ characteristics and their self-regulatory behaviour by performing event sequence analysis on log files extracted from ecologically valid online learning environments. In the first phase of the study, we described the instructional context as an external condition in order to map any aspects that might support self-regulation. We collected data on relevant learner characteristics as internal conditions and extracted timestamped log-file data as indicators of learners’ self-regulatory behaviour. Next, the data was cleaned and recoded using an action library. The third phase focused on discovering event patterns using the TraMineR package in R to identify frequent sub-sequences (Levenshtein distance) (Gabadinho, Ritschard, Studer, & Müller, 2009). Finally, significant discriminant sub-sequences were described in relation to various learner characteristics (Pearson’s Chi-square test). The results demonstrate how the design of an online learning environment triggers different event sequences — and hence different self-regulatory behaviour — in learners with different characteristics. The study offers a starting point for discussing sequence analysis of log files extracted from ecologically valid environments, as well as the conceptual and methodological issues related to this type of research.

Combining eye-tracking with EEG data analysis: Potentials and methodological challenges

Presenting Author:Christian Scharinger, Leibniz-Institut für Wissensmedien, Germany

Although working memory (WM) is hypothesized to play an important role in learning from multiple information sources like learning from multimedia material, to date WM load has been rarely assessed directly during learning. Changes in the alpha

and theta frequency band power of the Electroencephalogram (EEG) may be used to assess WM load directly (i.e., may serve as online process measures). The combination of eye-tracking and EEG allows analyzing the EEG data fixation-related and thus may allow measuring WM load in free, natural viewing situations of complex textual and pictorial task materials. We will present promising results of initial studies using this methodology in research on hypertext reading, web search result page evaluation, and text-picture integration, and will discuss methodological challenges.

Session J 28

31 August 2017 15:45 - 17:15

Main Building A - A32

Invited Symposium

Cognitive Science

Broadening the Scope of Conceptual Change: Conceptual Change Meets other Disciplines

Keywords: Attitudes and beliefs, Conceptual change, Mathematics, Science education

Interest group: SIG 03 - Conceptual Change

Chairperson: Haim Eshach, Ben-Gurion University of the Negev, Israel

Organiser: Konstantinos Christou, University of Western Macedonia , Greece

Organiser: Haim Eshach, Ben-Gurion University of the Negev, Israel

Discussant: Stella Vosniadou, Greece

The conceptual change (CC) framework is widely used in mathematics and science education, and to lesser extent in social topics like economics and history. This symposium brings together researchers from these fields, seeking to enrich and broaden our perspectives about CC research and implementation. Eshach argues that CC research should not only address individuals, but also CC processes within the whole class, or what he calls the *individual collective*. He brings examples from physics classes to support this argument. Davies argues that assumptions about actors' beliefs and motivations are embedded in *social scientific* conceptions, which could make CC in these disciplines somewhat distinctive. He adds that many studies focusing on learning economics have used 'threshold concepts' to describe CC. His presentation considers the merits of regarding this language as identifying a particular kind of CC in particular kinds of subjects, which is helpful for the design of teaching. Vamvakoussi claims that the CC approach was initially associated with science learning and a systematic attempt at a CC perspective on mathematics learning is a more recent development. Her presentation looks back on a decade-long effort to apply the framework theory approach to CC to mathematics and sketches directions for further research. Limon argues that a full explanation of why individuals are so reluctant to change their beliefs/knowledge is still lacking. Using literature on dual-processing theory, her paper offers an integrative review of recent findings that focus on how information should be presented in order to facilitate CC in different disciplines.

Conceptual change within the individual collective

Presenting Author: Haim Eshach, Ben-Gurion University of the Negev, Israel

Cognitive constructivism has led conceptual change literature to focus mainly on the solo cognitive approach, which sees the group of students that makes up a class as a collection of individuals. Inspired by social constructivism, I argue that to gain a broader understanding of how concepts change it is not enough to examine only how *individuals* change their concepts, but also how concepts change at the level of a *group of students* - what I call the *individual collective*. Any teacher who has conducted a full-class dialogic discussion will probably recall that even if they teach the same topic to different classes, the concepts that emerge in each, as well as the flow (the movement from one concept to another as the lesson progresses), may be absolutely different. This is because the two classes constitute different "individual collectives." Understanding *conceptual flow patterns* (CFP) (i.e. the way concepts emerge and change within the *individual collective*), as these are manifested in the whole-class dialogic discussion, may help educators design better learning environments that can lead students more successfully to meaningful learning. In my presentation I will introduce a series of studies based in learning environments that employ various strategies, like circus tricks and physics texts that are visually designed like the Talmud pages, and the CFPs that arise within them. I will also present a study describing the process of teaching teachers how to conduct dialogic discussions, focusing on the cultural difficulties associated with conducting whole-class dialogic discussions with rich CFPs.

Conceptual change and threshold concepts in economics: learning to see like an economist?

Presenting Author: Peter Davies, University of Birmingham, United Kingdom

This paper considers what, if anything, might be distinctive about conceptual change in learning economics in the final years of secondary school and the early years of an undergraduate education. This focus introduces two dimensions: students' prior experience of the discipline (as opposed to their prior experience of phenomena investigated by the discipline) and the nature of the discipline itself. Assumptions about actors' beliefs and motivations are embedded in *social scientific* conceptions and this could make conceptual change in these disciplines somewhat distinctive. The argument of the paper is developed through a review of evidence and commentary on students' learning. Whilst there is a large literature on teaching economics and measured outcomes from that teaching, there have been relatively few investigations of students' conceptions and the challenges that students face in their learning. Many of those studies which have focused on the learning of economics have used 'threshold concepts' to describe the change which researchers believe they

observe. This raises a question about whether it is fruitful to regard this language as identifying a particular kind of conceptual change in particular kinds of subject which is helpful for the design of teaching.

Conceptual change research in mathematics: Looking back and looking forward

Presenting Author:Xenia Vamvakoussi, University of Ioannina, Greece

The conceptual change approach to learning was initially associated with science learning and had minimal impact on research on mathematics learning. The systematic attempt to take a conceptual change perspective on mathematics learning is a more recent development. This paper looks back to a more than one decade long effort to apply the framework theory approach to conceptual change to the case of mathematics and sketches directions for further research including: a) more basic research in content areas other than number, b) more educationally-oriented research, and c) constructive dialogue with different theoretical perspectives, particularly those that put forward continuity in the development of mathematical concepts.

Dual Processes theory implications for conceptual change: A review

Presenting Author:Margarita Limon, Autonomous University of Madrid, Spain

Resistance to change individuals' beliefs/knowledge has been a repeated result obtained in conceptual change research. Difficulties to change have been especially experienced when knowledge /beliefs are highly entrenched. This result has been found in different domains (Limon & Mason, 2002; Sinatra & Pintrich, 2003; Vosniadou, 2013). Up to now a full explanation of why individuals are so reluctant to change is not available yet. I consider that making alternative questions and using different approaches might contribute to provide complementary data and ideas helpful for promoting and achieving conceptual change in the classroom. Both in social cognition and thinking research, the dual-processing theory (e.g. Evans, 2008; 2010; Evans & Frankish, 2009; Stanovich & West, 2000; Frederick, 2005; Kahneman, 2011; Stanovich, 2011) is currently used to give account of results. This theory proposed the existence of two types of processes: Type 1 (fast automatic unconscious processes) and type 2 (slow controlled conscious processes). Often these two types of processes are described as the intuitive mind (type 1) and the reflective mind (type 2). This paper intends to provide an integrative review of the main results obtained recently, either in the field of social cognition and attitude change or in the field of the psychology of thinking that focus on how information (arguments) should be presented in order to facilitate conceptual change in different disciplines. Research data will be presented to illustrate some points of the review, and particularly, the influence of intuition and reflective thinking processes in promoting conceptual change.

Session K 1

1 September 2017 08:30 - 10:00

Pinni A - A1081

Single Paper

Teaching and Teacher Education

Teaching and Pre-Service Teacher Education

Keywords: Achievement, Attitudes and beliefs, In-service teacher education, Knowledge creation, Mixed-method research, Pre-service teacher education, Religious studies, Self-regulation, Teacher Professional Development, Teaching / instruction, Video analysis

Interest group: SIG 11 - Teaching and Teacher Education, SIG 19 - Religious and Spiritual Education

Chairperson: Andreas Gegenfurtner, Germany

Teachers and students reciprocal relations in promoting self-regulation and math performance

Keywords: Achievement, Mixed-method research, Self-regulation, Teaching / instruction

Presenting Author:Bracha Kramarski, Bar-Ilan University, Israel; **Co-Author:**Anat Shilo¹, Bar Ilan University, Israel

Self-regulation in learning (SRL) is considered to be critical for success both academically and later in life. To cope with the complex dynamic challenge of helping students self-regulate their construction of knowledge and skills, teachers must undergo important dual processes. First, teachers need to learn to become more proactive self-regulated learners themselves (that is the learner role-SRL), and then teachers need to learn how to help students achieve SRL (that is the teacher role-SRT). Although, training models have been suggested in the literature to advance teachers' and students' reciprocal self-regulation processes, experimental interventions to assess these conceptualized dual effects are lacking. The current study investigated in a quasi - experimental study an explicit practical model for professional training program to help teachers attain the necessary knowledge and skills for successfully implementing their own dual SRL/SRT roles, which, in turn, may empower students' SRL and their academic achievements. The training program was compared to a control group with mixed method methodologies.

The role of teachers' diversity perception for teacher-student interactions

Keywords: Attitudes and beliefs, In-service teacher education, Teacher Professional Development, Video analysis

Presenting Author:Maralena Pielmeier, Technical University of Munich (TUM), Germany; **Co-Author:**sina huber, TUM School of Education/ZIB, Germany; **Co-Author:**Tina Seidel, Technische Universität München (TUM), Germany

As students grow increasingly diverse, individual student learning prerequisites gain importance. For individual learning

support teachers need to teach adaptively. Theory knows that teachers must be able to judge the differences in their students' characteristics and it gives first hints how to shape teacher-student interactions in order to provide individual learning support (Corno & Snow, 1986). Yet, teacher and student learning perspectives of adaptive teaching are rarely viewed together. Our study investigates both perspectives on teacher-student interactions in adaptive teaching for $N_S=429$ eighth grade students and their $N_T=20$ mathematics teachers. Our central research question was: Do teachers who see more of their students' differences in characteristics interact with them differently? And how do students perceive those interactions? Findings suggest that teachers who perceive the interplay of their students' characteristics to be more diverse shape interactions to allow more student involvement and seem to direct questions more intentionally. On the student side, higher intrinsic and interested motivation was connected to those more inclusive and adaptive interaction processes. This suggests that teacher professional development that includes both perspectives of adaptive teaching by allowing teachers to focus on their student perspectives and characteristics can yield advances in teacher and student learning.

Fostering Students' Professional Vision on Theological Discussions by Lesson Clips

Keywords: Pre-service teacher education, Religious studies, Video analysis, Knowledge creation

Presenting Author:Ulrich Riegel, University of Siegen, Germany

This paper gives first evidence on effects of analyzing video clips on the students' professional vision in the realm of religious education by using data from a course on Theological Discussion. Professional vision is conceptualized according to the two dimensions of noticing and reasoning (Seidel & Stürmer 2014; van Es & Sherin 2002). Each dimension has been operationalized according to four indicators. In the course the students ($N = 48$) commented on lesson clips (each about 4 min) at three times ($N = 144$), getting input about the theory and practice of Theological Discussion in between. These comments have been rated according to the students' ability to notice and to reason. While all ratings show sufficient inter-rater-reliability (Cohen's $K > .75$), Friedman-Test indicates changes between the three times of commenting as significant on only three variables: the frequency of words used in the comments, the frequency of scientific concepts referred to in the comments, and the frequency of given alternative practices. The changes on the other five variables are not significant. The paper will describe and discuss these results.

Session K 2

1 September 2017 08:30 - 10:00

Main Building D - D13

Single Paper

Assessment and Evaluation, Learning and Social Interaction, Teaching and Teacher Education

Professional Development

Keywords: Achievement, Attitudes and beliefs, Competencies, Learning approaches, Mathematics, Motivation, Problem solving, Quantitative methods, Student learning, Teaching / instruction, Vocational education, Workplace learning

Interest group: SIG 14 - Learning and Professional Development

Chairperson: Claudia Roebers, University of Bern, Switzerland

The influence of students learning experiences on learning results in complex learning environments

Keywords: Achievement, Learning approaches, Student learning, Teaching / instruction

Presenting Author:Mandy Hommel, TU Dresden, Germany

Complex learning environments and their characteristics are expected supporting deep learning and generating applicable knowledge. Empirical results differ and do not confirm this expectation in any case. Searching for reasons, one explanation is that learners need to have skills to orient themselves in complex learning environments to be able to plan, manage, monitor and reflect their learning processes. It can be assumed, that the quantity and quality of prior experiences in open learning environments influences how the learners use the learning potential of complex learning environments. Therefore, this study investigates learning experiences and their influence on learning results from a business case study lesson. Data were gathered by an experiences questionnaire and knowledge pre- and post-tests demanding different dimensions of cognitive processes for solving. The questionnaire data revealed a four-factor structure for the quality of experiences: (1) the perception of the own depth of learning in open and complex learning environments, (2) the attitudes towards characteristics of complex learning environments (complexity, reality, task identity), (3) towards different lesson concepts, and (4) cooperation. The analysis of learning results demanding analyse and apply knowledge in the post-test showed significant influences by the variable school, and an interaction effect between school and the quantity of experiences with open learning environments. The results give insights into the effect of experiences on learning and especially upon learning results in complex learning environments.

The Role of Beliefs and Motivational Variables in Enhancing Word Problem Solving

Keywords: Attitudes and beliefs, Mathematics, Motivation, Problem solving

Presenting Author:Nonmanut Pongsakdi, University of Turku, Finland; **Co-Author:**Eero Laakkonen, University of Turku, Finland; **Co-Author:**Teija Laine, Centre for Teacher Training, Turku, Finland; **Co-Author:**Koen Veermans, University of

Turku, Finland; **Co-Author:**Minna Hannula-Sormunen, University of Turku, Finland; **Co-Author:**Erno Lehtinen, University of Turku, Finland

Word problem solving and mathematical modelling are widely seen as important aims of mathematics learning, which can prepare students to use mathematics in everyday situations. However, teachers face difficulties in teaching mathematics that go beyond arithmetic. Several researchers have shown that the differences in student performance cannot be explained purely as the result of differences in cognitive skills, but the role of beliefs and motivational variables must also be taken into account. This study is about a Word Problem Enrichment programme (WPE) designed to encourage teachers to use innovative, self-created word problems to improve student mathematical modelling and word problem solving performance. A positive impact of WPE on student word problem solving performance was found in a previous study focusing on cognitive factors only. However, it is unknown if WPE has an impact on student beliefs about word problem solving, and how WPE works for students with different motivation in learning mathematics. This study investigated the impact of WPE on student beliefs about word problem solving by using Latent Profile Analysis and Structural Equation Modelling to analyse relations among the different cognitive, motivation, and belief factors. A total of 170 fourth- and sixth-grade students from elementary schools participated. Results showed that the effects of WPE are various depending on student initial motivation level. The impacts of WPE on student beliefs were found only in students with a low initial motivation level, while its impacts on student problem solving performance were found only in students with a high initial motivation level.

Learning in in the Icelandic dual VET system: Integration of school and work-based learning

Keywords: Competencies, Student learning, Vocational education, Workplace learning

Presenting Author:Elsa Eiríksdóttir, University of Iceland, Iceland

The goal of the study is to look at how the different implementation of the VET dual system in Iceland relates to the integration of learning at school and work and the competency developed at each site. Research on learning in a dual system has indicated that an effective implementation of the dual system is contingent upon successfully integrating learning at school and work. In the certified trades in Iceland the dual system varies considerably in terms of the duration of the work-based learning and the sequencing of school- and work-based learning periods and this variability should impact the integration and learning at the two sites. An electronic questionnaire on learning at school and work was sent to recent graduates, workplace trainers, and teachers in all 51 certified trades in Iceland ($N = 2838$). Data was collected May to September 2016 and 667 participants answered (24% response rate). The presentation will focus on results relating to ratings of which general and work-related competencies are developed at each site of learning in the dual system, as well as ratings on which of the listed competencies are the most important ones to develop while studying the trade. The results will show how recipients view learning in the VET dual system in Iceland and how the implementation of the dual system in terms of duration and sequencing relates to this view. Given the current discussion in Iceland on VET reform it is important to understand the intricacies and outcomes of the current system.

Comparing trainees' competences in the technical domain between Germany and Switzerland

Keywords: Achievement, Competencies, Quantitative methods, Vocational education

Presenting Author:Leo van Waveren, Technical University of Kaiserslautern, Germany

An accepted model for technical occupations is the multidimensionality of professional competence, separating content knowledge and its application (Nickolaus & Seeber, 2013). Furthermore, a number of studies found that in the technical domain content knowledge itself is again a multi-dimensional construct with dimensions structured by content, as it was successfully demonstrated, for example, for car mechatronics (Schmidt, Nickolaus, & Weber, 2014).

Problem solving, usually applying to an analytical construct (i.e. proposing necessary corrections to malfunctions (Abele, Walker, & Nickolaus, 2014)), is highly dependent on content knowledge, as discussed by Nickolaus (2011).

In the feasibility study by Baethge and Arends (2009) it was concluded, that for Germany and Switzerland the two occupations, car mechatronics and electronics technicians for automation technology, both share enough of their curriculum with their respective counterparts to warrant an empirical comparison.

This paper uses findings from a pilot study on car mechatronics from both countries to gather insights into expectable differences between the two countries in regard to the achieved professional competences (understood as content knowledge and analytical problem solving as its application) at the end of vocational training. Findings from a second study are presented in which a competence model, developed and empirically tested for the German occupation, was applied for a comparison between both countries.

Session K 3

1 September 2017 08:30 - 10:00

Virta - 113

Single Paper

Learning and Social Interaction

Social Interaction in Learning and Instruction - B

Keywords: Content analysis, Design based research, Learning and developmental difficulties, Literacy, Motivation, Motivation and emotion, Parental involvement in learning, Primary education, Social aspects of learning and teaching,

Social interaction, Synergies between learning - teaching and research, Teacher Effectiveness, Teacher Professional Development, Teaching approaches

Interest group: SIG 10 - Social Interaction in Learning and Instruction

Chairperson: Anne-Mari Kuusimäki, University of Helsinki, Finland

Challenges and learning potentials at the boundary: Encounters of educational research and practice

Keywords: Content analysis, Design based research, Social interaction, Synergies between learning - teaching and research

Presenting Author:Ulrike Hartmann, University of Wuppertal, Germany; **Co-Author:**Jasmin Decristan, Goethe-University Frankfurt; IDeA-Research Center, Germany

Following the notion of evidence-based practice in education, researchers are supposed to provide schools with significant evidence that can guide them in practical decisions. In turn, teachers are supposed to stay informed about latest results from educational research to make practical decisions on a sound scientific basis. Yet, researchers and teachers often bewail a wide gap between the results of educational research and daily school life. Our interview study aims to illustrate what kind of challenges researchers and teachers face when they exchange information or communicate directly with each other. Second, we identify learning potentials that can stem from cooperative efforts between educational research and school practice, relating to the concept of *boundary crossing* (e.g., Akkerman & Bakker, 2011; Akkerman & Bruining, 2016). 10 educational researchers and 10 teachers from Germany participated in the study. We identified three categories of challenges, being 1) a lack of individual resources, 2) emotional/ motivational challenges, and 3) challenges regarding the differences between the systems of research and practice. We also address four learning potentials in our interview data (i.e., Identification, Coordination, Reflection, and Transformation), and show how they relate to the experiences and potential benefits of research-practice-encounters. Our paper takes up the ideas on boundary crossings and the learning potentials that can stem from such crossing actions, and applies these thoughts to the field of educational research and school practice.

Effects of Parental and Teachers' Positive Feedback on their Children's Reading Motivation

Keywords: Literacy, Motivation, Parental involvement in learning, Primary education

Presenting Author:Frank Hellmich, Paderborn University, Germany; **Co-Author:**Fabian Hoya, Paderborn University, Germany

Parental and teachers' support are considered as important prerequisites for children's learning. In particular, parental and teachers' feedback play important roles for children's learning processes. This study examines whether differences in children's reading motivation, self-concept and self-efficacy can be predicted by their perceptions of their parental and teachers' positive feedback on reading processes. For this purpose, $N=684$ third and fourth grade students completed a questionnaire concerning their reading motivation, their self-concept and their self-efficacy beliefs. In addition, they were asked to give information about their perceptions of their parental and teachers' feedback on reading processes. The results of a structural equation model show that children's perceptions of their parental feedback predict their intrinsic reading motivation. The correlation between children's perceived parental feedback and their intrinsic motivation is mediated by their reading self-efficacy beliefs. Children's perceptions of their teachers' feedback show no effect on their reading motivation.

Effects of teacher training to reduce pupil inattention and hyperactivity in elementary classroom

Keywords: Learning and developmental difficulties, Primary education, Social aspects of learning and teaching, Teacher Professional Development

Presenting Author:Markus P. Neuenschwander, University of Applied Sciences and Arts Northwestern Switzerland, Switzerland; **Co-Author:**Sara Benini, Scuola Universitaria Professionale della Svizzera Italiana, Switzerland; **Co-Author:**Jennifer C. Fräulin, University of Applied Sciences and Arts Northwestern Switzerland, Switzerland

Average intelligent pupils who show higher levels of inattention and hyperactivity in classroom face more school adjustment challenges than their peers. The aim of this study was to develop a training program for elementary classroom teachers expected to reduce the pupils' inattention and hyperactive behavior in classroom. We assumed that pupils' attention and hyperactivity is influenced by classroom management strategies on the class level (1), on the individual pupil's level (2), and by effective collaboration strategies with the target parents (3). In a course the approach was taught to teachers and they put it into action. An experimental design was used to test the effects of this program: 42 teachers (full training, AB), 54 teachers (reduced training, A) and 41 teachers (no training, control group) filled out questionnaires on target pupil measures before and after the training (one pupil per classroom). In addition, the pupil's behavior was systematically observed during one lesson (45 minutes) by trained research collaborators before and after the teacher training. Analyses of variances indicated a significant interaction effect for the pupils' social integration (groups A and AB: increase from pretest to posttest, control group: decrease). Attention deficit decreased more in group AB than in control group (significant interaction). The decrease of the pupils' hyperactivity was stronger in group AB than in control group, however insignificant. The training showed how elementary teachers can successfully be taught in classroom management strategies on the class as well as on the individual level.

Nonviolent Communication and dealing with classroom conflicts: a qualitative study

Keywords: Social interaction, Teacher Effectiveness, Teaching approaches, Motivation and emotion

Presenting Author:Markus Dormann, Otto-Friedrich-Universität Bamberg, Germany; **Co-Author:**Eveline Wittmann, TUM School of Education, Germany

In the daily life of a teacher, conflicts are omnipresent and challenging (Ruedi 2014, Wittmann/Weyland 2010, 112; Kounin 1976; Nolting 2007 15f.). Although they may influence learning and social interaction not only in a negative way (Simmel 1908), we can determine that they often throw up a lot of challenging aspects for the conflict participants. In classrooms, they can produce a negative learning atmosphere and emotional stress for teachers and students, and may also create school abstinence and reduce the real time for learning (Schaarschmid 2005, 42; Helmke/Weinert 1997, 135). The aspects mentioned are the reason why the authorities in school systems and teacher education request solutions and ask for the integration of courses in the curriculum that promote the conflict communication competence of teachers and teacher trainees (KMK 2004, 10). The concept of Nonviolent Communication (NVC) has been suggested and promoted to address this issue (Rosenberg 2002; 2003). However, scant empirical evidence exists regarding the question whether such a concept can be successfully implemented in school classes. Hence, we conducted an explorative qualitative interview study with 41 NVC-trained teachers concerning challenges and achievements they achieved using NVC in classes. The research question was: Is NVC a suitable communication model to handle teacher-student-conflicts? The results underline that NVC is an effective classroom management tool to solve interpersonal conflicts; it also shows that there are identifiable types of NVC-trained teachers who have different experiences and achievements with the model. This typification may serve to specify research questions on the viability and efficiency of NVC implementation in classrooms and to improve future NVC teacher trainings.

Session K 4

1 September 2017 08:30 - 10:00

Main Building E - E301

Single Paper

Assessment and Evaluation, Learning and Social Interaction, Learning and Special Education

Early Childhood Education

Keywords: Achievement, Assessment methods and tools, Competencies, Early childhood education, Educational policy, Learning disabilities, Motivation, Numeracy, Parental involvement in learning, School effectiveness, Social sciences, Special education

Interest group: SIG 05 - Learning and Development in Early Childhood

Chairperson: Lina Markauskaite, University of Sydney, Australia

Linking Personal Qualities to Socioeconomic Differences in Early Language Competences

Keywords: Competencies, Early childhood education, Parental involvement in learning, Social sciences

Presenting Author:Tobias Linberg, Leibniz Institute for Educational Trajectories (LIfBi), Germany

This paper presents results on socioeconomic inequalities in language competencies of preschool children using data from the German National Educational Panel Study (NEPS). The analytical framework chosen goes beyond usual mediators including also children's personal qualities for the explanation of early social inequalities. Methodologically it goes beyond usual mean-based methods using quantile regression to research size and shape of inequalities (by education background, social class, and income). The main findings indicate (1) a group of linguistically early left behind children from families with little education and (2) that a child's curiosity and openness to new experiences contributes over and beyond language stimulations experienced at home to the explanation of socioeconomic differences in preschool age. The findings can contribute to the discussion on equality of opportunity at an early stage.

Preschool self-evaluation in Italy: a theoretical framework

Keywords: Assessment methods and tools, Early childhood education, Educational policy, School effectiveness

Presenting Author:Cristina Stringher, Istituto Nazionale per la Valutazione del Sistema Educativo di Istruzione e di Formazione (INVALSI), Italy

Monitoring quality in Early Childhood Education and Care (ECEC) settings can be a powerful lever to ensure that children benefit from stimulating experiences in these services. In the absence of quality provision, outcomes for children may be null or even pernicious. In spite of world-famous excellences in Italian ECEC, such as Reggio and Montessori education, at system level Italy does not yet have a centralized national monitoring system for ECEC and this fact leaves room for interpretation of its quality at the local setting level.

In order to overcome this issue, in 2015 the Ministry of Education commissioned INVALSI the study of a Preschool Self-Evaluation Report Format (PSERF), which was developed within the same year and is currently in its introductory phase in Italian preschools.

This paper documents the theoretical arguments behind PSERF, its aims and internal structure and provides preliminary insights into how schools have commented this form within a national consultation held in September 2015.

The central argument of PSERF is that Italian preschool, being the first but not compulsory level of education, has the

possibility to plan its processes around key outcomes for children, as detailed in the national curricular guidelines, in order to ensure that children are the first to benefit most from such processes.

Challenges in measuring growth in early reading development in two transparent orthographies

Keywords: Achievement, Assessment methods and tools, Learning disabilities, Motivation

Presenting Author:Oddny Judith Solheim, The Norwegian Reading Centre, Norway; **Co-Author:**Per Henning Uppstad, Centre for Reading Education and Research, Norway; **Co-Author:**Marja-Kristiina Lerkkanen, University of Jyväskylä, Finland

In order to evaluate effect of early interventions, we need measures that can capture reading growth, i.e. the amount of progress students make between two points in time, in a reliable and valid way. This is especially demanding when intervention starts simultaneously with formal instruction. The large diversity in skills can result in measurement challenges as we face both ceiling- and floor-effects. A vast majority of previous research on early reading interventions has been carried out in English-speaking countries with proven and standardized measures informed by longitudinal studies of emergent literacy skills and reading development in the opaque English orthography. However, as both skill distribution, pre-reading predictors, and the pace of learning are likely to differ with orthography and educational context, the distribution and development of emergent/early reading skills in transparent orthographies come forward as an urgent/timely task. In this presentation we compare distributions patterns in emergent literacy skills in two large samples of 6-years-olds in Norway (n = 5700) and Finland (N = 1880) in order to explore whether it would be possible to measure growth on the same scale for students on different achievement levels when intervention starts simultaneously with formal instruction. The results confirm large variations in emergent literacy skills and reveal partly similar distribution of emergent literacy skills across the two transparent languages. The findings indicate that we need to measure several emergent reading skills in order to capture development for the whole group of students. Consequences for designing pre-measures in early reading intervention are discussed.

Early numerical skills and special needs: A new instrument for 2- to 4½-year-old children

Keywords: Assessment methods and tools, Early childhood education, Numeracy, Special education

Presenting Author:Simone Schaub, University of Applied Sciences of Special Needs Education, Switzerland; **Co-Author:**Kerstin Olshausen Urech, Service for Early Education, Berne, Switzerland; **Co-Author:**Christina Koch, University of Applied Sciences of Special Needs Education, Switzerland; **Co-Author:**Martin Venetz, University of Applied Sciences of Special Needs Education, Switzerland

Despite the early emergence of numerical skills in child development and its continuous growth into formal mathematical knowledge, little attention has been paid to these skills in early remedial education. The study presents a new instrument, which tests numerical skills in 2 to 4½ year-old children with special needs. Latent factor analyses were conducted on the test scores from a sample of 171 typically developing children and 102 children with special needs (e.g., developmental delays in cognition or language, hard-of-hearing children). Results indicated that the instrument validly assesses the development of numerical skills. Also, results yielded particular delays in numerical skills in children with special needs, thus supporting its applicability in early remedial education.

Session K 5

1 September 2017 08:30 - 10:00

Main Building D - D10B

Single Paper

Higher Education

Higher Education - E

Keywords: Comprehension of text and graphics, Content analysis, Educational Psychology, Emotion and affect, Higher education, Knowledge creation, Learning analytics, Professions and applied sciences, Qualitative methods, Reasoning, Self-regulation

Interest group: SIG 04 - Higher Education

Chairperson: Liesje Coertjens, Université catholique de Louvain (UCL), Belgium

Teaching Academic Knowledge by Coordinating Conventions

Keywords: Higher education, Qualitative methods, Reasoning, Knowledge creation

Presenting Author:Caroline Dahlberg, Stockholm University, Sweden

Given the idea of universities' traditional values and the public good being under threat, because of changes in the organization of academic knowledge, we wanted to know more about the principles of evaluation in higher education. The purpose of this study is to investigate and report what academic knowledge becomes valued in the teaching practices of Swedish universities. In this qualitative interview study, the author interviews 40 teachers with course responsibility of degree courses (and experience of supervision and examination) in Fine Arts, Law, Philosophy, Physics and Sociology. Principles of evaluations are conceptualized as conventions of justification in accordance with Boltanski and Thévenot's theory on worlds of worth and thus seen as cognitive filters. This study shows that in degree projects valued academic knowledge is not only disciplinary knowledge, but also being able to coordinate evaluation principles. This is a learning

process in itself, both for the teacher and student. The coordination is not always the result of a conflict but a way to clarify academic thinking in a teaching and learning process. The study shows typical ways of how this is done. These results are interesting because they deepen our understanding of complexities of evaluations characterizing university teaching. We gain a theoretical understanding of the shaping of conventions and how they become relevant in situations. The results may also be useful in the advancement of university teaching pedagogics, because of a deeper understanding of how conflicts also are fruitful in teaching.

Understanding the factors affecting the use of Learning Analytics in the UK Higher Education Sector

Keywords: Content analysis, Higher education, Learning analytics, Qualitative methods

Presenting Author: Claudette Kika, University of Bedfordshire, United Kingdom; **Co-Author:** Yanqing Duan, University of Bedfordshire, United Kingdom; **Co-Author:** Guangming Cao, University of Bedfordshire, United Kingdom

Higher Education Institutions (HEIs) are collecting more data than ever before (Bichsel, 2012) which leads to an explosion of data and unprecedented challenges in making effective use of this formidable amount of data for better Student Experience Management. Whilst there is indication that HEIs that utilise Learning Analytics (LA) make better decisions regarding student experience and create competitive advantages (Kiron et al., 2012, Sclater, 2014) most HEIs are still yet to use LA to its full potential. Technology-Organisation-Environment (TOE) framework looks at the factors that influence technology adoption along with its characteristics (Meroño-Cerdán, 2008). So far there is currently no research on the adoption of the TOE framework and the factors that affect LA use in HEIs. This research therefore aims to close this gap by developing a better understanding of LA use on Student Experience Management. A qualitative methodology is adopted using thirty semi-structured interviews with key stakeholders across UK HEIs.

Processing of a Patient Case Among Medical Students and Residents – an eye-movement study

Keywords: Comprehension of text and graphics, Higher education, Professions and applied sciences, Reasoning

Presenting Author: Ilona Södervik (née Ahopelto), University of Turku, Finland; **Co-Author:** Henna Vilppu, University of Turku, Finland; **Co-Author:** Erika Österholm, University of Turku, Finland; **Co-Author:** Mirjamajja Mikkila-Erdmann, University of Turku, Finland

The purpose of this study was to investigate how third-year medical students (n=33) and internal medicine residents (n=13) process and solve a written patient case. According to previous studies, the processing of more experienced physicians is faster and more efficient compared to novices. However, little is studied the reading of a patient case texts in processing level. The text concerning pulmonary embolus followed a patient case in healthcare center including anamnesis, status and examination results from laboratory tests and it included both task-relevant and task-irrelevant aspects. The processing of the text was investigated using eye-tracking method and complemented with written questions. The processing of students was compared to that of internal medicine residents'. The results showed that there was variation among medical students in their diagnosing-performance, as little less than half of the students (n=15) diagnosed the case correctly. Processing of a patient case was faster among better-achieving students and residents, who also seemed to be more efficient in differentiating relevant aspects from irrelevant according to written answers. Surprisingly, the hypothesis that better-achieving participants would focus more on task-relevant areas was not supported by the eye movement results. However, the illness-script-activation might be differentiated from the eye-movement data of residents, who processed the very first key sentence relatively longer compared to the students. Based on to the results certain advances for medical education are discussed. We suggest that teaching of so-called illness script grammar could presumably benefit medical students learning of clinical reasoning skills.

The Impact of Stress on Well-being among Faculty Members: Moderating Role of Emotion Regulation

Keywords: Educational Psychology, Emotion and affect, Higher education, Self-regulation

Presenting Author: Alenoush Saroyan, McGill University, Canada; **Co-Author:** Nathan Hall, McGill University, Canada; **Co-Author:** Raheleh Salimzadeh, McGill University, Canada

Existing research suggests that numerous aspects of faculty career are stressful and trigger negative emotional responses. Evidence further shows that job-related stress impairs well-being and productivity amongst faculty. This study sought to investigate the moderating role of emotion regulation- a basic component of emotional intelligence- in the association between stress and well-being as indicated by emotional exhaustion, job satisfaction, and quitting intentions. Two emotion regulation strategies were included: cognitive reappraisal and expressive suppression. Questionnaire data were collected from 380 faculty members from seven Canadian research-intensive universities. Moderation analysis indicated that cognitive reappraisal buffers against the negative impact of stress on well-being whereas suppression aggravates the adverse impact of stress. Findings highlight the significance of developing stress management and emotion regulation interventions to help faculty members effectively manage stress and emotions and maintain well-being. **Keywords:** Faculty members, stress, emotions, emotion regulation, well-being

Session K 6

1 September 2017 08:30 - 10:00

Pinni B - B3107

Comprehension of Text and Graphics - D

Keywords: Argumentation, Comprehension of text and graphics, Developmental processes, Engineering, Experimental studies, Higher education, Instructional design, Metacognition, Multimedia learning, Reading comprehension, Reasoning

Interest group: SIG 02 - Comprehension of Text and Graphics

Chairperson: Christine Schmid, German Institute for International Educational Research (DIPF), Germany

The influence of perceptual cues in attributing importance in argument diagrams

Keywords: Argumentation, Comprehension of text and graphics, Instructional design, Reasoning

Presenting Author: Marije van Amelsvoort, Tilburg University, Netherlands; **Co-Author:** Joost Schilperoord, Tilburg University, Netherlands

Argument diagrams are schematic representations of claim-reason complexes. The question these studies address is whether perceptual cues, such as the size of boxes, affects argument functions, like evaluating claims or reasons. We conducted two experiments in which we systematically varied size and number of boxes in an argument diagram. In the first experiment, we used an empty argument diagram with a box stating 'standpoint' on top and boxes only noting in favor and against in two columns underneath. We asked participants to imagine there were arguments in the boxes and decide whether they would choose in favor or against. Participants chose according to hypotheses: the side that had the larger boxes, the side that had more boxes, or the side that had both larger and more boxes. When size and number mismatched, they tended to choose number over size. In the second experiment, boxes were contained a real standpoint and arguments. We found that effects of perceptual cues subdued under these circumstances, indicating that the content tends to be more important than the perceptual cues. However, if one side of the argument showed both more and larger boxes, people tended to choose this side.

Format effects on the comprehension of movement from static graphics in engineering education

Keywords: Comprehension of text and graphics, Engineering, Experimental studies, Higher education

Presenting Author: Olga Kasatkina, Université Grenoble Alpes, France; **Co-Author:** Erica de Vries, Université Grenoble Alpes, France; **Co-Author:** Jean-François Boujut, Univ. Grenoble Alpes, France; **Co-Author:** Cédric Masclet, Univ. Grenoble Alpes, France

In this study, effects of Palette (black and white vs. colour) and Projection (2D vs. 3D) were tested on comprehension of movement from static kinematic schemes of simple and complex mechanisms. We recruited 132 engineering students to perform the four experimental conditions. We expected that the potential benefits of tested formats would have faded with experience. Our results showed still a benefit from both colour and 3D for these intermediate engineering students. Only colour appeared to be less helpful for comprehending movement of simple mechanisms. One explanation resides in the fact that we studied intermediates and not experts. Another explanation lies in the fact that 2D might actually hinder comprehension since 3D is mostly used in teaching nowadays. More research is needed to understand comprehension of monosemic domain-specific graphics for novices and intermediates. These results have implications for engineering education.

Multi-Level Mental Representations of Written, Auditory, and Audiovisual Text in Children and Adults

Keywords: Comprehension of text and graphics, Developmental processes, Reading comprehension, Multimedia learning

Presenting Author: Wienke Wannagat, University of Würzburg, Germany; **Co-Author:** Gesine Waizenegger, University of Würzburg, Germany; **Co-Author:** Gerhild Nieding, University of Würzburg, Germany

In two experiments, we examined whether text comprehension differs between written, auditory, and audiovisual (auditory combined with pictures) presentations in second- and fourth-graders and adults (Experiment 1), and between auditory and audiovisual presentation in first-, fourth-, and sixth-graders (Experiment 2). To define and operationalize text comprehension, we refer to well-established multi-level theories of discourse processing (Kintsch, 1998) according to which processing and comprehension of text involve at least three levels of mental representation. We therefore measured text comprehension with a sentence recognition test that allows for assessing memory of text surface, textbase, and situation model separately (Schmalhofer & Glavanov, 1986). All in all, results of both experiments indicate that children up to the sixth grade benefit from pictures added to verbal materials in terms of memory of situation model information, and thus text comprehension, while adults do not. This effect was found in comparison to both written (Experiment 1) and auditory text (Experiment 2) and is in line with existing research and theoretical considerations. More importantly, these experiments supplement the existing body of knowledge by offering insights on how presentation mode separately affects different levels of text processing among different audiences.

Effects of (supported) drawing on self-regulated learning

Keywords: Comprehension of text and graphics, Experimental studies, Instructional design, Metacognition

Presenting Author: Julia Kollmer, University of Freiburg, Germany; **Co-Author:** Alexander Eitel, University of Freiburg, Germany; **Co-Author:** Katrin Schleinschok, Leibniz-Institut für Wissensmedien, Germany; **Co-Author:** Katharina Scheiter, Leibniz-Institut für Wissensmedien (IWM), Germany

Self-regulated learning, which entails monitoring one's learning progress in order to control it, is ubiquitous in modern

societies. However, monitoring is often inaccurate when learning with expository text. Building on previous research we assume that monitoring accuracy can be improved when learning with expository text (containing much visuo-spatial information) is accompanied by a drawing task. Specifically, we assumed that drawing tasks enhance monitoring accuracy (e.g., reduce overconfidence) especially when drawing is supported by a spatial scaffold. To test this assumption 85 participants were randomly assigned to one of three conditions. They read an expository text consisting of five paragraphs about the formation of auroras. After each paragraph one group generated free-hand drawings, one generated drawings supported by a spatial scaffold and one did not generate drawings at all. Participants gave judgements of learning (JoL) after each paragraph and selected paragraphs for restudy after studying the entire text, without the opportunity to actually restudy. Subsequently they took a test. On a learning outcome level there were no differences between the conditions. As expected the results indicate that drawing pictures, especially with scaffolds, reduced overconfidence. Hence, supporting learners draw supports monitoring. Whether this also results in more adequate restudy behavior, and hence fosters learning outcomes, is subject to further research.

Session K 7

1 September 2017 08:30 - 10:00

Virta - 109

Single Paper

Higher Education, Lifelong Learning, Motivational, Social and Affective Processes

Lifelong Learning and Out-of-School Learning

Keywords: Arts, Content analysis, Design based research, Higher education, In-service teacher education, Informal learning, Lifelong learning, Motivation, Out-of-school learning, Qualitative methods, Self-regulation, Social aspects of learning and teaching, Teacher Professional Development, Workplace learning

Interest group: SIG 04 - Higher Education, SIG 14 - Learning and Professional Development

Chairperson: Laura Hirsto, University of Eastern Finland, Finland

The role of social informal learning in the student/graduate entrepreneurs' entrepreneurial process

Keywords: Higher education, Informal learning, Qualitative methods, Social aspects of learning and teaching

Presenting Author: Carla Quesada-Pallarès, Universitat de Manresa, Spain; **Co-Author:** Nigel Lockett, Lancaster University, United Kingdom; **Co-Author:** Antonio Padilla-Meléndez, Universidad de Malaga, Spain; **Co-Author:** Karen Williams-Middleton, Chalmers University of Technology, Sweden; **Co-Author:** Sarah Jack, Lancaster University, United Kingdom

This paper aims to analyse the role of social informal learning of student/graduate entrepreneurs during their engagement in entrepreneurial processes while attending university. A qualitative methodological approach involving critical incident technique is used to map the entrepreneurial journeys of 18 students/graduates from Spain, Sweden and the United Kingdom. NVivo v10 software was used to conduct narrative analysis on collected data, focusing only on those entrepreneurial activities that occurred during university. Main findings suggest that student/graduate entrepreneurs tend to rely on mentors met in informal educational contexts in order to develop their entrepreneurial process; this person is contacted by the student/graduate entrepreneur itself with the idea of seeking their help. At an institutional-level, the study legitimises university inclusion of social networking activities into formal and non-formal entrepreneurship education, and encouragement of informal entrepreneurial learning. Moreover, the findings encourage educators to embed social networking activities within the curriculum in order to facilitate entrepreneurial learning.

Teacher Leadership and Professional Development in Challenging Contexts

Keywords: In-service teacher education, Informal learning, Teacher Professional Development, Workplace learning

Presenting Author: Maria A. Flores, University of Minho, Portugal

This paper reports on findings from funded research carried out over a three-year period aimed at examining conditions for teacher leadership and professional development in challenging circumstances. A mixed-method research design was devised. The project included a national survey to teachers (n=2702); interviews to 11 school principals; focus group with teachers (n=99) and with students (n=108); and development and evaluation of strategies to involve teachers in exercising leadership in their schools (5 schools and 66 teachers were involved). Findings point to the valorization of emancipatory and pedagogical motivations to participate in professional development opportunities as well as instrumental reasons (e.g. career progression). By and large, issues such as bureaucracy, intensification, the deterioration of social image of the teaching profession, unemployment amongst teachers due to the financial and economic crisis, endless reforms in Education (such as external evaluations for teachers, schools and students) are amongst the external factors that account for teachers lack of motivation and dissatisfaction with effects on their professional development. However, internal factors such as teacher collaboration, classroom work and the relationship with students were identified as factors and sources of personal and professional motivation which help teachers to remain in the teaching profession and to invest in their professional learning. Strong professional values, sense of professionalism as well as teacher resilience which is related to their sense of identity as teachers also emerged from the data. These and other issues will be explored further in the paper.

Self-regulated professional learning in the workplace: a state of the art and future perspectives

Keywords: Content analysis, Self-regulation, Workplace learning, Lifelong learning

Presenting Author:Katrien Cuyvers, University of Antwerp, Belgium; **Co-Author:**Piet Van den Bossche, University of Antwerp, Belgium; **Co-Author:**Vincent Donche, University of Antwerp, Belgium

A great deal of what is being learned takes place in the workplace, during job-performance. Professionals are increasingly expected to respond to changes and solve complex work problems. Within organizational contexts, hands-on solutions often lack and on the job learning is required. This implies that professionals take responsibility for their own learning and by that means engage in self-regulated learning (SRL). Research on self-regulated academic learning defined SRL as an active and goal-oriented process structured as interrelated phases, modulating cognition, affect, behavior and context. Notwithstanding a growing need for research on self-regulation of professional learning during job-performance (SRpL) focusing on how employees become masters of their own learning processes and explorations beyond common SRL grounds, existing research in this field is limited. The current study aims to systematically identify, synthesize and discuss the current state concerning conceptualization and operationalization within the field of SRpL. The particular focus of this study is on understanding how both core characteristics of SRL and professional learning have been integrated and translated conceptually and converted to the actual measurement of SRpL. In total, 15 retrieved studies were analyzed using a content analysis approach. Results show that concepts with different theoretical groundings, are conceptualized very similarly. Also, conceptualizations differ greatly with regard to key characteristics. Further, operationalizations often lack regulatory and process-oriented aspects. Insights show that conceptual clarity and measurement of how SRpL actually takes place in the social context of the workplace, is needed to move the field forward.

Exploring use of wearable technologies to study engagement, interest and learning in Makerspaces

Keywords: Arts, Design based research, Motivation, Out-of-school learning

Presenting Author:Victor Lee, Utah State University, United States

Makerspaces are considered exciting learning environments for the development of youth interest in STEM. However, whether and how interest develops and interacts with Maker activities remains unclear. This paper discusses a new research approach to examine this relationship that involves the use of wearable cameras and electrodermal activity sensors with youth participating in afterschool maker programs. Through collection and analysis of these two streams of data, we are identifying which maker activities lead to higher levels of engagement, seeking to identify regularities and differences within and among individual youth. Our data suggest that there are similarities and differences in the activities that are more or less engaging to youth working in parallel in the same Makerspace. Moreover, some youth seem to be expressing and maintaining pre-existing interests rather than establishing new ones in open-ended Maker activities.

Session K 8

1 September 2017 08:30 - 10:00

Main Building C - C8

Single Paper

Instructional Design, Learning and Instructional Technology

Comprehension of Text and Graphics - E

Keywords: Biology, Competencies, Comprehension of text and graphics, E-learning / Online learning, Instructional design, Language (Foreign and second), Learning Technologies, Literacy, Meta-analysis, Primary education, Reading comprehension, Secondary education, Writing / Literacy

Interest group: SIG 02 - Comprehension of Text and Graphics

Chairperson: Sarah Strauß, University of Cologne, Germany

Visual Representations in a High School Ecology Textbook: Promoting Representational Abilities

Keywords: Biology, Competencies, Comprehension of text and graphics, Secondary education

Presenting Author:Billie Eilam, University of Haifa, Israel; **Co-Author:**Ilana Sinai, University of Haifa, Israel, Israel

Among other functions, visual representations (VRs) hold vast potential for promoting learners' Meta-Representational Capabilities (MRC). Such capabilities are particularly needed in environmental education that deals with complex systems, abstract concepts, implicit causality, and unperceived sizes. Hence, students' mindful and guided encounters with VRs are recommended. Typically, school environment provides the context for such encounters: instructional aids and textbooks constitute rich and accessible sources of VRs, teachers guidance is available, and learning tasks are designed to activate students mindful information processing. Yet, it seems that present students' MRC does not catch up with the growing requirements of present visual world. This calls for a deep examination of the potential of these aforementioned VR sources to promote students' MRC. The present study focuses on the potential of school textbooks VRs to achieve this goal. Using a coding system, developed for this purpose and validated in previous studies, all VRs and related tasks, presented in one representative high school ecology textbook, were systematically analyzed. The general findings showed that mostly: VRs diversity was low; they carried a decorative role; VRs failed to clarify and simplify the represented complex processes and to make implicit objects visually accessible; Moreover, interpretation of the majority of VR did not require any prior science knowledge thus, reducing relevant knowledge retrieval and its linking into coherent bodies of knowledge. Finally, only few

tasks had the potential to raise awareness of representational-related issues and abilities. Hence, textbook's VRs exhibited low potential to support MRC development. Educational implications are discussed.

More efficacious representations? Examining the effect of diagrams in students' written explanations

Keywords: Comprehension of text and graphics, Instructional design, Language (Foreign and second), Writing / Literacy

Presenting Author:Emmanuel Manalo, Kyoto University, Japan; **Co-Author:**Rachel Dryer, Charles Sturt University, Australia; **Co-Author:**Ayano Tsuda, Kyoto University, Japan

This study addressed the question of how inclusion of self-generated diagrams in student explanations of what they have learned might affect quality features of those explanations. The participants were 19 undergraduate English-as-a-foreign language students taking an education course taught entirely in English. At the beginning (Pre-instruction) and end (Post-instruction) of the semester, they were administered an assessment task that required reading a passage and writing an explanation of it. During the semester the students had a weekly homework task of writing a one-page explanation of what they had learned in the course. Over the weeks of the semester, they were additionally given a hint about the usefulness of including diagrams in their explanations, and workshop instruction and practice in using diagrams. Analyses of the students' homework and Pre- and Post-instruction explanations revealed increases in quantity and types of diagrams they included in their explanations, indicating effectiveness of the interventions used in promoting diagram use. Analysis of Post-instruction explanations also showed that number of diagrams included in the explanations negatively correlated with both word- and verb-counts, but positively correlated with number of key points included. Subjective ratings of the usefulness of the diagrams students used were also high, indicating that the blinded rater perceived the diagrams as appropriate and contributing to the clarity of the explanations. These findings suggest that inclusion of appropriate diagrams may enable students to construct more concise and simpler explanations of what they have learned without sacrificing important points they should include.

Modeling online research and comprehension: What skills are critical when reading on the Internet?

Keywords: Comprehension of text and graphics, E-learning / Online learning, Learning Technologies, Literacy

Presenting Author:Laura Kanninen, University of Jyväskylä, Finland; **Co-Author:**Carita Kiili, University of Oslo, Norway; **Co-Author:**Donald J. Leu, University of Connecticut, United States; **Co-Author:**Jukka Utriainen, University of Jyväskylä, Finland; **Co-Author:**Kaisa Lohvansuu, University of Jyväskylä, Finland; **Co-Author:**Asko Tolvanen, University of Jyväskylä, Finland; **Co-Author:**Paavo H.T. Leppänen, University of Jyväskylä, Finland

This study aims at clarifying elements that are critical when students read on the Internet. We base our study on Online Research and Comprehension theory (Leu et. al., 2013) that defines online reading as a process of problem-based inquiry that consists of five practices: defining important questions, locating information, evaluating information, synthesizing information, and communicating one's learning with others. This study investigates whether there are separate elements related to online research and comprehension and how these elements compare to the theoretical model. A factor analytic approach (CFA) was used to evaluate models from four to six-factors of online research and comprehension using data from a Finnish assessment with sixth graders ($n=426$). Results show that the five-factor model had a better fit to the data than the four-factor model ($\chi^2\text{-diff (4)} = 23.60, p < .001$), and the six-factor model better than the five-factor model ($\chi^2\text{-diff (5)} = 43.08, p < .001$). The six factors were: ability to 1) locate information, 2) confirm credibility of information, 3) question information credibility, 4) identify main ideas from a single source, 5) synthesize information from multiple sources, and 6) communicate a justified position based on online inquiry. Overall, results generally reflect the components of Online Research and Comprehension theory. However, two of the original components, evaluating and synthesizing information were both divided into two separate factors. This study highlights the complexity of reading on the Internet implying that also instruction should take into account all the above mentioned components of online research and comprehension.

Effectiveness of reading strategy interventions in classrooms: A meta-analysis.

Keywords: Meta-analysis, Primary education, Reading comprehension, Secondary education

Presenting Author:Mariska Okkinga, Rotterdam University of Applied Sciences, Netherlands; **Co-Author:**Roel van Steensel, Erasmus University Rotterdam, Netherlands; **Co-Author:**Amos van Gelderen, University of Amsterdam / Rotterdam University of Applied Sciences, Netherlands; **Co-Author:**Lidia Arends, Erasmus University Rotterdam, Netherlands; **Co-Author:**Erik van Schooten, Hogeschool Rotterdam, Rotterdam University, Netherlands; **Co-Author:**Peter Sleegers, Twente University, Netherlands

Many students struggle with reading comprehension. Many studies have shown positive effects of reading strategy interventions on reading comprehension. However, it is unclear whether teaching reading strategies is as effective in regular classroom settings as in controlled experimental settings in which the experimenter is the instructor and/or in which instruction is given to small groups of students (as opposed to whole classrooms in which multiple groups of students work simultaneously). In this meta-analysis, results of studies on reading-strategy instruction in regular classroom contexts were collapsed to determine whether reading strategy interventions were effective in fostering reading comprehension and strategic ability. The meta-analysis included 59 studies in grades 3-12. A small effect size on reading comprehension on reading comprehension and a medium effect size on strategic ability were obtained. For both reading comprehension and strategic ability, effects were moderated by trainer type, with a higher effect size for treatments in which the researchers delivered the treatment compared to teachers. Furthermore, effects were higher when researcher-developed tests were used compared to standardized tests. Implications for educational practice and suggestions for further research are

discussed.

Session K 9

1 September 2017 08:30 - 10:00

Pinni B - B3116

Single Paper

Learning and Instructional Technology

Learning and Instruction with Computers - B

Keywords: Comprehension of text and graphics, Computer-assisted learning, E-learning / Online learning, Educational Technology, Emotion and affect, Experimental studies, Higher education, Learning Technologies, Mathematics, Multimedia learning, Primary education, Quantitative methods, Secondary education

Interest group: SIG 07 - Learning and Instruction with Computers

Chairperson: Marge W.J. van de Wiel, Maastricht University, Netherlands

Decorative pictures – the good, the bad, and the ugly

Keywords: Comprehension of text and graphics, Emotion and affect, Experimental studies, Multimedia learning

Presenting Author: Sascha Schneider, Chemnitz University of Technology, Germany; **Co-Author:** Maik Beege, Chemnitz University of Technology, Germany; **Co-Author:** Steve Nebel, Chemnitz University of Technology, Germany; **Co-Author:** Günter Daniel Rey, Chemnitz University of Technology, Germany

Decorative pictures in multimedia materials were long been regarded as detrimental (seductive) for learning. In contrast, recent research has shown that the impact of these pictures is moderated by a number of variables. In a series of experiments, this presentation examines if the emotional charge of decorative illustrations can be verified as an additional moderator. The first experiment investigated the effectiveness of different levels of valence (positive vs. negative) shown in decorative pictures. Results show that learning performance is better for positive than negative pictures. In addition, positively charged pictures enhance the intrinsic motivation and pleasure of students. Arousal, which is defined as a second dimension of affect, was also influenced. Hence, a second experiment was conducted in order to examine if the dimension of arousal (also called activation) plays a role in the explanation of emotionally charged pictures. In this experiment, students were assigned to three decorative picture groups (positive activating, negative activating, and negative deactivating) of a multimedia learning environment. Results show that a positive valence and a higher arousal enhance retention performances. In contrast, transfer was only enhanced by more activating pictures, whereas valence does not play a role. Results of a third experiment with an additionally included control group without decorative pictures reveal that positive activating decorative pictures can be seen as conducive and negative activating pictures as seductive for learning.

Computer-Based Simulations or Material-Based Experiments - Which Way to Foster Functional Thinking?

Keywords: Learning Technologies, Mathematics, Quantitative methods, Secondary education

Presenting Author: Michaela Scheuring, University of Koblenz-Landau, Germany; **Co-Author:** Jürgen Roth, University of Koblenz - Landau, Germany

Functional relationships are one of the central areas of mathematics education. Nevertheless, studies reveal pupils' difficulties with functional thinking, which can be described by the aspects mapping, covariation and function as object. Furthermore, pupils often show a concept of function that is not compatible to the conventional definition. Thus our research focuses on how to foster functional thinking. Referring to theory real experiments and simulations can make this possible. After developing a test to measure functional thinking and to identify mapping, covariation and function as object empirically as different dimensions of functional thinking, we designed an intervention using real experiments or simulations to foster functional thinking and implemented it in grade 6. The test analysis indicates that empirically functional thinking seems to be a one dimensional construct. The results of our intervention-study point out that computer-based simulations foster pupils' functional thinking more beneficial than the use of real-experiments.

The effects of learning analytics empowered technology on the students' arithmetic skills learning

Keywords: Computer-assisted learning, Learning Technologies, Mathematics, Primary education

Presenting Author: Carolien A. N. Knoop-van Campen, Radboud University Nijmegen, Netherlands; **Co-Author:** Inge Molenaar, Radboud University Nijmegen, Netherlands; **Co-Author:** Fred Hasselman, Radboud University Nijmegen, Netherlands

Learning analytics empowered educational technologies (LA-ET) in primary classrooms lead to blended learning scenarios with teacher lead instruction, class paced and individually paced practice. Learning analytics may function as a bridge between class and individual paced activities to support educational effectiveness. This quasi-experimental study investigates the effects of a LA-ET on the development of students' arithmetic skills over one school year. Children learning in a traditional paper based setting are compared to learners using a LA-ET on tablet computers in grade 4. The educational technology combines teacher dashboards (extracted analytics) and class and individually paced assignments (embedded analytics). The results indicate that children in the LA-ET condition make more progress on arithmetic skills. This study showed that educational technologies combining extracted and embedded learning analytics create new education scenarios, which contributed to increased development in primary education. However, the large variation in

usage application of practice does stress the need for advanced efforts to balance embedded analytics and extracted analytics, in such a way that system strengths and human strengths together optimally support personalized learning.

Investigating student interest in blending learning: Chatbot or human learning partner preferences?

Keywords: E-learning / Online learning, Educational Technology, Higher education, Learning Technologies

Presenting Author:Andrew Thompson, Kyushu Sangyo University, Japan; **Co-Author:**Luke Fryer, The University of Hong Kong, Hong Kong; **Co-Author:**Kaori Nakao, Kyushu Sangyo University, Japan; **Co-Author:**Aaron Gibson, Kyushu Sangyo University, Japan; **Co-Author:**Zelinda Sherlock, Kyushu Sangyo University, Japan

Educators widely agree that conversation practice is a fundamental requirement for language learners in order to become competent, global communicators. However, finding a conversation partner can be difficult and, in many cases, expensive due to the contact hours needed to see meaningful results. So as blended programs advance and mobile Internet usage continues to skyrocket, it would seem a meaningful role as conversation practice partners exists for conversational agents (or chatbots), but to date chatbots have failed to become a reliable tool within blended language learning programs. Using a mixed methods approach, this current study aimed to examine student situational interest in chatbots and human partners, and the merits and/or demerits of chatbots as conversation partners. This research seeks to investigate why chatbots are not yet an important instrument for conversation practice and also provides direction for the future development of chatbots in blended language learning programs. Preliminary investigation of the data indicates that: 1) prior interest in conversation with a human partner was the best predictor of future interest in chatbot conversations; 2) prior language fluency was more strongly linked to interest in chatbots than human conversations; 3) that the qualitative experience of having “learned more” with the chatbot was strongly connected to situational interest. In this paper session implications for using chatbots with language students and directions for future development of chatbots in blended language learning programs will be discussed.

Session K 10

1 September 2017 08:30 - 10:00

Main Building D - D11

Single Paper

Higher Education

Higher Education - J

Keywords: Achievement, Assessment methods and tools, Case studies, Citizenship education, Competencies, Developmental processes, Higher education, Quantitative methods, Student learning, Teaching / instruction, Vocational education

Interest group: SIG 04 - Higher Education

Chairperson: Mariel Musso, Argentina

Factors explaining learning of generic skills: A study of university students' experiences

Keywords: Competencies, Higher education, Student learning, Teaching / instruction

Presenting Author:Anne Virtanen, University of Jyväskylä, Finland; **Co-Author:**Päivi Tynjälä, University of Jyväskylä, Finland

Although generic skills have received widespread attention from both policy-makers and educationalists, little is known regarding how students acquire these skills, or how they should best be taught. Hence, the aim of this study was to identify what kinds of pedagogical practices are behind the learning of eight particular generic skills. The data were collected from university students (N=163, n= 123) via Internet questionnaires. The findings from regression analyses showed that teaching practices involving collaboration and interaction as well as features of constructivist learning environment and integrative pedagogy predicted learning of generic skills such as decision making skills, different forms of creativity, and problem solving skills. In contrast, the traditional forms of university teaching, such as reading, lecturing, and working alone were negatively associated to generic skills learning. Overall, this study offers detailed information about the pedagogical practices that nurture generic skills learning in university contexts.

Integrating PRME into an undergraduate curriculum – experiences from a Swiss University

Keywords: Case studies, Citizenship education, Developmental processes, Higher education

Presenting Author:Taiga Brahm, University of Tübingen, Germany; **Co-Author:**Patrizia Kuehner, University of St.Gallen, Switzerland

The integration of responsibility and sustainability into Higher Education Institutions is an ongoing challenge. While there is a growing number of initiatives, research regarding the concrete implementation processes remains scarce. This paper attempts to contribute to closing this research gap by describing three case studies from different disciplinary backgrounds. The case studies were developed as part of a bigger research project which aimed at implementing the so called Principles of Management Education (PRME) into an undergraduate programme at a University in Switzerland. Research methods include interviews, document analysis and focus groups with students. Results show that the both an agreement on how responsibility and sustainability are understood in the context of Higher Education as well as the quality of the available material are crucial for the lecturers to start their own integration processes. Another important question is the fit between

PRME and the subject taught by the lecturer. In sum, our case studies emphasize the broad range of possible implementation options, at the same time, also identifying different obstacles. The research provides important examples for curriculum development in Higher Education which are relevant for theory and practice. They highlight possible ways how to implement responsibility and sustainability into an undergraduate curriculum.

How successful are first-year university students? A multi-perspective approach

Keywords: Achievement, Higher education, Quantitative methods, Student learning

Presenting Author:Paulien Meijer, Radboud University Nijmegen, Netherlands; **Co-Author:**Petrie van der Zanden, Behavioural Science Institute & Radboud Teachers Academy, Radboud University, Netherlands; **Co-Author:**Eddie Denessen, Behavioural Science Institute, Radboud University, Netherlands; **Co-Author:**Toon Cillessen, Behavioural Science Institute, Radboud University, Netherlands

Although the importance of first-year student success is widely acknowledged, a clear and consistent definition of what it means to be successful at university is lacking. This study incorporates three perspectives on first-year student success, namely students' academic achievement, their critical thinking, and their personal adjustment to university life. Previous studies suggest that students might be well able to become successful in a particular domain, but might experience difficulties in other domains. We aimed to gain more insight into the differences between students regarding their first-year university success, following a multi-perspective approach, analyzing different domains of success simultaneously. Data were collected by means of questionnaires from 389 first-year university students. Latent class cluster analysis revealed three patterns of success: 1) Students with average levels of academic achievement and critical thinking, and particularly high levels of personal adjustment, 2) students with high academic achievement and critical thinking scores, and average levels of personal adjustment, 3) students who scored lower on academic achievement, critical thinking, and especially lower on personal adjustment than students in the other two clusters. Follow-up ANOVAs suggested that Cluster 3 students most strongly experienced that their social life hinders their study, whereas Cluster 2 students experienced least interference from their study on their social life. Our study showed that student success is a multidimensional concept, with subgroups of first-year students showing specific patterns of success. These insights contribute to the discussion on the aims of university education and enable universities to better support students.

Training and assessment of communication skills

Keywords: Assessment methods and tools, Competencies, Higher education, Vocational education

Presenting Author:Edith Braun, University of Kassel, Germany; **Co-Author:**Georgios Athanassiou, University of Kassel, Greece; **Co-Author:**Ulrike Schwabe, Universität Kassel, Germany

Non-cognitive competences are considered to be central learning outcomes of higher education. Communication skills hold a major significance among non-cognitive competences and are mentioned in almost all qualification frameworks as respective skills to be learned in the context of higher education. We use Habermas' theory of communicative action as the theoretical starting point for the construction of role plays. Habermas differentiates between two types of social action namely strategic action and communicative action. Our question is: how can we assess these communication skills? We will present a performance based instrument for assessing communication skills. Therefore, we use role plays, and developed accordingly to theoretical dimensions observation forms. We will present the theoretical basis, as well introduce the assessment modality, and will discuss first results.

Session K 11

1 September 2017 08:30 - 10:00

Main Building A - A2B

Single Paper

Higher Education, Instructional Design, Motivational, Social and Affective Processes

Writing

Keywords: Educational Psychology, Higher education, Instructional design, Literacy, Reasoning, Second language acquisition, Writing / Literacy

Interest group: SIG 12 - Writing

Chairperson: Merja Kuisma, University of Tampere, Finland

Effects of different learning activities on different synthesis writing outcomes

Keywords: Educational Psychology, Instructional design, Literacy, Writing / Literacy

Presenting Author:Mar Mateos, Universidad Autónoma de Madrid, Spain; **Presenting Author:**Ruth Villalon, University of Cantabria, Spain; **Co-Author:**Elena Martin, Universidad Autonoma de Madrid, Spain; **Co-Author:**Isabel Cuevas, Autonoma University of Madrid, Spain; **Co-Author:**Marianita Solari, Universidad Autonoma de Madrid, Spain; **Co-Author:**Gert Rijlaarsdam, University of Amsterdam, Netherlands

In this study, a comparison was made between two interventions in which students had to write two syntheses, in collaboration with a partner and with the support of written guidelines, after reading pairs of texts presenting counterposed views on controverted subjects in the field of education. In one of these interventions, the collaborative practice sessions were preceded by an explicit instruction session, in which the processes for the selection and integration of conflicting

information from the two sources were modelled and explained. Before and after this intervention, students produced a synthesis working individually without the help of the guide. The participants were 114 undergraduate psychology students. The results from the analysis of the role played by different components of the intervention (explicit instruction and collaborative practice with the help of a guide) and their effects on a range of synthesis quality criteria (selection and integration) by means of SEM-analysis are presented. The model obtained shows that learning the selection process for arguments took place mainly through collaborative practice with a partner and the support of the guide. In contrast, for integration, the effect is due to explicit instruction. These findings highlight that when learning a complex process, such as writing a synthesis from multiple sources implying several sub-processes, not all of these are acquired necessarily in the same manner.

Effects of peer observation in strategy instruction on synthesizing skills in teaching EFL writing

Keywords: Instructional design, Literacy, Second language acquisition, Writing / Literacy

Presenting Author:Elke Van Steendam, KU Leuven, Belgium; **Co-Author:**Mujgan Buyuktas Kara, University of Amsterdam, Turkey; **Co-Author:**Gert Rijlaarsdam, University of Amsterdam, Netherlands

In the EFL program of a Turkish University, we compared the effects of explicit strategy instruction with and without peer observation for learning to write synthesis tasks after a four-hour intervention program. Participants were 155 upper-intermediate level EFL learners (mean age=18), randomly assigned to three conditions. We hypothesized that strategy focused instruction conditions would have a positive effect on students' writing quality and writing processes compared to a control condition, and that peer observation of the explicit strategy use would outperform the other conditions. Results showed that students in the peer observation condition had better source use skills and wrote more authentic texts than students in the other conditions in Posttest 1, and in Posttest 2 they maintained their performance in source use skills. Participants in the peer observation and the explicit strategy instruction conditions also showed more effective temporal organization of writing activities.

Writing synthesis texts: Effects of think-aloud on students' short argumentation essays

Keywords: Instructional design, Literacy, Reasoning, Writing / Literacy

Presenting Author:Christian Tarchi, University of Florence, Italy

When reading multiple documents presenting conflictual perspectives on a controversial topic, both sources and content of each text need to be represented and integrated by the reader. The think-aloud procedure, typically used as an assessment methodology, might have a positive effect on participants' internal processes, and could be used as an intervention strategy. This study analysed the efficacy of think-aloud on the soundness of argumentation in University students' short essays, after reading six multiple documents on the controversial topic of flu vaccination. Fifty-three Italian University students were randomly assigned to a control or an experimental condition. We assessed students' prior beliefs, interest, and prior knowledge on the topic of flu vaccination. Each student was asked to read six texts on vaccination, but the experimental group students were asked to think-aloud and report what they were thinking while reading the texts. According to the ANOVA results, experimental group students wrote longer essays, and essays with a sounder argumentation than the control group did. This study confirms the efficacy of the think-aloud methodology to improve the soundness of argumentation in students' short essay after reading six documents on flu vaccination.

Learning to write a synthesis text: Effects of instructional method and reflection

Keywords: Higher education, Instructional design, Literacy, Writing / Literacy

Presenting Author:Janneke van der Loo, Tilburg University, Netherlands; **Co-Author:**Emiel Krahmer, Tilburg University, Netherlands; **Co-Author:**Marije van Amelsvoort, Tilburg University, Netherlands

In this paper we present results on a study on the effect of instructional method (observational learning and learning by doing) and reflection (yes or no) on text quality and self-efficacy beliefs in learning to write a synthesis text. 116 undergraduate students were assigned to either an observational learning or learning-by-doing condition, with or without reflection. In the exercises participants learned how to write a synthesis text based on three summaries. They were tested on text quality, self-efficacy beliefs and satisfaction with the instructional method. Our results indicate that there are no main effects of instructional method and reflection on text quality and self-efficacy beliefs. However, participants who learned by doing were more satisfied with the method than participants who learned by observing, and participants who reflected were more satisfied than those who did not. We also found that participants who learned by observation and reflected were more satisfied than those who learned by observation and did not reflect. In this study observational learning and learning by doing, with or without reflection, seem equally effective for learning how to write a synthesis text. Participants, however, seem to prefer learning by doing and reflecting.

Session K 12

1 September 2017 08:30 - 10:00

Virta - 120

Single Paper

Higher Education

Higher Education - K

Keywords: Achievement, Emotion and affect, Higher education, Instructional design, Learning approaches, Literacy, Student learning, Teacher Professional Development, Teaching approaches

Interest group: SIG 04 - Higher Education

Chairperson: Helma Oolbekkink-Marchand, Radboud University Nijmegen, Netherlands

"At uni, regulate your feelings wisely" – Students' emotion regulation and approaches to learning

Keywords: Emotion and affect, Higher education, Learning approaches, Student learning

Presenting Author: Robert Kordts-Freudinger, Paderborn University, Germany; **Co-Author:** Thomas Grosse Honebrink, Paderborn University, Germany; **Co-Author:** Dagmar Festner, University of Paderborn, Germany

Based on studies about stress in teacher education programs and relations between emotions and approaches to learning, the study investigated the use of emotion regulation strategies during a five-month teaching internship. More specifically, we researched the development of cognitive reappraisal, an emotion regulation strategy, and of the deep approach to learning. In addition, we investigated relations between two emotion regulation strategies and approaches to learning. For Study 1, $n = 69$ German teacher students completed several questionnaires after their teaching internship in a cross-sectional design, including the Study Process Questionnaire (R-SPQ-2F, Biggs et al., 2001) and the Emotion Regulation Questionnaire (ERQ; Gross & John, 2003). The results indicate positive relations between the deep approach to learning and cognitive reappraisal, but not with expressive suppression. For Study 2, $n = 86$ teacher students completed parts of these questionnaires in a longitudinal design, before and after their teaching internship. The correlational analyses confirm the results of Study 1. In addition, data show that both reappraisal and the deep approach to learning are declining over the course of the internship. The paper discusses implications for future research on emotion regulation and learning as well as on the organization of internships in teacher education.

How do the different study profiles of first-year students predict their completion of degrees?

Keywords: Achievement, Higher education, Learning approaches, Student learning

Presenting Author: Anne Haarala-Muhonen, University of Helsinki, Finland; **Co-Author:** Mirja Ruohoniemi, University of Helsinki, Finland; **Co-Author:** Anna Parpala, University of Helsinki, Finland; **Co-Author:** Erkki Komulainen, University of Helsinki, Finland; **Co-Author:** Sari Lindblom-Ylänne, University of Helsinki, Finland

The relationship between study progress and the nature of 550 first-year law students' study processes was investigated using a modified version of the Approaches to Learning and Studying Inventory. The students were classified into four study profiles according to their approaches to learning, indicating the nature of their study processes. The results showed that approaches to learning in the first study year predicted graduation time and the completion of the degree. Therefore, it is important to promote first-year students' awareness of their study practices and support the progress of their studies. Individual students need tailored guidance in transitioning to university studies and identifying the demands of the study programme.

Transitions in Research Postgraduate Students' Teaching and Learning Profiles in a Training Course

Keywords: Higher education, Learning approaches, Teacher Professional Development, Teaching approaches

Presenting Author: Alex Shum, The University of Hong Kong, Hong Kong; **Co-Author:** Luke Fryer, The University of Hong Kong, Hong Kong

Teacher-training courses for research postgraduate students (RPGs) in higher education provide the necessary preparation to teach effectively. Examining RPGs' conceptions of teaching and learning longitudinally provides insight regarding the development of their beliefs over the course and may help to describe their long-term changes. As variable-centred analysis approaches are limited to describing the mean of an entire class, a person-centred analysis offers a description of existing latent groups. A longitudinal person-centred analysis examined participants ($N=137$) of a short training course at an Asian-Pacific research-intensive university by responding to two instruments (measuring teacher-focused and student-focused approaches to teaching, and surface and deep approaches to learning) at the beginning and end of the course. Latent Profile Transition Analysis examined the profiles of groups at both time-points and tested for movement between them, suggesting four groups at both time-points. Two groups (Teacher Focused, Student Focused) indicated an inclination towards specific teaching and learning approaches, while the other two (Low Quantity, High Quantity) groups were undifferentiated in approaches. Significant increases were observed in deep learning approach for Low Quantity, High Quantity and Student Focused groups, and in student-focused teaching approach for High Quantity and Student Focused groups. These results suggest development in these adaptive conceptions occur more readily for participants who already identified with them initially. Movement between groups was limited to transitions between Low Quantity and High Quantity, indicating that a short course might be insufficient to change the overall conceptions of participants. Implications for theory and practice are discussed.

Fostering University students' evaluation of information sources: A classroom intervention study.

Keywords: Higher education, Instructional design, Literacy, Student learning

Presenting Author: Jean-Francois Rouet, University of Poitiers, France; **Co-Author:** Benjamin Bordas, University of Poitiers, France; **Co-Author:** Nicolas Vibert, University of Poitiers, France

The study investigated the effects of a series of classroom workshops on first-semester university students' critical evaluation of information sources. More specifically, the workshops provided explanations and examples illustrating the

constructs of author competence, author intention (benevolence) and media quality. Five hundred and fifty-five students distributed across 20 classes were included in the data analysis. The study used a cross-lagged design whereby half of the classes were trained at the beginning and half at the end of the semester. Students' performance on various document evaluation tasks was collected at a pre-test and two post-tests. Teaching assistants were also invited to provide feedback on their experience of teaching the workshops. The data were being analyzed at the time of submission.

Session K 13

1 September 2017 08:30 - 10:00

Main Building A - A32

Single Paper

Learning and Social Interaction, Teaching and Teacher Education

Teaching and Teacher Education - O

Keywords: Collaborative Learning, Communities of practice, Content analysis, Conversation / Discourse analysis, In-service teacher education, Peer interaction, Pre-service teacher education, Qualitative methods, Teacher Professional Development, Teaching / instruction

Interest group: SIG 11 - Teaching and Teacher Education

Chairperson: Teresa Guasch, Open University of Catalonia (UOC), Spain

“I like the talk!”: Collaborative rounds for teacher professional learning in Australia

Keywords: Communities of practice, In-service teacher education, Qualitative methods, Teacher Professional Development

Presenting Author: Caroline Mansfield, Murdoch University, Australia; **Co-Author:** Greg Thompson, Queensland University of Technology (QUT), Australia

The reform agenda in the teaching profession in Australia has seen an increased emphasis on teacher professional learning (PL) to improve teaching quality and effectiveness. Whereas historically, PL has consisted of one-off workshops or full day in-services, recent approaches have favoured collaborative, authentic and relevant PL opportunities for teachers. This paper presents a year long study of a collaborative rounds-based approach for teacher professional learning involving three primary schools in Western Australia. Qualitative data in the form of interviews, discussions and journal reflections were analysed to explore the affordances and challenges of the approach. Findings highlight support for teacher learning, perceptions of change in classroom instruction and the benefits of collaborative discussion about classroom practice. Even so, challenges to overcome included apprehension regarding peer observation, logistics, time, and development of observational skills. Theoretical and educational implications are discussed.

The development process of a coding protocol for understanding teacher learning in Lesson Study

Keywords: Collaborative Learning, Conversation / Discourse analysis, In-service teacher education, Teacher Professional Development

Presenting Author: Paul Warwick, University of Cambridge, United Kingdom; **Co-Author:** Maria Vrikki, University of Cambridge, United Kingdom; **Co-Author:** Jan Vermunt, University of Cambridge, United Kingdom; **Co-Author:** Neil Mercer, University of Cambridge, United Kingdom

This paper presents the iterative process of developing a coding protocol for analysing teacher peer talk and the learning that emerges from it in the context of Lesson Study (LS), a model of professional development which involves joint planning and reflection. The coding aimed to systematically identify features of videorecorded teacher discussion that contribute to teacher learning. Data are drawn from a two-year project with 59 participating schools, both primary and secondary, across London. During the project, Mathematics teachers formed LS groups six times during the two years. At end of each phase, the analysis of their videorecorded discussions led to further refinement of the protocol and its codes. This paper presents the final and reliable version of the protocol and discusses strategies of validity and reliability that were adopted. These are also discussed in relation to the affordances of the tool and how compromises had an effect on coded features.

Peer Coaching moves of student teachers in lesson planning dialogues – an intervention study

Keywords: Collaborative Learning, Conversation / Discourse analysis, Peer interaction, Pre-service teacher education

Presenting Author: Annelies Kreis, Zurich University of Teacher Education, Switzerland; **Co-Author:** Stefanie Schnebel, University of Tübingen, Germany

Practice-based teacher education offers a range of learning opportunities for teacher students (Schwille, 2008). From a socio-cultural perspective, pre- and post-lesson dialogues are particularly crucial as mediators in learning processes of student teachers. A substantial body of research gives insight into effective mentoring dialogues between student teachers and experienced mentor teachers (Hennissen, Crasborn, Brouwer, Korthagen & Bergen, 2008). A further promising approach in this field is peer coaching (Lu, 2014). However, knowledge about processes of peer mentoring dialogues, which goes beyond self-report is scarce. In a bi-national intervention study we explored what kind of coaching moves are used by peer coaches of a control group ($N_{CG} = 55$), and compare this to the practice of coaches ($N_G = 64$) who were trained with content-focused peer coaches (Kreis & Staub, 2013). Participants were students of 3 Swiss and 1 German teacher education institutions, qualifying as Biology teachers for lower secondary. Lesson planning dialogues of both

groups were video-recorded, transcribed, and analysed in a video based linguistic discourse analysis for differences with respect to coaching moves. Results suggest that participants of the intervention group adopted coaching moves according to the intervention model, and significantly differ from the control group. The study provides insight into ways of spontaneous vs. theoretically inspired structured peer coaching dialogues as an opportunity to foster learning processes in teacher education.

What pre-service teachers talk about in peer lesson dialogues, and how this can be influenced

Keywords: Content analysis, Peer interaction, Pre-service teacher education, Teaching / instruction

Presenting Author:Stefanie Schnebel, University of Tübingen, Germany; **Co-Author:**Annelies Kreis, Zurich University of Teacher Education, Switzerland

Peer coaching is a promising approach to enrich opportunities to learn for pre-service teachers. This study focuses on the content of lesson planning dialogues between student teachers. As part of an interdisciplinary, mixed-methods, bi-national project, we studied the outcomes of an intervention with Content-Focused Peer Coaching (CPC). CPC structures the interaction during situated teacher learning for co-construction with a focus on PCK. Whether, and how could the content of peer coached planning dialogues be enriched by this training? To explore this question, 119 planning dialogues were videotaped, transcribed, and analysed with a content-focused discourse analysis. Results of the quantification of the analysis show that 8 out of 25 aspects were significantly more often discussed in dialogues of the intervention group, where also significantly more time was spent to discuss issues of GPK, but not PCK. The study shows how the intervention induced the aimed for difference in peer coached lesson dialogues regarding the range of issues and duration of time the teacher students talk about GPK, but not PCK.

Session K 14

1 September 2017 08:30 - 10:00

Linna - K103

Single Paper

Motivational, Social and Affective Processes

Motivation and Educational Psychology

Keywords: Attitudes and beliefs, Educational Psychology, Educational Technology, Goal orientation, Higher education, Motivation, Quantitative methods, Secondary education, Self-efficacy

Interest group: SIG 08 - Motivation and Emotion

Chairperson: Manuela Paechter, University of Graz, Austria

Do Purpose in Life, Social Support and Digital Use Contribute to Adolescents' Life Satisfaction?

Keywords: Attitudes and beliefs, Goal orientation, Quantitative methods, Secondary education

Presenting Author:Ina Blau, Open University of Israel, Israel; **Co-Author:**Shira Goldberg, the Open University of Israel, Israel; **Co-Author:**Nurit Benolol, Beit Berl Academic College, Israel

This study examined the relationships between adolescents' life satisfaction, purpose in life, meaning in life, social support, and problematic digital use. The sample included 190 participants aged 14-18 who completed self-report questionnaires on life satisfaction, purpose in life, meaning in life, social support, and problem digital use. The following purpose in life clusters were found: (1) other-oriented goals ($n=32$); (2) self-oriented goals ($n=42$); and (3) both other- and self-oriented goals ($n=107$). Adolescents with both self- and other-oriented goals had significantly higher life satisfaction, meaning in life, and social support compared to the other groups. Meaning in life and greater parent and teacher support were significantly associated with *greater* life satisfaction. In addition, having other-oriented goals was associated with *lower* life satisfaction. Finally, social support mediated the association between problematic digital use and life satisfaction. Findings are discussed in light of previous research and the theoretical and practical implications are examined.

Understanding gender differences in motivation at school: a latent-variable approach

Keywords: Educational Psychology, Motivation, Secondary education, Self-efficacy

Presenting Author:Natalie Vannini, Goethe-Universität Frankfurt, Germany; **Co-Author:**Barbara Otto, Ludwigsburg University of Education, Germany; **Co-Author:**Tanja Könen, Goethe-Universität Frankfurt, Germany

Many empirical studies reveal gender differences in students' motivation to learn. Generally, girls tend to show a more favorable motivational pattern in reading and language arts whereas boys do so in mathematics and sciences. However, only a few studies examined motivation on a latent variable level. Thus, it is still unclear whether measurement invariance between girls and boys holds, which is a fundamental assumption behind group mean comparisons. In addition, measurement error can result in an underestimation of the true effect size. We addressed this issue within the domain of language arts (German). Further, we illustrated potential consequences and strategies for intervention. A sample of 2947 students attending German secondary schools (age 9-18, 49% female) reported their autonomous and controlled motivation as well as their self-efficacy in German based on Self-Determination Theory. Using structural equation modeling we demonstrated scalar group measurement invariance across gender in the full sample as well as in the subsamples of grade five, seven and nine. The comparison of latent mean scores showed that girls reported a higher autonomous motivation ($d = 1.87$) and self-efficacy ($d = 1.79$) whereas boys reported a higher controlled motivation ($d = 1.00$). In

summary, group mean comparisons are valid and mean differences are substantial. This is relevant because motivation and self-efficacy predicted grades in German over and above general intelligence. On a class level we found that teachers' constructivist beliefs and enthusiasm about the subject positively predicted boy's class mean autonomous motivation which might be a starting point for interventions.

Relationships between achievement goals and epistemic beliefs: developmental trends over grades 5-11

Keywords: Attitudes and beliefs, Educational Psychology, Goal orientation, Motivation

Presenting Author:Anders Hofverberg, Umeå University, Sweden; **Co-Author:**Mikael Winberg, Umeå University, Sweden

The aims of the study are to describe how students' epistemic beliefs and achievement goals develop over grades 5-11, to describe the correlations between epistemic beliefs and achievement goals, and how these correlations develop over grades 5-11. Furthermore, we will explore the data for indications of causal relationships between students' goals and epistemic beliefs, and the directionality of these relationships. The analyses builds on data from a cross-sectional survey distributed to all students in grades 5-11 in two municipalities in Sweden in 2014. Confirmatory factor analysis (CFA) of students' responses revealed four valid constructs concerning students' epistemic beliefs: *Development*, *Justification*, *Certainty*, and *Source*. Regarding students' achievement goals, two constructs were identified: *Mastery approach* goals and *Performance goals* (including both approach and avoidance goals). Students' factor scores on the constructs were used for calculating zero order Spearman correlations between constructs. Overall, students' epistemic beliefs were stable over the grades, while performance goals increased at the transition between primary and secondary school. Mastery goals showed a mainly decreasing trend over the grades. Development and Justification of knowledge showed positive significant correlations with Mastery goals over grades 5 – 11, while naïve beliefs about Certainty and Source of knowledge were moderately and positively correlated with Performance goals in grades 5 - 7, weakly correlated in grade 8 - 9, and insignificant in grades 10 and 11. For the conference, results will be complemented with longitudinal data, focusing on causal relations between epistemic beliefs and achievement goals.

Potential and Limits of Online Self-Assessments: Effects on Study Choice Certainty and Self-Efficacy

Keywords: Educational Technology, Higher education, Motivation, Self-efficacy

Presenting Author:Fani Lauermann, University of Bonn, Germany; **Co-Author:**Marold Wosnitza, RWTH Aachen University, Germany; **Co-Author:**Stuart Karabenick, University of Michigan, United States; **Co-Author:**Katharina Zay, RWTH Aachen University, Germany

High dropout rates and low graduation rates, with their dramatic personal and social costs, plague tertiary education institutions across Europe. One key reason for high dropout rates is the mismatch between the demands of higher education and students' personal resources and expectations. Over the past decade, universities have established the goal of reducing drop-outs by using low-stakes online self-assessments. This approach provides the foundation for *self-selection* and proactive *self-improvement* rather than high-stakes external selection. In this paper we focus on how students' motivation contributes to this process, framed in terms of expectancy-value theory. The sample of this study consists of 1624 individuals interested in studying mechanical engineering. The results show a relation between self-efficacy, certainty in study choice and study progress (credit points). The results can therefore also aid counselors who support prospective students and can contribute toward a better understanding of the interrelations between OSA-participation and potential changes in students' study field-related motivations and performance.

Session K 15

1 September 2017 08:30 - 10:00

Pinni B - B4115

Single Paper

Cognitive Science

Argumentation and Reasoning

Keywords: Argumentation, Attitudes and beliefs, Comprehension of text and graphics, Conceptual change, Informal learning, Metacognition, Misconceptions, Peer interaction, Qualitative methods, Reasoning, Science education, Teaching / instruction

Interest group: SIG 03 - Conceptual Change

Chairperson: Steffen Schmidgall, Leibniz-Institut für Wissensmedien, Germany

Using refutational text for the remediation of an incorrect intuition

Keywords: Comprehension of text and graphics, Conceptual change, Misconceptions, Reasoning

Presenting Author:Stephanie Lem, KU Leuven, Belgium; **Co-Author:**Patrick Onghena, KU LEUVEN, Belgium; **Co-Author:**Lieven Verschaffel, KU LEUVEN, Belgium; **Co-Author:**Wim Van Dooren, KU LEUVEN, Belgium

Refutational text has successfully been used to remediate a variety of misconceptions (Tippett, 2010). Refutational text explicitly states and refutes a misconception. Our study tested to what extent refutational text can also be used to remediate an incorrect intuition, i.e. the intuitive misinterpretation of the area of box plots. We used an experimental design to test the effect of refutational text on intuitive reasoning. One hundred and two adult volunteers were randomly assigned to either a control condition or a refutational text condition. In the control condition participants were asked to read an

explanation about box plots, while in the refutational text condition the participants read the same explanation but with several refutational elements added. After the intervention an intuitive reasoning test, aimed to test the occurrence of the area intuition, was administered, logging accuracy and reaction times. Both reaction time and accuracy rate patterns showed that participants in the refutation condition scored significantly better than participants in the control condition, although the area intuition was not completely eradicated. On top of that, there were more participants with (near) perfect performance in the refutation than in the control condition. We conclude that refutational text can help in remediating erroneous answers attributable to the area intuition, although it does not completely eradicate this incorrect intuition.

How the ethical stances of source and recipient affect laypeople's evaluation of scientific claims

Keywords: Argumentation, Attitudes and beliefs, Informal learning, Science education

Presenting Author: Marc Stadler, University of Münster, Germany; **Co-Author:** Lisa Scharrer, University of Münster, Germany; **Co-Author:** Rainer Bromme, University of Münster, Germany

The present study investigated how laypeople who inform themselves about a scientific topic with ethical implications evaluate scientific claims and their sources. 110 participants who held a strong stance about an ethical issue read a text in which the source, who also held a clear ethical stance, proposed a topic-related scientific claim. The source's ethical stance either matched or opposed the participant's ethical stance; in addition, the source provided a scientific claim that either did or did not support their own ethical stance. After reading, participants evaluated the scientific claim as well as the source's credibility. The results show that laypeople seem to consider the possibility that the source may be driven by an ethical bias that colors their scientific message. However, this vigilance is only applied if the source holds an opposing ethical stance. Laypeople are less skeptical about a potential source bias if the source's ethical stance matches their own.

How does teachers' epistemic thinking relate to their inquiry-based teaching practices?

Keywords: Metacognition, Reasoning, Science education, Teaching / instruction

Presenting Author: Tessa van Schijndel, Leiden University, Netherlands; **Co-Author:** Nadira Saab, Leiden University, Netherlands; **Co-Author:** Amanda Berry, RMIT University, Australia; **Co-Author:** Jan van Driel, The University of Melbourne, Australia

The last decades, policymakers have been arguing for the use of inquiry-based learning and teaching in science education. More recently, the inquiry-based approach has also found its way to other educational domains. Epistemic thinking is considered to be at the core of the inquiry-based approach. In order for teachers to improve students' levels of epistemic thinking, they need to show advanced levels themselves. In the present study, we therefore examine the epistemic thinking of secondary teachers from different educational domains, and the way their epistemic thinking relates to their inquiry-based teaching practices. The study is set in the context of international schools, as the International Baccalaureate (IB) curriculum that is frequently used at international schools, has a strong emphasis on inquiry-based teaching. Teachers' (N=147) epistemic thinking is measured by using the scenario-based approach of Barzilai and Weinstock (2015) that is based on the theoretical perspective of Kuhn and Weinstock's (2002, in Kuhn et al., 2008). In this perspective, the development of epistemic thinking is defined in terms of the coordination between the objective and subjective dimensions of knowing. Both teachers' epistemic thinking and their inquiry-based teaching practices are assessed with a digital questionnaire. The study's results (are momentarily being analyzed, and) will bear relevance to the educational context by providing a possible explanation for the difficulties in implementing inquiry-based approaches, as well as by providing suggestions for teacher training in the area of inquiry-based teaching.

Children's minds at work in argumentative activity

Keywords: Argumentation, Peer interaction, Qualitative methods, Reasoning

Presenting Author: Josephine Convertini, University of Neuchâtel, Switzerland; **Co-Author:** Anne-Nelly Perret-Clermont, University of Neuchâtel, Switzerland; **Co-Author:** Antonio Iannaccone, Institut de Psychologie et Education, Switzerland

As suggested by Nonnon (1996), argumentation is better considered not as a monological performance of making explicit predetermined standpoints backed up by arguments, but as a process of co-construction regarding diverse issues, notions and meanings as well as creating opportunities for the development of interlocutors' standpoints in relation to this process. How do children's minds work in this complexity? Our study aims at describing these processes. It is based on the observation of play activities of various kinds (e.g. exploration of physical phenomena, problem-solving, etc.) in which triads of 4 to 6 year old children interact. The sessions are recorded and transcribed (Jefferson, 2004) and then analysed qualitatively. A first step consists of identifying moments of critical discussion and/or moments of communicative disruptions. These are further transcribed in order to include gestures, gaze, positions of the objects, etc. Then a second-by-second analysis of the communication allows to identify the issues, the inference or deductive moves and to reconstruct the on-going argumentation and its motives. In this way, in certain cases, we can manage to recover the implicit premises of the children but also of the adult. The findings highlight the richness of young children's work in argumentative activities. The understanding of this complexity can have long-term consequences in the field of education, by supporting teachers with resources to welcome and optimize children's efforts, often underestimated by adults.

Session K 16

1 September 2017 08:30 - 10:00

Pinni B - B4113

Single Paper

Educational Policy and Systems, Learning and Social Interaction, Teaching and Teacher Education

Educational Theory

Keywords: Cultural diversity in school, Cultural psychology, Educational policy, Emotion and affect, Qualitative methods, Social aspects of learning and teaching, Social development, Synergies between learning - teaching and research, Teacher Professional Development, Video analysis, Workplace learning

Interest group: SIG 25 - Educational Theory

Chairperson: Pirkko Siklander, University of Lapland, Finland

The virtuous circle between educational research and educational policies

Keywords: Cultural diversity in school, Educational policy, Social development, Synergies between learning - teaching and research

Presenting Author: Emilio Lastrucci, University of Basilicata, Italy

The paper presents a theoretical model, proposed by the author, concerning the relationship between educational research and development of educational policies. The model is based on the idea to create a virtuous circle generated by the continuous alternation of movements of *bottom-up* kind and *top-down* kind. The former are intended to introduce, through legislative measures, generalized innovations in the educational system, whereas the latter concern previous innovative ferments and leaps (the 'best practices') matured slowly in limited and privileged conditions and contexts inside the system, in the "militant school". Educational research fits into this virtuous circle at every stage: at local level, in limited didactic experiments, research performs the function to support the creative initiatives by single teachers and schools providing scientific procedures and tools, in order to make intelligible, reproducible and exportable their findings; in the phase of first application of new teaching/learning paradigms at generalised level, scientific/academic institutions cooperate with political ones to make effective changes through the evaluation of its impact on the whole system.

Teachers making sense of educational change: Perezhivanie in a temporal perspective

Keywords: Cultural psychology, Qualitative methods, Teacher Professional Development, Workplace learning

Presenting Author: Antti Rajala, University of Helsinki, Finland; **Co-Author:** Kristiina Kumpulainen, University of Helsinki, Finland; **Co-Author:** Anna Mikkola, University of Helsinki, Finland

In this paper, we investigate teachers' sensemaking of educational change in two Finnish schools during the uptake of a new digital learning environment, called the FUSE Studio (FUSE). Finnish schools represent an interesting site for researching the uptake of FUSE due to the unique nature of Finnish educational policy that centers on teachers' autonomy (Simola, 2015). Our study asks: How do Finnish teachers make sense of FUSE? How do their varied interpretations mediate their intended uptake of FUSE? Drawing upon cultural historical theorizing, we approach the teachers' sensemaking with the notion of *perezhivanie* (Vygotsky, 1994). We propose and test a temporal framework for investigating teachers' sensemaking of educational change, accounting for three dimensions of teachers' changing temporal orientations. The data comprise 23 teachers' semi-structured interviews after a two-day in-service FUSE training program, analyzed using qualitative content analysis. Our study found four distinct orientations that illuminate the teachers' *perezhivanie* of the educational change efforts. Firstly, the practical-evaluative orientation emphasized the contextualization of FUSE in the practical details of the teachers' work. Secondly, through the reproductive orientation the change effort was appropriated within a habitual pedagogical framework that considered how existing pedagogical practices could be implemented in the new arrangement. Thirdly, the critical-projective and creative-projective orientations manifested the teachers' future-orientation. In sum, our study evidences the usefulness of the notion of *perezhivanie* for unpacking the complexity of teachers' sensemaking of educational change. Our study makes a conceptual contribution in proposing and testing a temporal framework for investigating teachers' *perezhivanie* of educational change.

Visualisation as a method to represent *perezhivanie* as a unity of emotional experience-in-place

Keywords: Cultural psychology, Emotion and affect, Qualitative methods, Social aspects of learning and teaching

Presenting Author: Peter David Renshaw, The University of Queensland, Australia; **Co-Author:** Marcelo Valente Ramos, The University of Queensland, Australia

In this paper we elaborate the visual method Vygotsky explored in the Psychology of Art (1925) to consider how *perezhivanie* might be represented and mapped as a unity of emotional experience in place. We illustrate the method with regard to children's lived and relived emotional experiences recorded during an environmental education excursion. The visualization method foregrounds the dynamic relationship between children's emotional experiences and the specific places where such experiences were embodied. The method also foregrounds *time* by mapping experience-in-place as remembered (*analepsis*) or foreshadowed (*prolepsis*) within an ongoing narrative. The visualisation method is an attempt to

bring together three related aspects of *perezhivanie*, namely emotional experience, place, and time, into a unified analytical approach.

Reading dramatically: Affect and generalization in primary school from the lenses of perezhivanie

Keywords: Cultural psychology, Emotion and affect, Qualitative methods, Video analysis

Presenting Author: Alfredo Jornet Gil, University of Oslo, Norway

Perezhivanie is an everyday Russian term that acquires a special signification when seen as a concept within a larger theory of human learning and development. Sometimes translated as *dramatic experience*, *perezhivanie*'s relation to *drama*, and the implications that such a relation may have for learning and instruction, have been explored only to a limited extent. Yet, L. S. Vygotsky first formulated the concept of *perezhivanie* in a stage of his career in which *drama* had become fundamental to the *concrete human psychology* he was developing. In this study, I explore the relations between drama and the concept of *perezhivanie* in the context of drama education in an arts-based elementary school. Drawing from interaction analysis, I examine the work that teachers and students jointly perform in moving from simply *reading a script* to performing it *dramatically*. This allows me identifying aspects unique to dramatization, but also the everyday competences that are involved. Findings show how achieving a dramatic performance rests upon the learners' development of a sensitive competence to coordinate orchestrated action with others first, and to do so with regard to an emerging semantic field latter. *Perezhivanie*, a concept that denotes unity of person and environment, and of intellect and affect, emerges as a useful concept to characterize the transition from these two moments of classroom development.

Session K 17

1 September 2017 08:30 - 10:00

Main Building A - A2A

Single Paper

Learning and Social Interaction, Teaching and Teacher Education

Learning and Professional Development - D

Keywords: Action research, Case studies, Communities of practice, Cooperative / collaborative learning, In-service teacher education, Mathematics, Primary education, Problem-based learning, Reflection, Survey Research, Teacher Professional Development, Workplace learning

Interest group: SIG 14 - Learning and Professional Development

Chairperson: Roger Säljö, University of Gothenburg, Sweden

Towards Student-Centred Pedagogy: Action Research with Ethiopian Village School Teachers

Keywords: Action research, Cooperative / collaborative learning, In-service teacher education, Teacher Professional Development

Presenting Author: Kati Keski-Mäenpää, University of Jyväskylä, Finland

This participatory action research was conducted between 2011 and 2015 in one Ethiopian village school with 23 primary and secondary school teachers. The aim of the doctoral research was to develop student-centred teaching methods instead of traditional lecturing and rote-learning. The purpose of this conference paper is to describe a) the action research process b) the professional development of participating teachers c) practice architectures that enable or constrain using student-centred learning. Action research process followed the cycle of planning, acting, observing and reflecting. The goal of the action and steps of the four cycles were planned by teachers. The research data consist of field notes, group discussions, videos and interviews. Data has been analysed thematically by atlas.ti –programme and through theory of practice architectures (Kemmis & Heikkinen 2012). Findings show that action research provided teachers a good tool to create contextual and culturally suitable teaching methods. It also supported teachers in their professional development. The action research process increased communication and co-working among teachers. Findings also show that the existing structure at schools with detailed curriculum, large groups and annual tests do not support the usage of child-centred teaching methods in Ethiopia.

Five Years of a National Mentoring Program for Novice Principals: Benefits and Weaknesses

Keywords: In-service teacher education, Survey Research, Teacher Professional Development, Workplace learning

Presenting Author: Frauke Meyer, University of Auckland, New Zealand; **Co-Author:** Viviane M.J. Robinson, University of Auckland, New Zealand; **Co-Author:** Jacqueline Patuawa, University of Auckland, New Zealand

Mentors can play an important part in helping beginning principals lift their confidence, improve their management skills, and establish themselves as instructional leaders (Darling-Hammond, LaPointe, Meyerson, & Orr, 2007). This study reports on the evaluation of the mentoring strand of the New Zealand national principal induction program. It gives an overview of the program design and reports the experiences of principals in the 2010-2014 program cohorts. The study draws on quantitative and qualitative data collected through evaluation surveys sent to principals on program completion. The findings indicate that it was a valuable model for the support and professional development of novice principals. While program satisfaction was mainly predicted by the personal benefits gained, satisfaction with the mentors was predicted by

mentor qualities. It offered personalised, needs-based and flexible support by trained mentors. The data highlight the relational nature of mentoring and the importance of mentors being trained in interpersonal skills and values. Weaknesses were seen in the length of the program, and, for a small number of principals, in the difficulties that persisted in matching principals with mentors who were situated in close distance, had expertise from similar school contexts and were currently leading a school. A more detailed program overview and the evaluation findings will offer insights for those interested in program design, policy and the professional development of principals. The study further adds to the literature base on mentoring novice principals and effective program design.

Student teachers' explanatory voices on theory-practice interaction

Keywords: Mathematics, Primary education, Teacher Professional Development, Problem-based learning

Presenting Author: Sinikka Kaartinen, University of Jyväskylä, Finland; **Co-Author:** Kristiina Kumpulainen, University of Helsinki, Finland

This study investigates student teachers' explanatory voices on theory-practice interaction in the context of primary mathematics teaching. The study is situated in a Finnish teacher education course that dealt with mathematics teaching from the viewpoint of sociocultural theories. We applied narrative data analysis to student teachers' written course accounts to unravel how these explained theory-practice interaction. The results of the study show the multi-voicedness of the student-teachers' sense-making mediated by a *change voice*, *conditional voice* and *normative voice*. The study reveals personal, relational and institutional conditions by which the student teachers confer sense to theory-practice interaction. The paper concludes by stressing the centrality of sense making in professional learning, and the need to enrich mathematics teacher education with more idiographic approaches that can shed light to the complex dynamics involved in student teachers' sense making for theory in and for the teaching of primary mathematics.

Identity Work and Meaning-making during Organizational Storytelling

Keywords: Case studies, Communities of practice, Reflection, Workplace learning

Presenting Author: Satu Hakanurmi, University of Turku, Finland

This study provides new insights into organizational storytelling, narrative learning and identity work in a socio-cultural context. The research interrogates the meaning making-process during the storytelling, what the single participant felt and learnt and how the social aspect influenced the individual one. The theoretical position of the research is rooted in narrative theory and socio-cultural theory. A case study approach was used to capture the complexities of the phenomenon. Narratives varied from open to closed narratives and promoted learning differently. Discussion around stories was future-oriented even though the stories were dealing past experiences. Communication allowed the co-authoring of narratives, collaborative meaning-making and negotiation of identities. There is evidence that storytelling has potential in promoting the sense of coherence and renewal of identities. Telling stories about work at work works.

Session K 18

1 September 2017 08:30 - 10:00

Main Building C - C5

Single Paper

Learning and Social Interaction, Motivational, Social and Affective Processes, Teaching and Teacher Education

Inquiry Learning - B

Keywords: Case studies, Inquiry learning, Mixed-method research, Model-based reasoning, Motivation, Out-of-school learning, Reasoning, Science education, Teaching / instruction

Interest group: SIG 20 - Inquiry Learning

Chairperson: Simoni Symeonidou, University of Cyprus, Cyprus

Pre-service teachers' guidance and dialogic inquiry-based science teaching with simulations

Keywords: Case studies, Inquiry learning, Science education, Teaching / instruction

Presenting Author: Antti Lehtinen, University of Jyväskylä, Finland; **Co-Author:** Jouni Viiri, University of Jyväskylä, Finland

Research on guidance for inquiry-based learning with simulations has concentrated on guidance provided by simulations and their learning effects. Guidance provided by teachers and its effect on teaching is in need of research. Our study investigates closely one inquiry-based science lesson where simulations were used for investigations. Pre-service teachers' practices are analyzed through the communicative approaches they applied and the forms of guidance that they provided. These two approaches for teacher-student interaction lenses deal with teacher's role in balancing between promoting learners' active role in learning and guiding them in their learning activities. Our research question is: How are the communicative approaches used by the pre-service teachers and forms of guidance provided by them linked in the lesson under study? Data was collected from a lesson taught by a group of 5 pre-service teachers for 6th graders on the topic of static electricity. The data consisted of two video recordings of the lesson and screen recording videos. The analysis combined three temporal levels of analysis: micro-, meso- and macro-levels. Reliability was ensured through having a second coder code part of the data. In episodes containing an authoritative communicative approach the pre-service teachers used more specific forms of guidance in contrast with episodes containing a dialogic communicative approach. In

those episodes the provided forms of guidance were more non-specific e.g. prompts. The results implicate the important role of guidance for inquiry-based learning not just for learning outcomes but also for the communication in the classroom.

Middle-school students engage in pre-instruction model revision task

Keywords: Inquiry learning, Reasoning, Science education, Model-based reasoning

Presenting Author:Brandon Mauclair-Augustin, Rutgers University, United States; **Presenting Author:**Clark Chinn, Rutgers University, United States; **Co-Author:**Veronica Cavera, Rutgers University, United States; **Co-Author:**Ravit Golan Duncan, Rutgers University, United States

Previous research has identified both accurate and inaccurate conceptions students have about the practice of scientific modeling and the standards that should be set to determine model goodness (Authors, 2011). In this present study, we examined if students could indeed use their understanding of criteria for good models on a practical modeling task, specifically model revision. Would students suggest revisions to models that reflect appeals to epistemic criteria for good models? To investigate students' first exposure to modeling and model revisions we gave 303 students assessments that required them to evaluate and revise scientific models. We found that students' proposed model revisions were largely consistent with normative standards for model goodness. In fact, they were able to employ multiple criterion that could improve the coherence and accuracy of models (e.g. causal mechanisms and fit with evidence) and criteria that affect the representation and communicative elements of models (e.g. having visuals and having good quality visuals). Despite the assessment being students' first exposure to modeling practices, students were able to recognize specific aspects of the causal mechanism that would benefit from further elaboration to more fully explain the biological phenomenon in question. These results contribute to a much more complete picture of students' abilities to engage in modeling and to use modeling epistemic criteria and their modeling practices.

Use of Teaching Strategies to Promote Dialogic Discourse in a Design-Based Science Classroom

Keywords: Inquiry learning, Mixed-method research, Science education, Teaching / instruction

Presenting Author:Dana Gnesdilow, University of Wisconsin-Madison, United States; **Co-Author:**Nafsaniath Fathema, University of Wisconsin Madison, United States; **Co-Author:**Sadhana Puntambekar, University of Wisconsin, United States

In this study, we examined how an inquiry-based biology curriculum was enacted by two seventh grade teachers and how their enactments may have been influenced their students' learning. We found significant differences in students' learning based on the teacher they had. Teacher 2's students performed significantly better than Teacher 1's students on a biology content test. To explore how each teacher's enactment may have affected students' learning, we developed a coding scheme to capture they types of strategies the teachers used when facilitating their classrooms. Using this coding scheme, we analyzed classroom video data and found significant differences in teachers' use of instructional strategies. We found that Teacher 1's talk was mostly focused on asking questions to help students to reveal and extend their scientific thinking and addressing procedural aspects of the classroom. Alternatively, Teacher 2 used more of a balanced approach, using several important strategies like summarizing ideas, asking questions, making connections between concepts and giving metacognitive prompts to help students learn how to think through difficult science concepts or practices. The significance and implications of the study and the future directions are discussed in the paper.

Studying interest and learning in an out of school workshop

Keywords: Mixed-method research, Motivation, Out-of-school learning, Science education

Presenting Author:K. Ann Renninger, Swarthmore College, United States; **Co-Author:**Fatema Jivanjee, Swarthmore College, United States; **Co-Author:**Ashley McQuiller, Swarthmore College, United States

In this paper, we address session questions by drawing on an ongoing set of mixed method studies of economically challenged, urban, middle-school age, African American youth and their participation in out-of-school, inquiry-oriented science workshops. In these studies we are assessing change in the workshop participants' science interest and learning. Consideration of each study in relation to the others has allowed us to explore the use of the ICAN Intervention to boost science interest and learning. The ICAN Intervention consists of probes for writing responses to probes addressing daily science activity (e.g., I CAN write some examples about how an animal can use its senses to find things out about its environment.""). We describe use of different methods to assess and confirm the identification of participants' science interest and of their science learning (as theory, practice, and logical reasoning; and science practices) in the out of school inquiry workshops. We also report more specifically on findings from current work in which the ICAN probes received by participants were tailored to help them focus attention on key elements of the workshop's science inquiry activities. Findings indicate that the science interest and learning of all participants benefit when they are provided with tailored ICAN probes.

Session K 19

1 September 2017 08:30 - 10:00

Pinni B - B4116

Single Paper

Assessment and Evaluation, Developmental Aspects of Instruction, Learning and Special Education

Educational Attainment and School Effectiveness

Keywords: At-risk students, Educational attainment, Educational policy, Experimental studies, Mathematics, Metacognition, Primary education, Quantitative methods, School effectiveness, Teacher Effectiveness, Teaching / instruction

Interest group: SIG 18 - Educational Effectiveness

Chairperson: Marlies ter Beek, University of Groningen, Netherlands

Individual and Organizational Predictors of Behavioral and Emotional Risk in Schools

Keywords: At-risk students, Educational policy, Quantitative methods, School effectiveness

Presenting Author:Bridget Dever, Lehigh University, United States; **Co-Author:**Erin Dowdy, University of California, Santa Barbara, United States; **Co-Author:**Randy Kamphaus, University of Oregon, United States

In the United States as well as globally, a significant number of youth are negatively affected by behavioral and emotional problems. From a prevention standpoint it is important to identify students who are *at risk* for behavioral and emotional disorders prior to the point of diagnosis, as even students who are exhibiting early signs of behavioral and emotional risk experience difficulties in school. The present study sought to determine whether individual-level demographic characteristics and school-level organizational variables served as predictors of behavioral and emotional risk in a high-needs school district in the United States. Hierarchical linear modeling analyses of 612 students nested within 25 schools determined that males and younger students reported more behavioral and emotional risk. In addition, larger schools, larger average class sizes, and higher average teacher salaries predicted higher levels of risk. Implications are discussed from a systems perspective.

A Two-year Study of Textbook Effects on German Primary School Students' Mathematical Competence

Keywords: Mathematics, Primary education, Quantitative methods, Teaching / instruction

Presenting Author:Ann-Katrin van den Ham, Leibniz Institute for Science and Mathematics Education (IPN), Germany; **Co-Author:**Inga Niedermeyer, Leibniz Institute for Science Education (IPN), Germany; **Co-Author:**Aiso Heinze, Leibniz Institute for Science and Mathematics Education (IPN), Germany

Though empirical findings show that mathematics textbooks have an influence on teachers' instruction, research on textbook effects on students' achievement is rare. Mostly, textbook effects are considered in studies of curriculum effects which means that different textbooks correspond to different curricula. Hence, it is unclear whether the effects are caused by the curricula or by the textbooks. Only a few studies avoid this problem but yield contradicting results on the influence of textbooks. Moreover, there are hardly longitudinal studies on textbook effects on students' achievement. We report findings from a re-analysis of a two-year longitudinal study with 91 German primary school classes. The teachers of the sample used one of four different mathematics textbook series which follow the same curriculum prescribed by the federal state government. Mathematics achievement was measured by two interlinked arithmetic tests at the end of grade 1 and grade 2. As control variables data for numerical, language and general cognitive abilities at school entrance as well as teacher qualification and school characteristics were included. Results of multilevel analyses show substantial textbook effects at the end of grade 1 and of grade 2. In particular, the findings indicate disadvantages for those students which were taught by a mathematics textbook strongly suggesting an individualized learning with an emphasis on procedural arithmetic knowledge. Implications of the results for textbook research and for textbook implementation in the mathematics classroom are discussed.

Promoting Quality and Equity in Education: The impact of the Dynamic Approach to School Improvement

Keywords: Educational attainment, Experimental studies, Primary education, School effectiveness

Presenting Author:Leonidas Kyriakides, University of Cyprus, Cyprus; **Co-Author:**Panayiotis Antoniou, University of Cambridge, United Kingdom; **Co-Author:**Evi Charalambous, University of Cyprus, Cyprus; **Co-Author:**Bert (Hubertus P M) Creemers, University of Groningen / GION, Netherlands; **Co-Author:**Dympna Devine, University College Dublin, Ireland; **Co-Author:**Dona Papastilianou, National and Kapodistrian University of Athens, Greece; **Co-Author:**Declan Fahie, University College Dublin, Ireland

This paper investigates the extent to which the Dynamic Approach to School Improvement (DASI) can promote both quality and equity in student learning outcomes in schools with low socioeconomic status. A sample of 72 primary schools from Cyprus, England, Greece and Ireland were selected. The schools were randomly allocated in two groups. Following the initial evaluation phase, feedback on the functioning of school factors was provided to all schools. Then schools of the first group (control group) were encouraged to develop their own action plans to promote student learning outcomes, whereas schools of the second group were asked to make use of DASI for improvement purposes. Student achievement in mathematics at the beginning and at the end of the school year was measured. The analysis of the data on final achievement in Mathematics, using multilevel modelling techniques, is currently in process to find out whether schools which made use of DASI managed to promote student learning outcomes more than schools of the control group. To measure the impact of DASI on promoting equity, we are searching for the extent to which the impact of SES on student achievement has been reduced. Thus, the results of the international study presented here may provide support to the use of DASI for promoting equity. Implications of findings for educational effectiveness research are, therefore, drawn and suggestions for further research are provided.

Exploring the effects of teaching factors on promoting students' cognitive and metacognitive skills

Keywords: Educational attainment, Metacognition, Quantitative methods, Teacher Effectiveness

Presenting Author: Maria Anthimou, University of Cyprus, Cyprus; **Co-Author:** Leonidas Kyriakides, University of Cyprus, Cyprus

The dynamic model of educational effectiveness takes into account the new goals of education and related to this their implications for teaching and learning. It is based on traditional views on instruction such as direct learning and teaching which emphasize not only the role of teacher as instructor responsible for providing knowledge and skills but also the specific behaviors he/she should apply. The model also takes into account new ideas on instruction associated with constructivism which give emphasis to independent learning. An integrated approach in defining quality of teaching is therefore adopted. Five longitudinal studies and a meta-analysis of teacher effectiveness studies revealed that teacher factors included in the dynamic model are associated with student achievement gains. However, none of these studies was concerned with metacognitive learning outcomes. Thus, the study reported here investigates the impact of teacher factors on students' cognitive (i.e., mathematics) and metacognitive (i.e., prediction and evaluation) skills. Written tests in mathematics and the "Metacognitive Skills and Knowledge Assessment" tool were administered to all grade 4 and 5 students (n=924) of 15 Cypriot primary schools at the beginning and at the end of the school year 2013-2014. Students completed a questionnaire measuring teachers' classroom behavior. Multilevel SEM analysis revealed a reciprocal relationship between students' cognitive and metacognitive skills. Almost all teacher factors were associated with achievement in mathematics but only four (i.e., modeling, assessment, questioning, dealing with misbehavior) were associated with the development of students' metacognitive skills. Implications of findings are drawn.

Session K 20

1 September 2017 08:30 - 10:00

Main Building A - A05

Single Paper

Learning and Instructional Technology, Learning and Social Interaction, Teaching and Teacher Education

Learning and Teaching in Culturally Diverse Settings - B

Keywords: Action research, Bilingual education, Citizenship education, Computer-assisted learning, Cultural diversity in school, History, In-service teacher education, Learning Technologies, Mixed-method research, Multicultural education, Primary education, Qualitative methods, Quantitative methods, Quasi-experimental research, Social aspects of learning and teaching, Social interaction

Interest group: SIG 21 - Learning and Teaching in Culturally Diverse Settings

Chairperson: Tom Rosman, Germany

Potential and peril of the past: A cross-national study of teaching sensitive historical issues

Keywords: Citizenship education, History, Quantitative methods, Social aspects of learning and teaching

Presenting Author: Tsafir Goldberg, University of Haifa, Israel

Sensitive historical issues call growing attention in the last two decades. These include coping with victimization or collective trauma as well engagement with immoral actions of the nation raising collective guilt. Meeting the challenge of such issues is assumed to foster collective healing, intergroup empathy and reconciliation. However, teaching such issues may arouse strong emotional and ideological reactions from learners, peers, superiors and the community. Our study set out to map what issues are considered sensitive, how often teachers attempt to teach them, and what motivates and impedes such teachers. In a collaborative research spanning 10 countries across Europe and its neighbors we collected over 500 teachers' perspectives on the teaching of sensitive historical topics. Findings show that respondents appeared committed to the teaching of sensitive issues as sensitivity and frequency of teaching were correlated. Most teachers reported minor obstacles and opposition and little anxiety of peer or superior sanctions. Atnic minority teachers and teachers in conflict zones showed more awareness of opposition and reasons for evading the teaching of sensitive issues. Teachers outlined frequent methods and gave concrete examples of best practice in teaching sensitive issues. The study offers insight into the challenges facing the expansion of teaching sensitive issues. It draws the profiles of sensitive issues teachers, and outlines their current needs and strengths

Mobile Learning in elementary Science Education

Keywords: Computer-assisted learning, Learning Technologies, Mixed-method research, Primary education

Presenting Author: Charles Max, University of Luxembourg, Luxembourg

The contribution discusses the use of tablets in elementary science education, i.e. to what extent do these technologies impact on learning processes in the sense of promoting self-regulated student activities and the comprehension of scientific phenomena. High-performing mobile devices are currently entering school environments following local or governmental digitalisation initiatives. Their mobile access to the web allows to use web-based learning resources without space restrictions within the school environment. Their impressive range of digital features allows to capture, collect, treat and visualize multimodal data related to self-regulated inquiries. Specific apps enable students to merge their own data with content they download from digital sources and to share their multimodal creations with the school community. The contribution draws on evidence gathered during a four-year long research project. Through a mixed-methods approach

different sets of data were collected by a) students (e.g. multimodal classroom productions, self-recordings about their learning activities), b) the research team (video data from lessons, video-stimulated recall interviews, interviews with teachers). The study reveals that students quickly acknowledge the potential of these devices for gathering information, (re)-evaluating own explanations, communicating inquiry results or reflecting on their learning. This led to evidence-based explanations and explicit justification of own interpretations. Moreover, we evidenced an increase of self-directed and interest-driven learning processes as tablets stimulate students' engagement and aesthetic self-expression. The interactive technologies also trigger new forms of group exchange and feedback in relation to student-generated quality criteria for own achievements.

Self-reported reasons for acceptance or rejection of bilingual interaction during peer-learning

Keywords: Bilingual education, Qualitative methods, Quasi-experimental research, Social interaction

Presenting Author: Martin Schastak, German Institute of International Educational Research (DIPF); IDeA-Research Center, Germany; **Co-Author:** Valentina Reitenbach, German Institute for International Educational Research, Germany; **Co-Author:** Jasmin Decristan, Goethe-University Frankfurt; IDeA-Research Center, Germany; **Co-Author:** Dominique Rauch, German Institute for International Educational Research (DIPF), Germany

This study analyses whether Turkish-German bilingual primary school students choose to accept or reject the offer of bilingual interactions within the context of a peer-learning intervention focusing on basic reading or arithmetic strategies. Bilingual trainers explicitly offered the use of Turkish-German bilingual interactions and provided opportunities to communicate bilingually using bilingual input, materials and games. Data of 37 bilingual speakers of Turkish and German, attending grades three and four were analysed. Students answered during and at the end of a six week peer-learning intervention, whether they used Turkish during the sessions and why (not). The self-reported acceptance or rejection of the language offer was analysed descriptively and students' reasons for their language choice were analysed using content-analysis by Mayring (2015). At both measurement points, students reported more often an acceptance rather than a rejection of the language offer. The acceptance or rejection of the bilingual interaction offer did not differ between the interventions' topics (reading and arithmetic strategies). Students' reasons for their language choice mostly referred to the individual itself (e.g., their language competencies, task solving competencies, and emotions and attitudes). Neither the peer nor the trainer played a crucial role in justifying the students' language choice. The context (intervention study) was only an argument for the acceptance but not for the rejection of bilingual interactions. Finally, practical implications for bilingual language offers in peer-learning are discussed.

Teachers' Beliefs and Educational Practice Concerning Cultural Diversity

Keywords: Action research, Cultural diversity in school, In-service teacher education, Multicultural education

Presenting Author: Luca Agostinetto, University of Padova, Italy; **Co-Author:** Lisa Bugno, Università degli Studi di Padova (University of Padova), Italy

TEACHERS' BELIEFS AND EDUCATIONAL PRACTICE CONCERNING CULTURAL DIVERSITY. This study aspires to investigate the relation between the teachers' beliefs about diversity, and their teaching activities. Moreover, the purpose of the research is studying the meaning of the belief in the education context and in reference to the diversity content. Therefore, the aim of the research is investigating both the theoretical and the empirical levels. Referring to the first, the purpose is to systematize the multitude of the meanings found in literature, in order to propose an accurate pedagogical consideration. For what concerns the empirical level, the relation between theory, beliefs, and the teaching activities on diversity is being examined in detail using integrated analysis tools, and involving 3 groups of 10 in-service teachers. Research instruments work towards three crucial perspectives: teachers' semi-structured interviews, participant observations and focus group. The emerging results indicate a rhetoric lack of coherence between what teachers affirm and what they do. It can be expected that the focus group experience will allow the reconceptualization of teachers' beliefs about diversity, improving teaching actions and producing a positive effect on educational practice. Potentially, this research could be the first step to achieve a program that can better support in-service and new teachers dealing with cultural diversity.

Session K 21

1 September 2017 08:30 - 10:00

Pinni A - Paavo Koli

Single Paper

Teaching and Teacher Education

Teaching and Teacher Education - T

Keywords: Cognitive skills, Collaborative Learning, Competencies, Conceptual change, Cooperative / collaborative learning, Educational Technology, Lifelong learning, Motivation, Pre-service teacher education, Qualitative methods, Self-efficacy, Teacher Professional Development, Vocational education

Interest group: SIG 11 - Teaching and Teacher Education

Chairperson: Debra Myhill, University of Exeter, United Kingdom

Trainee teachers' conceptions of their own learning: does context make a difference?

Keywords: Conceptual change, Cooperative / collaborative learning, Self-efficacy, Teacher Professional Development
Presenting Author: Peter Davies, University of Birmingham, United Kingdom; **Co-Author:** Rachel Lofthouse, University of Newcastle, UK, United Kingdom; **Co-Author:** Celia Greenway, University of Birmingham, United Kingdom; **Co-Author:** Dan Davies, Cardiff Metropolitan University, United Kingdom

This study examined change in trainee teachers' conceptions of their own learning during initial teacher education. The sample comprised 36 trainees on university-led and school-led routes into teaching associated with four Higher Education Institutions (HEIs) in England and Wales. Each trainee was interviewed after their first school experience and then towards the end of their one year of training or, in the case of trainees on undergraduate programmes, roughly ten months later. The study identified (i) qualitative differences between trainee teachers' conceptions of their learning to become a teacher in terms of the focus of reflection; degree of self-determination; gestation of learning; beliefs about knowledge for teaching; context for learning (who else was involved in the trainee's learning); and mode of learning (the role the trainee adopted in their learning). The research also distinguished between trainees who described their learning in the same way in both interviews; trainees whose description in the second interview was less expansive than in the first, becoming compliant to expectations in the schools in which they had gained experience; and trainees who had developed a more expansive way of learning in which they were more proactive. We discuss the indications in these data of some relationships between these conceptions and the contexts in which trainee teachers are working.

Vocational teachers' perceptions in mobile-supported boundary-crossing settings

Keywords: Educational Technology, Qualitative methods, Teacher Professional Development, Vocational education
Presenting Author: Elisa Motta, Swiss Federal Institute for Vocational Education and Training, Switzerland; **Co-Author:** Alberto Cattaneo, Swiss Federal Institute for Vocational Education and Training (SFIVET), Switzerland; **Co-Author:** Raija Hamalainen, University of Jyväskylä, Finland

In Vocational Education and Training (VET) systems, apprentices live heterogeneous experiences in different contexts (in Switzerland the system is –mainly work-based, in Finland it is school-based). As apprentices usually perceive a gap among learning locations, the need to promote a closer cooperation between vocational institutions and workplaces is argued. In such framework, technologies may provide support by enabling better integration of activities lived on the boundaries of working-life and school contexts. Teachers, who have the role to assist apprentices to move backward and forward between the boundaries of vocational education, also need to develop teaching practices based on technology integration, also to engage in purposeful technology-enhanced activities. Against this background, the present study – involving teachers through semi-structured interviews (n=3 in the Swiss context, plus an additional focus-group; n=4 in Finland) – aimed at investigating technology-enhanced teaching practices in vocational education, specifically with respect to their potential to foster boundary crossing, also looking at peculiarities of school-based and work-based systems. This study illustrated how teachers described different opportunities when considering the role of technology especially in narrowing the gap between schools and authentic work contexts. The main emerging trends described by vocational teachers are the following: 1. An interest for technologies in the professional experience cannot be avoided by teachers nowadays; 2. Mobile devices can facilitate learning locations connection; 3. visualization is the most exploited option (smartphones and action cameras); 4. The role teachers play changes, in favour of a more learner-centred instructional approach.

Pre-service Teachers' Perceptions of Their Strategic Learning Skills and Collaboration Dispositions

Keywords: Cognitive skills, Collaborative Learning, Competencies, Pre-service teacher education
Presenting Author: Päivi Häkkinen, University of Jyväskylä, Finland; **Co-Author:** Anne Virtanen, University of Jyväskylä, Finland; **Co-Author:** Johanna Pöysä-Tarhonen, University of Jyväskylä, Finland; **Co-Author:** Mikko Niilo-Rämä, University of Jyväskylä, Finland; **Co-Author:** Piia Naykki, University of Oulu, Finland; **Co-Author:** Sanna Järvelä, University of Oulu, Finland

To support the development of students' 21st century skills, such as strategic learning skills and collaboration skills, teachers themselves must also be competent in them (Voogt, et al., 2012). There is a fair amount of research addressing strategic learning skills and their role in enhancing academic achievement in higher education contexts, including teacher education (Zimmerman & Schunk, 2011). Productive self-regulated learning means setting high-quality goals, selecting appropriate tactics to achieve those goals, monitoring progress and adapting as necessary during their academic work (Winne & Hadwin, 2008). Previous studies in the teacher education context have shown that actively regulating pre-service teachers use a large variety of activities to regulate their learning (Vermunt & Endedijk, 2011). In addition to individual learning skills, also social construction of knowledge and collaboration are important prerequisites for today's learner. There is also evidence showing that working collaboratively can have a positive impact on cognitive performance and knowledge construction (O'Donnell & Hmelo-Silver, 2013). In our study, by collaboration dispositions we refer to a set of individuals' general attitudes that are related to the emergence of high-quality collaboration and teamwork (PISA 2015 framework, based on Wang et al., 2009).

Motivation for professional development: A subjective perspective from teachers

Keywords: Motivation, Qualitative methods, Teacher Professional Development, Lifelong learning
Presenting Author: Claudia Krille, Goethe-Universität Frankfurt, Germany

Teacher professional development (PD) is seen as a crucial part of the teacher profession and to positively influence students' learning and performance. However, there is only little known about training motivation within teacher PD and the few existing studies focus on rather general motivational constructs. In addition, the addressed studies usually use questionnaires – mainly with close-ended questions –working with presumed motivation factors. To get a deeper insight on how teachers decide whether they participate in PD and in which training programme, the study aims to investigate what teachers report what motivates them to participate in teacher PD. In addition, since especially studies on teacher PD are scarce within the field of vocational education, this study will focus on teachers from business and economic education. In the main study it is aimed to interview $N=40$ teachers. Results from the pilot study confirmed existing research but also helped to gain a deeper view on reasons to participate in training programmes (e.g., opportunity to learn something new or stay up-dated, to exchange and collaborate with colleagues, interest in a certain topic) or not to participate (lesson cancellation for students, lack of interesting or relevant training programmes, spending leisure time for PD, lack of relevance for school or classes). At the conference, results of the main study will be presented and will be the basis to develop a questionnaire that can be applied to a greater teacher sample to provide a basis to derive recommendations for example for schools or training providers.

Session K 22

1 September 2017 08:30 - 10:00

Pinni B - B1097

Single Paper

Assessment and Evaluation, Cognitive Science, Higher Education

Writing, Literacy and Language

Keywords: Assessment methods and tools, Bilingual education, Cognitive skills, Computer-assisted learning, Content analysis, Experimental studies, Language (Foreign and second), Language (L1/Standard Language), Mixed-method research, Peer interaction, Quantitative methods, Reasoning, Social aspects of learning and teaching, Writing / Literacy

Interest group: SIG 12 - Writing

Chairperson: Ellen Usher, University of Kentucky, United States

The use of generic language in pedagogical and non-pedagogical contexts in a diglossic environment

Keywords: Bilingual education, Language (L1/Standard Language), Reasoning, Social aspects of learning and teaching

Presenting Author: Ursina Markwalder, ETH Zurich, Switzerland; **Co-Author:** Henrik Saalbach, University of Leipzig, Germany; **Co-Author:** Lennart Schalk, ETH Zurich - Research on Learning and Instruction, Switzerland

English-speaking students have been shown to produce more generic language in pedagogical than in non-pedagogical contexts. We replicate these findings in a German-speaking diglossic environment, and demonstrate that this adaptive use of language exists both in colloquial and standard language. In Swiss classrooms, teachers and students speak Standard German (standard language), while in most other contexts (e.g. in the schoolyard, at home with their families), teachers and students speak Swiss German (colloquial language). Furthermore this study showed no differences between both language forms (colloquial and standard) with respect to the number of generic statements. Accordingly, generic constructions are used for knowledge transfer in both language forms.

How assessors differ in the aspects they look at when comparing texts

Keywords: Assessment methods and tools, Content analysis, Mixed-method research, Writing / Literacy

Presenting Author: Marije Lesterhuis, University of Antwerp, Belgium; **Co-Author:** Sven De Maeyer, University of Antwerp, Belgium; **Co-Author:** Vincent Donche, University of Antwerp, Belgium

Introduction Research has shown that assessors differ in the aspects they value within texts, mostly explained by their expertise. Recently scholars have focused on the merits of Comparative Judgement (CJ) as an assessment method. In CJ assessment this expertise is specifically valued as assessors have to apply their own conceptualization of good writing to decide on which of two texts is better. Based upon the decisions made by a group of assessors, the texts can be scaled according to their quality. This scale represents the shared consensus on what is valued in the texts. Within CJ literature there is a clear lack of knowledge on how assessors differ in the aspects they value most when comparing two texts and whether this is related to their expertise. Expertise is looked upon from two perspectives: 1) the years of relevant experience and 2) the accuracy of the decisions of the assessor compared to the other assessors. Using a three-step Latent Class Analysis, three types of assessors are detected: the content focused assessor, the lower-order skill focused assessor and the assessor focusing on public orientated writing. Less experience in assessing writing seems to increase the probability to belong to the second type, whereas accuracy does not seem to be related to the types. This study shows a new approach in studying assessors' cognition in writing assessment. Next to that, it creates awareness on the importance of assessor' selection for the validity of writing assessment.

To plan or not to plan: The effects of planning on the process and product of writing

Keywords: Cognitive skills, Experimental studies, Quantitative methods, Writing / Literacy

Presenting Author: Teresa Limpo, University of Porto, Portugal; **Co-Author:** Rui Alexandre Alves, University of Porto, Portugal

Intervention studies with school-aged writers provided sound evidence on the importance of planning to produce good writing. However, little research has focused on planning effects on expert writing. This was the main goal of the present study, in which we examined the effects of planning on the writing process (assessed through directed retrospection and interference in reactions times; Kellogg, 1988) and the written product. Forty-two undergraduates were randomly assigned to a no planning or outline condition. Before writing an argumentative text, the no-planning group did a filler task, whereas the outline group filled out a graphic organizer with major argumentation parts (10 min). During writing (20-25 min), participants reacted to beeps and choose a label describing the ongoing activity, among planning, translating, and revising. Results showed that planning influenced writing processes occurrences, but not cognitive effort. Translating was more frequently activated in the outline than in the no-planning group. Additionally, there was a decrease in planning occurrences paralleled by an increase in revising occurrences that happened in an early stage of composition in the no-planning group, but in a later stage of composition in the outline group. Results also showed that the outline group produced more words per minute, as well as longer and better texts than the no-planning group. Overall, using a structured plan before writing influences writing dynamics and improves text quality. These findings confirm the importance of promoting students' planning skills and giving them time to enact these skills before writing.

Modelling the effectiveness of peer review comments

Keywords: Computer-assisted learning, Language (Foreign and second), Peer interaction, Writing / Literacy

Presenting Author: Djuddah Leijen, University of Tartu, Estonia

Technological advances have made the application of peer feedback in the L2 writing context more accessible. Web-based tools such as blogs, wikis, and web-based peer review systems, such as MyReviewers, are more frequently used in writing classrooms. The main aim of these applications is to engage students in peer review activities. As web-based peer review systems systematically collect student generated data, new research methods able to investigate the data systematically are needed. These methods should specifically focus on the development of taxonomies measuring different aspects of the writing process that can be replicated on different sets of data using methods such as NLP and machine learning (Crossley, 2013). This study applies machine learning as a novel method on a large set of web-based generated data of L2 writers using peer feedback using a web-based peer review system (SWoRD) to support the development of their text over a number of drafts to better understand how L2 writers conduct peer feedback activities by looking at the types and the traits of the feedback they provide and how these may influence revisions made in subsequent drafts.

Session K 23

1 September 2017 08:30 - 10:00

Main Building D - D14

Single Paper

Higher Education, Learning and Instructional Technology, Learning and Social Interaction

Argumentation, Dialogue and Reasoning - B

Keywords: Argumentation, Collaborative Learning, Computer-supported collaborative learning, Conversation / Discourse analysis, E-learning / Online learning, Educational Psychology, Higher education, Literacy, Mathematics, Qualitative methods, Science education, Secondary education, Teacher Professional Development

Interest group: SIG 26 - Argumentation, Dialogue and Reasoning

Chairperson: Pamela Paek, United States

Analysing student argumentation in lower secondary mathematics and science

Keywords: Argumentation, Mathematics, Qualitative methods, Science education

Presenting Author: Jenna Hiltunen, University of Jyväskylä, Finland; **Presenting Author:** Kaisa Jokiranta, University of Jyväskylä, Finland; **Co-Author:** Jouni Viiri, University of Jyväskylä, Finland; **Co-Author:** Markus Hähkiöniemi, University of Jyväskylä, Finland; **Co-Author:** Pasi Nieminen, University of Jyväskylä, Finland; **Co-Author:** Sami Lehesvuori, University of Jyväskylä, Finland

This proposal introduces the pilot phase of a longitudinal research project on dialogic argumentation in lower secondary physics and mathematics education. During 2015-2016, argumentation tasks together with instructional approaches enabling classroom argumentation were developed. Also, a qualitative method of analysis covering the structure, content and dialogic aspects of student argumentation was composed by combining elements from prior studies. The argumentation tasks, teaching approaches and analytical items were tested iteratively in a pilot study. We found that our method produces a plausible and diverse image of student argumentation where previous methods have covered single aspects of it.

In the analysed lessons, student argumentation was found to be diverse in quality with a majority of weak arguments without support or reasoning. The type of argumentation was typically non-dialogic with a student e.g. presenting an idea and others supporting it without critique or elaboration. All in all, students quite easily grabbed onto the first solution they got; discussing competing claims was rare. Further analysis will provide us with a comprehensive image of classroom argumentation, and also give us valuable information on how argumentation should be implemented into mathematics and science instruction. This knowledge is valuable for both the theory and practice of argumentation in education, and will be passed on to schools through teacher education (pre- and in-service) and complimentary online teaching materials.

Upper secondary school students' abilities to question the credibility of Internet sources

Keywords: Argumentation, E-learning / Online learning, Literacy, Secondary education

Presenting Author: Miika Marttunen, University of Jyväskylä, Finland; **Co-Author:** Timo Salminen, University of Jyväskylä, Finland; **Co-Author:** Carita Kiili, University of Oslo, Norway

This study explores upper secondary school students' abilities to evaluate the credibility of internet sources and justify their critical evaluations, and whether students' performance in critical evaluation tasks can be explained by gender, prior knowledge, and grades in language arts and health science. In the study, 180 students were asked to evaluate the credibility of two internet sources (a blog text and a YouTube video) dealing with vaccination of children from opposite perspectives, and to justify their evaluations. The students' justifications were analyzed for trustworthiness and expertise. For the blog text, 5 % of the students did not question the credibility of the source at all. When they questioned the credibility, they either did not present any justifications for their critical evaluation or justified it only narrowly (55.6 %). The corresponding proportions for the video were 10 and 61.7. Students performed in the critical evaluation task for the blog text better than in the task for the video. Multiple linear regression analyses showed that the background variables explained only 7.2 % of the students' performance in the critical evaluation task for the blog text. For the video, the corresponding result was 5.6 %. The study suggests that students need more practice in justifying their critical evaluations of online sources, and that current school teaching in language arts and health science does not support the development of skills students need when they work with knowledge found from the internet.

Sequencing and fading worked examples and collaboration scripts to foster mathematical argumentation

Keywords: Argumentation, Collaborative Learning, Higher education, Mathematics

Presenting Author: Freydis Vogel, Technical University of Munich (TUM), Germany; **Co-Author:** Matthias Schwaighofer, Ludwig-Maximilians-Universität (LMU), Germany; **Co-Author:** Ingo Kollar, University of Augsburg, Germany; **Co-Author:** Anselm Strohmaier, Technische Universität München (TUM), Germany; **Co-Author:** Sarah Ottinger, Ludwig-Maximilians-Universität (LMU), Germany; **Co-Author:** Ilka Terwedow, Ludwig-Maximilians-Universität (LMU), Germany; **Co-Author:** Kristina Reiss, Technische Universität München (TUM), Germany; **Co-Author:** Frank Fischer, Ludwig-Maximilians-Universität (LMU), Germany

Combining heuristic worked examples and collaboration scripts might be a promising approach to foster mathematical argumentation skills (MAS). However, little is known about the role of the sequence of introducing both scaffolds and the fading of the primarily introduced scaffold when collaboration scripts are used together with heuristic worked examples. Furthermore, the influence of some potential moderators such as working memory capacity has been neglected so far. Our study investigated the effects of the sequence of introducing scaffolds (heuristic worked example first vs. collaboration script first) and the fading out of the primarily introduced scaffold (fading out vs. no fading out) on the dialogic and dialectic component of MAS. In addition, we explored how different learning prerequisites (e.g., prior knowledge; working memory capacity) affect the results. Overall, $N = 110$ participants worked in dyads on mathematical proof tasks in four treatment sessions. Results showed a positive main effect for the fading of scaffolds on the dialogic component of MAS. With respect to the dialectical component of MAS, we found that learners with low working memory capacity benefitted the most when the script was primarily introduced, but then faded. Results suggest how learning environments can be designed with two different scaffolding approaches, in particular for students with differences in their working memory capacity.

argumentApp: The use of a tablet-supported software to promote and sustain classroom argumentation.

Keywords: Computer-supported collaborative learning, Conversation / Discourse analysis, Educational Psychology, Teacher Professional Development

Presenting Author: Antonia Larrain, Universidad Alberto Hurtado, Chile; **Co-Author:** Patricia Lopez, Universidad Alberto Hurtado, Chile; **Co-Author:** Jorge Pinochet, Universidad Alberto Hurtado, Chile; **Co-Author:** Katherine Strasser, Pontificia Universidad Católica de Chile, Chile; **Co-Author:** Christine Howe, University of Cambridge, United Kingdom; **Co-Author:** Selma Leitao, Universidad Federal de Pernambuco, Brazil; **Co-Author:** Elizabeth Plé, Université de Reims Champagne-Ardenne, France

The pedagogical use of argumentation has been shown to have benefits for reasoning development and concept learning. However, argumentation is rarely found in classrooms. We conducted a study whose aim was to evaluate the use of tablet-driven software (TDS) –argumentApp— especially designed to scaffold the leading role of teachers in promoting classroom argumentation. Twenty-one classes (4th grade) and teachers participated in the study under one of three conditions: TDS (7), lesson plans without technology (8, WTG) and control group (6, CG). Lesson plans of both technology and WTG conditions were developed to enhance argumentation in the teaching of Forces. Students were measured on content knowledge and argumentation skills pre- and post-intervention. Four classes were videotaped: one baseline and three during the Unit. We analyse the videos using a coding scheme specially developed to identify classroom argumentation. We conducted ANOVA repeated measures and non-parametric test (U-Mann Whitney) to evaluate differences across conditions. Results showed statistical significant differences between conditions: while all classrooms started at the baseline showing no differences in the total frequency of argumentative utterances, TDS and paper-supported classes showed significantly more argumentation at lesson 1. Implications to educational research and pedagogical practice are discussed.

Session K 24

1 September 2017 08:30 - 10:00

Main Building A - A4

Symposium

Higher Education

The Intersection between Depth and the Regulation of Strategy Use

Keywords: Cognitive skills, Educational Psychology, Higher education, Learning approaches, Motivation, Science education, Student learning

Interest group: SIG 04 - Higher Education

Chairperson: Luke K. Fryer, The University of Hong Kong, Hong Kong

Organiser: Daniel Dinsmore, University of North Florida, United States

Organiser: Luke K. Fryer, The University of Hong Kong, Hong Kong

Discussant: Patricia A. Alexander, University of Maryland, United States

While much is known about how levels of processing (e.g., Cano, 2007) and metacognitive strategy use influence performance (e.g., Dunlosky, Serra, Matvey, & Rawson, 2005), less is known how these types of strategies interact with each other. The interrelations between depth of strategies and metacognition/self-regulation of strategies are particularly salient for two reasons. First, there appear to be mediating and moderating effects in the relations between levels of processing and performance (e.g., Dinsmore & Alexander, 2016) and the relations between metacognitive strategy use and performance (e.g., Coiro & Dobler, 2007). Second, cognitive strategy training appears to be ineffective without additional metacognitive training (Pintrich, 2002). The current symposium seeks to extend previous work in this area with four studies examining students' strategies at both the pattern and process level and with large- (SEM and Latent Profile Analysis) to small-scale (think-aloud and eye tracking) research designs. Paper-1 employed a mixed-method design to examine cognitive/meta-cognitive strategies during an earth climate simulation task with college students. Paper-2 utilised eye tracking with short study tasks and surveys, aimed at triangulating students' approaches to learning and self-regulation behaviours. Paper-3 conducted path modelling with think-aloud protocol data, testing the interconnections between students' on task cognitive/meta-cognitive strategies and learning outcomes. Paper-4 integrated and examined students' processing and regulation strategies through Latent Profile Analysis of self-reported data from institutions in five countries. An internationally renowned discussant on the topic will synthesize these issues theoretically and empirically and then facilitate discussion.

The Relations between Strategic and Metacognitive Processing During Science Simulations

Presenting Author: Daniel Dinsmore, University of North Florida, United States; **Co-Author:** Brian Zoellner, University of North Florida, United States

This investigation was designed to uncover the relations between students' cognitive and metacognitive strategies used during a complex Earth climate simulation. While cognitive strategy use during science inquiry has been studied, the factors related to this strategy use, such as concurrent metacognition, prior knowledge, and prior interest have not. Data collection is underway and we anticipate having 70 participants with data, with 25 already collected and partially analyzed. Measures for the study included a survey used to gather demographics, prior knowledge and interest, video recordings of participants' strategic processing through think-aloud protocols, as well as their model of Earth's climate dynamics using an open-ended survey response. Three main findings have emerged following the preliminary analysis – participants engaged in a control of variables or a history-cued strategy, as demonstrated in previous literature, trended toward more concurrent metacognitive strategy use with the history-cued strategy than the control of variables strategies. While there was a general trend toward those with more prior knowledge using the history-cued strategies, this finding was somewhat mixed there were notable exceptions as to how prior knowledge and interest emerged during this simulation. Implications, particularly for theoretical contributions are discussed.

Triangulating online and offline measures to explore students' processing strategies

Presenting Author: Leen Catrysse, University of Antwerp, Belgium; **Co-Author:** David Gijbels, University of Antwerp, Belgium; **Co-Author:** Vincent Donche, University of Antwerpen, Belgium; **Co-Author:** Marije Lestherhuis, University of Antwerp, Belgium

This paper starts from the observation that research in which objective process tracking measures are adopted to uncover differences in processing strategies is currently lacking within the Student Approaches to Learning (SAL) field. In this paper, we will therefore use eye tracking in combination with the often-used self-report measures (questionnaires and cued recalls) to operationalize and triangulate processing and strategies. Therefore the Inventory of Learning Styles – Short version (Donche & Van Petegem, 2008) questionnaire was administered to 230 higher education freshman in social sciences. In order to allow for a restricted sample of students, 40 volunteers out of the total group were purposeful selected (based on their general preferences). In a next step, students were asked to study three short study tasks (\pm 400 words) on positive psychology while eye tracking is used to register their learning and reading behavior. Afterwards a cued recall was conducted on the last text. Next to that, students working memory capacity and topic interest were measured as well as their regulation strategies when learning. Results indicate that in the early phase of processing texts, no clear differences exist between students with a different generic learning profile. In the delayed processing of the texts, students with all high and surface learning profiles processed the text longer in comparison with students with an all low learning profile. Results

indicate that self-regulated learners, scoring high on deep processing strategies, need less time to process the texts and process them more efficiently.

Monitoring and Depth of Strategy Use in Computer-Based Learning Environments for Science and History

Presenting Author: Nikki Lobczowski, University of North Carolina at Chapel Hill, United States; **Co-Author:** Jeff Greene, University of North Carolina, United States; **Co-Author:** Victor Deekens, University of North Carolina at Chapel Hill, United States

Both the metacognitive processes described by self-regulated learning and cognitive strategy use have been shown to predict student learning. However, less is known about how these metacognitive processes and the kinds of strategies that are employed (e.g., deep vs. surface level) interact to influence learning. We conducted a secondary data analysis of existing think-aloud protocol data from two data sets to investigate relationships among the frequency of monitoring, utilization of both deep and surface level strategies, and academic performance. In both studies, participants engaged in a learning task within a computer-based learning environment. The first data set was gathered from college students learning about a science topic, and the second from high school students learning about a history topic. Using structural equation modeling and path analysis, we found consistent results indicating the frequency of monitoring was positively related to the frequency of deep strategy use. Further, the utilization of deep level strategies positively predicted performance on outcome measures in both studies, above and beyond the effect of prior knowledge. These findings have implications for how to investigate theories of self-regulated learning, as well as implications for helping students more effectively utilize computer based learning environments.

Bridging cross-cultural perspectives on how students study and learn university course materials

Presenting Author: Jan Vermunt, University of Cambridge, United Kingdom; **Co-Author:** Vincent Donche, Universiteit Antwerpen, Belgium; **Co-Author:** Yu Ji, Cambridge University, United Kingdom; **Co-Author:** Jose Reinaldo Martinez-Fernandez, Autonomous University of Barcelona, Spain; **Co-Author:** Clara Ajisuksmo, Atma Jaya Catholic University of Indonesia, Indonesia; **Co-Author:** Daniel Law Chung S Law Chung Sea, Council on Law in Higher Education, Hong Kong; **Co-Author:** Luke Fryer, The University of Hong Kong, Hong Kong

Studying/learning strategies are an essential part of the university experience and lifelong learning. How an individual studies/manages/organises (i.e., regulates) new materials and then how s/he goes about learning (i.e., processing) that material each, separately and intertwined have lasting effect on students' learning outcomes. Despite their importance and a general understanding of study/learning strategies respective roles, their interplay is poorly understood. Further to this point, what we do know chiefly arises from research in Western contexts. The current study therefore aims to begin to address both of these gaps by undertaking a person-centred study with six samples from two Western and three Asian-pacific countries. Higher education students from Belgium, Spain, Indonesia, Hong Kong and Mainland China participated. All students completed the inventory of learning styles, from which scales measuring students' process and regulation were extracted and analysed: Relating, Critical processing, Memorising, Analysing, Concrete processing, Self-regulation, External-regulation, and Lack-of-regulation. Latent Profile Analysis of these strategies with each sample resulted in three sub-groups for five samples and two subgroups for one sample as fitting the data best. Profiles presented theoretically consistent alignment (deep-processing/self-regulation and surface-processing/lack-of-regulation) with each profile. Sub-group profiles generally ranged across a continuum of adaptive (deep-processing/self-regulation) to less adaptive (surface-processing/lack-of-regulation), while exhibiting context/culturally-specific patterns of study/learning strategies. Culturally specific patterns exhibited themselves as reliance on a specific type of processing or regulation, or in some cases a pair of strategies. Implications for theory and practice will be discussed.

Session K 25

1 September 2017 08:30 - 10:00

Pinni B - B1100

Symposium

Instructional Design

How to Optimize Example-Based Learning?

Keywords: Computer-assisted learning, Educational Psychology, Experimental studies, Instructional design

Interest group: SIG 06 - Instructional Design

Chairperson: Julian Roelle, Bielefeld University, Germany

Discussant: Katharina Scheiter, Leibniz-Institut für Wissensmedien, Germany

Example-based learning is a widely-used and highly effective instructional approach to introduce learners to new content. Nevertheless, it is not always equally effective; rather, its effectiveness depends on various design factors. The aim of this symposium is to extend our knowledge regarding these factors and thus to contribute to further optimizing the example-based learning approach. Contribution 1 deals with the question as to whether the effectiveness of example-based learning can be increased by prompting learners to deeply process instructional explanations, which are typically provided before learners receive examples to communicate basic declarative knowledge regarding new content. Contribution 2 views example-based learning through the lens of category induction and discrimination learning and tests how learners can be supported in distinguishing easy to confuse principles by presenting examples in specific sequences (i.e., blocking,

interleaving, comparison, and contrast). Contribution 3 links research on example-based learning to the teaching-on-video approach and tests whether the effectiveness of worked examples can be enhanced by requiring learners to teach the content of an example to a fictitious peer on video. Contribution 4 investigates example-based learning in the context of the productive failure approach. Specifically, the authors explore whether two types of examples (modeling examples vs. worked examples) differ in terms of their potential to prepare learners for learning from subsequent instruction. The different theoretical perspectives and the sound design of the (quasi-)experiments of the contributions indicate that the symposium will point to fruitful conclusions that are relevant for both research on example-based learning and educational practice.

Fostering Learning From Examples by Prompting Organization Processes

Presenting Author:Sara Hiller, Bielefeld University, Germany; **Co-Author:**Julian Roelle, Bielefeld University, Germany; **Co-Author:**Kirsten Berthold, University of Bielefeld, Germany; **Co-Author:**Stefan Rumann, University of Duisburg-Essen, Germany

In example-based learning, learners usually receive instructional explanations introducing new concepts and principles in a first step and examples referring to those explanations in a second step. For learners to succeed in gaining knowledge, it is critical that they generate principle-based self-explanations; that is, they should explain the examples by using the knowledge components of the instructional explanations. However, prompting only principle-based self-explanations might be suboptimal because generating these self-explanations does not necessarily entail that learners process the knowledge components of the instructional explanations in an integrated manner and thus form a coherent mental representation of the instructional explanations' content. Against this background, in two experiments with high school students ($N_1 = 128$, $N_2 = 95$), one of them a replication study, we investigated whether prompting learners to organize the content of the instructional explanations before providing examples (and self-explanation prompts) enhances the effectiveness of example-based learning. As main results, we consistently found that prompting learners to organize the content of the instructional explanations fostered learning irrespective of whether learners also received principle-based self-explanation prompts. We conclude that in addition to prompting principle-based self-explanations, organization of the content of the instructional explanations should be prompted as well in example-based learning.

Sequencing Worked Examples: Effects of Blocking, Interleaving, Comparison, and Contrast

Presenting Author:Lennart Schalk, ETH Zurich, Switzerland; **Co-Author:**Julian Roelle, Bielefeld University, Germany; **Co-Author:**Henrik Saalbach, University of Leipzig, Germany; **Co-Author:**Kirsten Berthold, University of Bielefeld, Germany; **Co-Author:**Elsbeth Stern, ETH Zurich, Switzerland; **Co-Author:**Alexander Renkl, University of Freiburg, Germany

Worked examples are by themselves an effective approach to support learning. However, especially if they are used to introduce learners to new concepts or principles that learners tend to confuse, specific ways of sequencing worked examples influence their effectiveness. Worked examples can introduce principles either in an ordered (e.g., first, all worked examples for principle X, then all for principle Y) or an intermixed sequence (e.g., one worked example for principle X followed by a worked example for principle Y). Furthermore, multiple worked examples can either be presented individually in a sequence or simultaneously. In accordance with the literature, the resulting four different sequences can be labeled as blocking (individual/ordered), interleaving (individual/intermixed), comparison (multiple/ordered), and contrast (multiple/intermixed). We tested how these sequences benefit the acquisition of procedural and conceptual knowledge in an experimental study (2x2 factorial design) with university students ($N=174$) who were introduced to four different mathematic, stochastic principles. While blocking turned out to be the least effective sequence, comparison and contrast benefitted procedural knowledge. The acquisition of conceptual knowledge benefitted from interleaving and contrast. Mediation analyses indicate that these effects are related to different foci and qualities of the self-explanations generated by the participants during learning. Thus, specific sequences improve the processing of worked examples and the resulting learning outcome.

Learning From and By Example

Presenting Author:Vincent Hoogerheide, Utrecht University, Netherlands; **Co-Author:**Tamara Van Gog, Utrecht University, Netherlands; **Co-Author:**Alexander Renkl, University of Freiburg, Germany; **Co-Author:**Logan Fiorella, University of Georgia, United States; **Co-Author:**Fred Paas, Erasmus University Rotterdam/University of Wollongong, Netherlands

For novices, example-based learning in which example study and practice problem solving are alternated, is a more effective and efficient instructional strategy for learning problem-solving skills than engaging in practice problem solving only. The present experiment investigated whether the effectiveness of example-based learning can be enhanced further by making use of teaching on video. Recent findings have shown that teaching learned materials to a fictitious peer on video consistently leads to better learning outcomes than restudy (e.g., Fiorella & Mayer, 2014; Hoogerheide et al., 2016). University students ($N=61$) first received two worked examples and a practice problem, and then either taught the content of a worked example on video (teaching condition) or studied that example (control condition). Time on task was kept constant. On the posttest, those in the teaching condition outperformed those in the control condition on both isomorphic and transfer tasks. We also collected physiological data (i.e., blood volume pulse, electrodermal activity) which are currently being analyzed to determine whether these beneficial effects of teaching on video are in part a result of greater levels of arousal, and follow-up studies will address the extent to which arousal is affected by awareness of the potential

audience.

Productive or Vicarious Failure: Do Students Need to Make Every Mistake by Themselves?

Presenting Author:Christian Hartmann, Ruhr University Bochum, Germany; **Co-Author:**Nikol Rummel, Ruhr University Bochum, Institute of Educational Research, Germany; **Co-Author:**Tamara Van Gog, Utrecht University, Netherlands

Studies on the Productive Failure (PF) approach have demonstrated that prompting students to solve a problem before they get instruction about its solution, aids their learning more than getting instruction first, even if they mostly fail at solving the problem (Loibl, Roll, & Rummel, 2016; Kapur, 2014). Although students initially fail, they are engaged in actively generating intuitive ideas using their prior knowledge, which makes them more receptive to the subsequent instruction, as evidenced by higher conceptual understanding (Loibl et al., 2016). However, it is still unclear which activities during the initial problem-solving phase best prepare students for gaining from the subsequent instruction. Specifically, the importance of generating own solutions and experiencing failure for oneself can be questioned. It can be hypothesized that vicarious learning from examples of other students' engaging in PF might be as effective for preparing students for the subsequent instruction. Therefore, in a quasi-experimental study with 75 students, we compared four conditions of implementing the problem-solving phase: 1) own problem-solving (PF), 2) studying video modeling examples (ME) of another student's problem-solving, 3) studying worked examples (WE) of another student's problem-solving, and 4) getting direct instruction (DI). Results indicate that problem-solving and generating of own solutions was more effective for students' conceptual understanding than all other conditions, but ME also outperformed the DI condition. Thus, by bringing together example-based learning and the PF approach, we can study essential learning mechanisms of PF.

Session K 26

1 September 2017 08:30 - 10:00

Main Building C - C6

Invited Symposium

Instructional Design

Learning with dynamic media in formal and informal contexts

Keywords: Communities of learners, Comprehension of text and graphics, Computer-assisted learning, E-learning / Online learning, Experimental studies, Informal learning, Instructional design, Multimedia learning, Self-efficacy

Interest group: SIG 02 - Comprehension of Text and Graphics

Chairperson: Mireille Betrancourt, University of Geneva, Switzerland

Organiser: Mireille Betrancourt, University of Geneva, Switzerland

Organiser: Juliette Désiron, University of Geneva, Switzerland

Discussant: Huib Tabbers, Erasmus University Rotterdam, Netherlands

Dynamic visualizations of all kinds – computer animations, videos, screen captures – have become extremely popular in formal instructional materials as well as in informal learning contexts. Although the findings of meta-analyses show that dynamic visualizations are overall superior to static graphics (Hoeffler and Leutner, 2007; Berney & Betrancourt, 2016), there are many cases where they do not improve learning. The multimedia literature has unravelled several influential factors pertaining to individual differences (visuospatial ability, previous knowledge), instructional tasks (e.g., drawing, demonstrating or just viewing) and information design (e.g., cueing, accompanying text pauses). This symposium explores the following questions: how to help learners to adequately observe the dynamic visualizations and extract the relevant information? How to support the construction of relevant cognitive representations? More generally, how and why people learn from dynamic visualizations? The four contributions examine learning from dynamic visualizations of diverse semiotic natures (video, computer animation, video of computer demonstration and combination of video and animation) and for different learning purposes (procedural learning and conceptual understanding). The first two presentations from van der Meij and Merkt & Schwan investigate instructional features embedded in the visualization (previews and pauses respectively) while the presentation from Lowe & Boucheix explores the impact of the instructional task by asking learners to demonstrate the functioning of a mechanical device on a physical model. The last presentation by Erica de Vries offers an overview of the different theoretical frameworks that could open new avenues for the research on dynamic visualizations.

Investigating the effectiveness of Demonstration-Based Training (DBT) videos for Chinese students

Presenting Author:Hans van der Meij, University of Twente, Netherlands

The present study investigated a Demonstration-Based Training (DBT) approach for constructing a video tutorial for software training. DBT attempts to optimize learning, by enhancing a model of task performance with instructional features that are linked to observational processes. There were two conditions in the experiment. In the control condition, the videos consisted of DBT-enhanced demonstrations of task performances. In the experimental condition, these were preceded by concise dynamic summaries (i.e., previews). The study assessed the development of the participants' self-efficacy (the belief in one's capacity to organize and execute the actions necessary to manage particular task outcomes) and their task performance success. Participants were 61 students (11.8 years) from a middle school in Shanghai, China. Self-efficacy was measured with a questionnaire administered before and after training. Task performance was measured with four similar tests (i.e., pre-test, practice during training, immediate and delayed post-test). The findings revealed that

training raised the participants' self-efficacy. No effect of condition was found. Task performances significantly improved from pre-test to training, dropped on the immediate post-test (but remained higher than on the pre-test) and raised significantly again on the delayed post-test. Comparisons between conditions revealed a significant effect of condition for the gain scores from pre-test to practice and from pre-test to delayed post-test. The discussion draws attention to issues of audience characteristics, post-test findings and preview effects.

Does the frequency of pauses in videos affect learning?

Presenting Author:Martin Merkt, Leibniz-Institut für Wissensmedien, Germany; **Co-Author:**Stephan Schwan, Leibniz - Institut für Wissensmedien, Germany

Various studies demonstrated the beneficial effects of pauses in videos on learning. On the backdrop of the Event Horizon Model (Radvansky, 2012), this experiment tested whether the frequency of pauses affects learning by providing more segmented learning materials when keeping the overall duration of the pauses constant. Seventy- three participants were randomly assigned to watch an educational video about acoustics either with 24 (many) pauses, 12 (few), or no pauses. The hypothesis that more pauses result in superior learning outcomes was neither confirmed for retention, nor for transfer. We discuss these findings focusing on the format of our knowledge test as well as on the characteristics of the learning materials.

Demonstration as an aid to learning from animation

Presenting Author:Richard Lowe, Curtin University, Australia; **Co-Author:**Jean-Michel Boucheix, University of Dijon, LEAD-CNRS, France

The effectiveness of requiring learners to generate operational demonstrations while viewing an animation of a working mechanism was explored as a means of improving their animation processing. We assumed that the demonstration requirement would enhance learner extraction of key dynamic information needed for building a high quality mental model. It is expected that compared with note-taking controls, those in the demonstration group will give more attention to the spatiotemporal relationships amongst the mechanism's components. This would result in these participants exhibiting superior scores on a test of mental model quality were attributed to the effect on their animation processing of having to 'act-out' of the mechanism's dynamics.

Complementing theoretical frames for understanding global how-to-video-sharing

Presenting Author:Erica de Vries, Université Grenoble Alpes, France

Nowadays, upon encountering a problem, more and more people search for instructional videos on the internet. By typing the words "How to" in a search engine, followed by "install", "do", "use", "fix", "make", or "learn", a wealth of videos comes up for a variety of cognitive and motor tasks. This contribution to the Invited Symposium presents a number of different complementary theoretical frames which can be used to shed light on this contemporary phenomenon. These frames focus on the type of 1) knowledge, 2) media, 3) learning, 4) instruction, and 5) cultural transmission involved in global how-to-video-sharing. We then explore opportunities for cross-fertilization in the study of global how-to-video-sharing.

Session K 27

1 September 2017 08:30 - 10:00

Main Building A - A3

Invited Symposium

Teaching and Teacher Education

Practice-based practitioner research in education

Keywords: Action research, Culture, In-service teacher education, Interdisciplinary, Knowledge creation, Mixed-method research, Peer interaction, Pre-service teacher education, Professions and applied sciences, Social interaction, Synergies between learning - teaching and research, Teacher Professional Development, Teaching / instruction

Interest group:

Chairperson: Sirpa Laitinen-Väänänen, JAMK University of Applied Sciences, Finland

Organiser: Sirpa Laitinen-Väänänen, JAMK University of Applied Sciences, Finland

Discussant: Filip Dochy, KU LEUVEN, Belgium

OECD (2002) defines research as follows: "Research and experimental development comprise creative work undertaken on a systematic basis in order to increase the stock of knowledge including knowledge of man, culture and society, and the use of this stock of knowledge to devise new applications". Following the OECD's statement, our Practice-based Practitioner Research in Education –symposium aims to discuss and elaborate, with examples given by experts and researchers from the field, the role, actors, methods in use, benefits and feasibility the practice-based perspective brings to research in educational science. In 2006, a group of researchers in EARLI found it necessary to facilitate the research that contributes to practice. They founded EAPRIL: the European Association for Practitioner Research on Improving Learning. Within that association, researchers and practitioners interested in practice-based or practice-oriented research on formal, informal and on corporate learning areas have collaborated and networked.

The role of research in teacher education

Presenting Author:Kari Smith, Norwegian University of Science and Technology, Norway

Research is a wide and complex concept and a major question concerns the purpose of research and its value in contributing to the development of new knowledge. Research in teacher education should be mainly (not only) practice-oriented research. Practice-oriented is not the same as practice-based, the latter can be perceived that all research is based in practice. Practice-oriented research on the other hand, is that it is relevant for the practice field. Practice-oriented research is research that aims at supporting decisions or at developing new knowledge that contribute to solving a practical problem (Bleijenbergh et al, 2011). In practice oriented research the researchers are often, yet not always, the practitioners themselves, either they are teacher educators, teachers in school or students of teaching, and there are close links between practice-oriented and practitioner research. Common characteristics for practitioner research are according to Cochran-Smith & Lytle (2009, 39) that the practitioner is the researcher, and it is assumed that there are close links between knowledge, knowers and knowing. The contexts for study are professional practice, which frames communities of practice and collaboration, and as such there are sometimes blurred boundaries between inquiry and practice. Practitioner research differs from positivistic research in that it has to develop new conceptions of validity and generalizability, but the rigour related to systematic data collection and analysis cannot be questioned. Finally, according to Cochran-Smith & Lytle (2009), practitioner research needs to be published beyond the local contexts and become subject to public and academic critique.

Educators' professional development in Flanders: Practitioner research, a promising strategy

Presenting Author:Ruben Vanderlinde, Ghent University, Belgium; **Co-Author:**Hanne Tack, Ghent University, Belgium

Given the specific nature of teacher educators' work and the clearly related demand of developing one's role as a teacher educator-researcher (Lunenberg et al., 2014), practitioner research is often promoted as a promising strategy. Practitioner research – the systematic and intentional study into one's own practice (Cochran-Smith & Lytle, 2009) – has the twofold goal of (1) improving one's practice and knowledge about teacher education, and (2) contributing to the broader knowledge base on teacher education. Addressing the need for research on the relationship between professional development activities and learning outcomes of teacher educators, this presentation discusses the impact of an intervention on teacher educators' professional development. The study fits within an intervention mixed method framework (Creswell, 2003). Twenty-five Flemish teacher educators participated in a one-year intervention on practitioner research. Quantitative and qualitative data were collected to explore the impact of the intervention on teacher educators' professional development, conceptualized as the development of a researchy disposition (Tack & Vanderlinde, 2014; 2016a; 2016b). After participation, teacher educators indicate that they use more research to inform their own and colleagues teaching practices; that they now conduct research into their own practices. Moreover, they also value their role as a researcher more positively, and are now able to assess their own capabilities as a teacher educator-researcher more accurately. Finally, most participants already believed in the importance of research in general, but the specific need of practitioner research to improve their own practice as a teacher educator, only emerged at the end of the intervention.

Practice-based and practitioner research in social science e.g. education is of a different nature

Presenting Author:Frank De Jong, Aeres University of Applied Sciences, Netherlands

Practice based or oriented research aims at improving practice in collective co-creating knowledge with practitioners, contributing to their wisdom inspired by the ecology of the practice and being aware of the narrativity of the research and researcher. Developing knowledge is understanding the interconnected relations between phenomena. Science is thoroughly a social activity and a process of meaning making by 'actanten' (Latour, 2005). Also Heikkinen, de Jong, & Vanderlinde (2016) made a distinction between episteme (the spectators knowledge), techné and praxis (practitioners knowledge) as different types of social constructed knowledge. Concluded was that practitioner research needs different methodology in the endless process of meaning making and negotiation (validation process in practitioner and social sciences) versus the corresponding between fact and 'outside world' (validity process in the natural sciences). Practice oriented and Practitioner research takes distance to research that aims to find the truth. A truth which is mostly determined by the question/hypothesis and its subsequent evidence (Foucault, Referred by Fendler, 2010)). Practitioners research moves towards Foucault's inquiring of the inter-relation between subject, object and truth, how they implicate each other and the analysis of the implicit power relations. Theory however is not reality. We present a research concerning 'learning in and with the region' as a pedagogical school approach of three schools in the North of the Netherlands. We try to show the narrativity how we tried to realize co-creation in finding the interrelation between subject, object and 'truth', and our role as researchers in this process.

Interaction as the locus (for the observation) of practice - an example

Presenting Author:Gudrun Ziegler, multi-LEARN Institute, Luxembourg

In order to investigate development, learning or teaching, various settings for analysis can be and have been defined. Yet, actual interaction and the in-depth in-situ observation of such interactions is key to understanding practices, in terms of professional action (e.g. teachers, agents) but also in terms of learning as practice (Lave/Wenger, 1995). Following these lines of thought, the project "tecpart [takepart] — "Luxembourg: your country - my country: using participative technology to construct mutual images of Luxembourg" puts interactions between newcomers and Luxembourgish youngsters at the center of the research. More specifically, the project aims at letting young people (age: 14 to 18) (re-)discover, share, discuss and construct sites within Luxembourg (e.g. geographical, historical, cultural) via technological mediation, i.e. ipads.

The observation, re-discussion and objects of interaction are key to the project as they allow for analysing the practices which are deployed by the participants in the project. In the detail, there levels are assessed (cf. transformation): firstly, the level of action and mutual engagement is documented and analyzed in terms of quality of interactions, type of interaction (e.g., verbal, gesture, facial) and quantification of efforts to engage in cooperation in terms of (efficient) mutual creation (i.e., result of jointly produced images); secondly, the level sharedness is assessed as regards concrete vs. abstract level of explanations, presentations and building on a interactional partners ideas, formulations and imagery; finally, the project aims at describing the potential of transformation for the individual, the group and the society at large.

Session L 1

1 September 2017 10:15 - 11:45

Pinni B - B4117

Symposium

Developmental Aspects of Instruction

Learning to read across languages and writing systems: Implications for education

Keywords: Bilingual education, Language (Foreign and second), Language (L1/Standard Language), Literacy, Primary education

Interest group: SIG 05 - Learning and Development in Early Childhood

Chairperson: Ludo Verhoeven, Radboud University Nijmegen, Netherlands

Discussant: Charles Perfetti, University of Pittsburgh, United States

This symposium aims to uncover the universal and particular principles in learning to read across languages and writing systems in perspective of optimal reading instruction. In learning to read, children are confronted with the task of acquiring implicit knowledge of how a writing system works—how the written word reveals meaning through a layer of graphic forms. This layer of graphic forms has different properties across the world, classifiable typologically according to the levels of language the graphs represent: morphemes, syllables, and phonemes. All of these writing systems encode language in one way or another, often mixing levels. This symposium considers this variability in written language and its impact on learning to read. Operating principles for learning to read are posited to enable the processing of linguistic input and the organization or re-organization of stored representations in order for the learner to acquire implicit knowledge of how a given writing system relates to spoken language or a given linguistic system. In this symposium, the processes of learning to read are compared in four papers covering a broad variety of orthographies: Dutch, Finnish, Arabic, and Chinese. All of these papers show that learning to read is highly dependent on quality instruction that needs to be geared to the specific needs of the learner. In a final presentation, the universals and particulars in learning to read across languages and writing systems are evidenced and guidelines are provided for optimal reading instruction.

Learning to read Dutch as a transparent orthography

Presenting Author: Ludo Verhoeven, Radboud University Nijmegen, Netherlands

The present longitudinal study investigated the growth of word reading fluency in Dutch as a transparent orthography as a function of meaning (words vs pseudowords) and orthographic complexity throughout the elementary school years. For a representative sample of 511 Dutch children, decoding abilities for both words and pseudowords were assessed at four different orthographic complexity levels: (1) regular consonant-vowel-consonant (CVC), (2) complex monosyllabic with consonant clusters in prevocalic and postvocalic position, (3) bisyllabic, and (4) polysyllabic on two occasions in each school year (Grades 1-6). Besides, every year children's abilities in phonemic awareness (phoneme segmentation, phoneme deletion), phonological memory (pseudoword repetition), and rapid naming (picture, letters) were also assessed. The growth of decoding skills was found to be largely a matter of increased speed. Growth curve analyses showed a gradual curvilinear model to be superior to a step-model for all word decoding skills but not for pseudoword decoding skills for which a linear model better applied. Furthermore, the eight decoding measures showed strong longitudinal stability. In the early grades, the decoding measures showed a single underlying factor. However, over the years unique variance for words and pseudowords and orthographic complexity level also appeared. Overall, word reading fluency could be predicted from phonemic awareness, phonological memory, and rapid naming. It is concluded that the development of word reading fluency is fueled by phonological abilities, that it requires the learning of orthographic complexities, and that it is enhanced by context-based associations with meaning representations of words in the mental lexicon.

Learning to read and spell Finnish as a symmetrically transparent orthography

Presenting Author: Mikko Aro, University of Jyväskylä, Finland

The aim of the paper is to explore the features of the Finnish language and orthography and to examine early reading and spelling acquisition in Finnish, accordingly. The presented summary of the Finnish language focuses on Finnish phonology, morphology, and orthography. Finnish has a complex inflectional, agglutinative morphology, but the orthography is based on strict phonemic principle. On the morphemic level, Finnish orthography is transparent on the level of single letters. The basic decoding and spelling accuracy develop rapidly, and individual variation in reading skill after the early stages is reflected mostly as problems in reading rate. The development of reading and spelling accuracy are closely associated, and there are no signs of dissociation between word and pseudoword reading at the early stages of development. It can be concluded that the symmetrical transparency of the orthography facilitates the acquisition of both decoding and spelling

skills. From the instructional perspective, the advanced literacy levels of many children already at school entry requires attention to differentiation of early literacy instruction. The knowledge concerning the fluency development is still scarce and remains a challenge for future research in the Finnish context.

The Impact of Diglossia on Voweled and Unvoweled Word Reading in Arabic

Presenting Author:Elinor Saiegh-Haddad, Bar-Ilan University, Israel

The talk discusses the role of two factors on reading in Arabic orthography. The first is the orthographic structure of Arabic, specifically vowelization and the use of diacritics to map phonological information with the resultant regular relationship between the word's spelling and sound. The second is diglossia, specifically the lexical and lexico-phonological distance between the word's phonological form in the spoken language used in everyday speech and its form in Standard Arabic, the language of reading and writing. The paper reviews published research as well as research conducted by the author in order to evaluate the importance of these two sources of influence on word reading in Arabic. The research supports the implication of phonological processes in reading in voweled and unvoweled Arabic. At the same time, it shows that whereas vowelization, or the use of diacritics to map phonological information contributes to high rates of reading accuracy in voweled Arabic, it impedes the development of reading fluency, especially as vowelization is only used in the early grades and as the phonological information represented by diacritics may be recovered from the morphological structure of the word. The results also show that diglossia has a clear and consistent effect on reading accuracy and fluency across all the school grades and in both voweled and unvoweled Arabic. The results provide direct evidence of the effect of diglossia on word reading in Arabic. They also show that vowelization impedes rather than facilitates the development of reading efficiency.

Learning to read Chinese as a logographic orthography

Presenting Author:Xi Chen, OISE/University of Toronto, Canada

This paper has two purposes. First, it provides a detailed description of the Chinese language and orthography, including the linguistic system (phonology, morphology), the writing system, and literacy and schooling. Second, it discusses the contributions of phonological awareness, morphological awareness, and lexical-semantic knowledge to word reading and reading comprehension. Therefore, a comprehensive review was conducted to provide systematic evidence in the abovementioned areas. It is shown that the Chinese language and writing system have many unique features, which shape the development of metalinguistic awareness and reading skills in Chinese children. Moreover, phonological awareness, morphological awareness, and lexical-semantic knowledge are important for learning to read Chinese. Compared to alphabetic languages, morphological awareness may play a larger role in Chinese reading. The same metalinguistic skills, together with lexical-semantic knowledge, are important for text comprehension in Chinese children. It is concluded that learning to read in Chinese shares many similarities to that in alphabetic languages. On the other hand, there are many unique features determined by the characteristics of the Chinese language and orthography.

Session L 2

1 September 2017 10:15 - 11:45

Main Building C - C8

Symposium

Cognitive Science

Mathematical Flexibility in Three Countries: Comparative Results

Keywords: Cognitive skills, Comparative studies, Mathematics, Problem solving, Student learning

Interest group: SIG 03 - Conceptual Change

Chairperson: Jon Star, Harvard University, United States

Discussant: Mike Altieri, Germany

Mathematical flexibility, where solvers have knowledge of multiple strategies and the ability to select the most appropriate strategies for a given problem, is an important learning outcome in many countries. However, prior work on flexibility, particularly in the domain of algebra equation solving (e.g., Star & Seifert, 2006; Star & Rittle-Johnson, 2008), has indicated that students may have knowledge of multiple strategies without the ability to implement these strategies during problem solving. This finding, which is analogous to the distinction in psychology between competence and performance (Flavell & Wohlwill, 1969), has important educational implications for efforts to promote the development of flexibility among school-aged learners. In this symposium, researchers from the USA, Spain, and Finland offer the following contributions to the study of mathematical flexibility. First, we report on the development and validation of an instrument and assessment protocol for assessing flexibility, with particular emphasis on distinguishing between (what we refer to as) potential and practical flexibility. Second, we present results from the administration of this instrument to students in Finland, Spain, and China, focusing on commonalities and differences in the mathematical flexibility of middle school and high school students in these countries. Finally, a researcher from Germany offers summary remarks, including identifying important next steps – both theoretically and empirically – for understanding the development of mathematical flexibility.

Potential Flexibility and Practical Flexibility in Equation Solving

Presenting Author:Jon Star, Harvard University, United States; **Co-Author:**Le Xu, Beijing Normal University, China; **Co-**

Author:Ru-De Liu, Beijing Normal University, China; **Co-Author:**Jia Wang, Beijing Normal University, China; **Co-Author:**Ying Liu, Beijing Normal University, China; **Co-Author:**Rui Zhen, Beijing Normal University, China

Researchers interested in mathematical proficiency have recently begun to explore the development of strategy flexibility, where flexibility is defined as knowledge of multiple strategies for solving a problem and the ability to select the optimal strategy for a given problem solving circumstance. However, anecdotal findings from this literature indicate that students do not consistently use the optimal strategy for solving a given problem, even when these same students demonstrate knowledge of the optimal strategy. This distinction, sometimes framed in the psychological literature as competence versus performance – has not been previously studied for flexibility. In order to explore the competence/performance distinction in flexibility, here we develop and validate measures for *potential* flexibility (e.g., competence, or knowledge of strategies) and *practical* flexibility (e.g., performance, use of efficient strategies). 158 middle school students were asked to generate and evaluate multiple strategies for solving equations. Measures were found to have high reliability and validity; potential and practical flexibility were found to have distinct structures. Furthermore, results indicate that potential flexibility positively predicted practical flexibility.

Flexibility in linear equation solving by Spanish secondary students

Presenting Author:Nuria Joglar-Prieto, Complutense University of Madrid, Spain; **Co-Author:**Miguel Abánades, Universidad Rey Juan Carlos, Spain

For middle school students, solving linear equations in one variable is their first contact with abstract algebraic problems. Solving equations is not only essential for subsequent math courses but also to comprehend the nature of mathematics. Mathematical flexibility is understood as the ability to produce different strategies to solve a problem and to be able to distinguish the most effective. Equation solving, where multiple ways to solve an equation are often available, is a topic especially suitable for the study of flexibility. We present initial results of a study on the mathematical flexibility showed by 246 Spanish students solving linear equations in one variable. A total of 164 eighth graders and 82 eleventh graders were asked to solve 12 equations in multiple ways and to mark the solution that they considered to be the most effective. This allowed us to assess students' knowledge of different strategies, as well as their ability to implement these strategies. Results indicated that students of both grades, despite significant differences in procedural skills, showed surprisingly similar low frequencies of use of innovative strategies as first solutions. Most students, regardless of age, followed the standard strategy (expand the parentheses and then combine terms) when they were asked to solve the equations for the first time. However, significant differences between the two age groups were found in the number of innovative solutions provided by the students when asked to find different solving strategies.

Flexibility among Finnish students

Presenting Author:Riikka Palkki, University of Oulu, Finland; **Presenting Author:**Dimitri Tuomela, University of Oulu, Finland; **Co-Author:**Anna-Helena Hietamäki, University of Oulu, Finland; **Co-Author:**Peter Hästö, University of Oulu, Finland

A total of 258 Finnish students (93 8th graders and 165 11th graders) participated in an equation solving test on practical and potential flexibility. (Of the 165 11th graders, 104 were in an advanced track while 61 were in a more basic track in mathematics.) We studied whether students produced innovative solutions when instructed to solve the equations (practical flexibility) and when instructed to produce as many solutions as possible (potential flexibility). The results show that 11th grade advanced mathematics students were able to produce innovative strategies despite not having been explicitly taught such techniques, yet these innovative solutions generally were given only when students were prompted to solve equations in as many ways as possible. Most of the 8th graders and 11th grade students in basic mathematics were only able to use standard algorithms, even when prompted to solve problems in multiple ways.

Turning Potential Flexibility Into Flexible Performance

Presenting Author:Jon Star, Harvard University, United States; **Co-Author:**Jia Wang, Beijing Normal University, China; **Co-Author:**Ru-De Liu, Beijing Normal University, China; **Co-Author:**Le Xu, Beijing Normal University, China; **Co-Author:**Rui Zhen, Beijing Normal University, China

This study examined the relationship between two types of mathematical flexibility – potential flexibility, which indicates individuals' capacities to generate and use multiple strategies, and practical flexibility, which refers to individuals' flexible performances when solving math problems. Both types of flexibility were assessed in the domain of linear equation solving. Furthermore, two types of beliefs – self-efficacy and use of flexible cognition – were investigated as potential moderators between potential and practical flexibility. 123 7th grade students from China took part in this study. Results indicate that both potential flexibility and self-efficacy positively predicted practical flexibility. Additionally, self-efficacy and use of flexible cognition moderated the relationship between these two types of flexibility, suggesting that potential flexibility may lead to different degrees of practical flexibility depending on different levels of beliefs. Implications of these findings for research on mathematical flexibility and for educational practice are discussed.

Session L 3

1 September 2017 10:15 - 11:45

Teacher Gaze and Teacher-Student Interactions in Different Cultural Contexts

Keywords: Educational Psychology, Teacher Effectiveness, Teacher Professional Development, Teaching / instruction, Teaching approaches

Interest group: SIG 11 - Teaching and Teacher Education

Chairperson: Irene Skuballa, New York University Abu Dhabi, United Arab Emirates

Organiser: Irene Skuballa, New York University Abu Dhabi, United Arab Emirates

Discussant: Matthias Nückles, University of Freiburg, Germany

Teachers' professional vision transfers into instructional quality which affects teacher-student interactions and students' achievements (van den Bogert et al., 2014). Eye-tracking provides access to teachers' perception and cognition that are not accessible to conscious thought, and are not evident in questionnaires or verbal data. The application of mobile eye-tracking glasses is proved to be non-reactive and allows, for the first time, the investigation of the subjective perspective of the teacher. Initial studies on teachers' vision showed that effective teachers' gaze reveals student-supportive priorities, whereas ineffective teachers' gaze reveals preoccupation with student control (Wolff et al., 2016). However, gaze patterns (Akechi et al., 2013) and the optimal classroom climate (Li, 2002) vary according to culture. As classroom climate may change with the cultural context, the culture-specific relationship between teacher gaze and classroom climate is an obvious question to ask in educational science. Our symposium explores real-time gaze in natural classroom situations. Each study reports gaze patterns from different cultural regions: The first contribution represents the Middle east, the second Western Europe, the third East Asia and the fourth Southeast Europe. All contributors break new ground by using mobile eye-tracking glasses, which make real-life investigations of gaze through the eyes of the teachers in classrooms accessible. This symposium is submitted as part of a double symposium on classroom-related gaze. McIntyre's symposium addresses technical issues for high quality gaze research, whereas this symposium focuses on the cultural relevance of teacher gaze in teaching.

Through Teachers' Lenses: Gaze Behavior in United Arab Emirates Classrooms

Presenting Author: Irene Skuballa, New York University Abu Dhabi, United Arab Emirates; **Co-Author:** Antje von Suchodoletz, New York University Abu Dhabi, United Arab Emirates

In day-to-day classroom routines and instructional activities teachers have to monitor students' progress and behaviors to be able to provide individualized feedback and instructions. Such monitoring is transferred into teachers' gaze behavior. Therefore, vision may be a way to capture individual differences in teachers' ability to provide high-quality instruction and, thus, can be indicative of professional expertise level. We applied mobile eye-tracking glasses to explore the visual attention allocation of 31 pre-Kindergarten teachers during natural teaching. In our study, we focused on teachers in United Arab Emirates (UAE). Findings show that teachers pay more attention to children than to materials and manage to distribute their visual attention more equally among children when classes are large. In contrast to previous research, our preliminary results indicate that level of expertise is not reflected in gaze behavior. We discuss the necessity of data triangulation, i.e., combination of various data sources, to interpret eye movement data and the possibility of applying eye-tracking methodology in teacher professional development.

Teacher Gaze in Relation to Teacher-Child Interactions and Efficacy Beliefs in Finnish Kindergarten

Presenting Author: Marja-Kristiina Lerkkanen, University of Jyväskylä, Finland; **Co-Author:** Eija Pakarinen, University of Jyväskylä, Finland; **Co-Author:** Heli Muhonen, University of Jyväskylä, Finland

The present study aimed to investigate the associations between teacher allocation of visual attention and teacher-child interactions, teaching practices and teacher self-perceived efficacy in classrooms. The sample comprised 11 Finnish kindergarten classrooms. The quality of teacher-child interactions and teaching practices were observed using the CLASS and ECCOM. At the same time, teachers' gaze behavior was recorded during a 20-minute pre-academic activity using mobile eye-tracking glasses. The results showed first that teachers allocated their attention equally on children and materials. The correlational analyses showed that classroom organization of a high quality was related to a high number of areas of teacher's interest, i.e., children and materials. Teachers who were rated as deploying child-centered practices, were shown to have tendentially more attentional shifts between children whereas teachers deploying teacher-directed practices allocated their attention on a few children in classroom. Teachers who reported a high efficacy related to instruction and engagement, had a higher number of attentional shifts. Higher efficacy beliefs on management were negatively linked to time allocated on materials. The results can increase our understanding of the behavioral mechanisms underlying teacher-child interactions and teacher focus of attention in classroom, and to better understand the role of positive and nurturing teacher-child relationship. The present research will have implications for further research by providing eye-tracking tool for collecting observational data from classroom, and further develop professional development programs for pre-service and in-service teachers with a focus on improving supportive educational processes in classroom.

Expert Teacher Interpersonal Gaze in Chinese Classroom Settings

Presenting Author: Nora McIntyre, University of Sheffield, United Kingdom; **Co-Author:** Robert Klassen, University of York, United Kingdom

Gaze patterns can be expected to contribute to the overall perception students have of their teacher. Not only do teachers reveal the direction of information that they are conveying (ie. perceiving vs signalling gaze), but teachers also build a picture of themselves for students to relate to. While a little research has been conducting on Western teachers' interpersonal gaze (Cortina et al., 2015), none has been conducted on Chinese interpersonal gaze. Therefore, the present study aimed to identify teacher gaze patterns that contribute to student ratings of teacher interpersonal style. Twenty Hong Kong Chinese teachers wore eye-tracking glasses in the real-world during teacher-centred instruction before students completed the Questionnaire on Teacher Interaction (QTI, Wubbels et al., 2012). In particular, we analysed gaze teachers' attentional (i.e., information-seeking) and communicative (ie. information-giving) gaze. We explored the ability of various teacher gaze measures to predict teacher agency, affiliation and interpersonal style (agency x affiliation). Communicative teacher gaze is more important to teacher interpersonal style than attentional teacher gaze. But aspects of attentional teacher gaze can predict teacher affiliation.

The Relations Between Teacher's Vision and Children's Cognitive, Social and Academic Performance

Presenting Author:Fitim Uka, University of Freiburg, Germany; **Co-Author:**Antje von Suchodoletz, New York University Abu Dhabi, United Arab Emirates

Teachers' visual expertise is an important professional skill, particularly the ability to simultaneously perceive and interpret classroom situations (Wolff et al., 2016). Since many events involving various actors take place at the same time, visual expertise helps teachers to manage the classroom (Doyle 2006). To date, less is known about the ways how precisely teachers use visual information to manage the classroom and whether teachers' visual attention allocation differs dependent on children's characteristics. The study used mobile eye-tracking glasses to investigate whether the teachers' distribution of the visual attention among the children is related to children's academic and social performance. A sample of 9 kindergarten teachers (all females) was recruited from 3 schools in Kosovo ($M_{age} = 37.1$ years, $SD = 10.2$). Gaze behavior was recorded during a 20 minute regular class (SMI ETG2, SensoMotoric Instruments). The fixation time allocated to each child in the class was used for analyses. Teachers rated academic and social performance of all children in their class. Results showed a positive moderate correlation between teachers' visual attention and literacy readiness ($r = .19, p < .05$) and between teachers' visual attention and numeracy readiness ($r = .24, p < .01$). The findings suggest that teachers focus their visual attention longer on children with good academic performance. The results add to the literature on the strategies that teachers use to manage the classroom. Implications for teacher training will be discussed.

Session L 4

1 September 2017 10:15 - 11:45

Pinni B - B3116

Symposium

Developmental Aspects of Instruction, Teaching and Teacher Education

Why Is It So Hard? Teachers' Growth in Scaffolding Collaborative Dialogue

Keywords: Argumentation, Collaborative Learning, Conversation / Discourse analysis, Cooperative / collaborative learning, Mathematics, Reasoning, Student learning, Teacher Effectiveness, Teacher Professional Development, Teaching / instruction, Teaching approaches

Interest group: SIG 26 - Argumentation, Dialogue and Reasoning

Chairperson: Sherice Clarke, United States

Discussant: Ian A.G. Wilkinson, The Ohio State University, United States

Reviews have shown that although teachers talk significantly less in coaching collaborative learning compared to normal direct instruction, their instruction and support has a key impact on children's successful experience in collaborative discussions. However, so far there has been limited research documenting how teachers grow in their effectiveness and competence in using different instructional support (Reznitskaya & Wilkinson, 2015). We know little about factors that contributing to the contingent decisions that teachers make in orchestrating small-group and whole-class discussions. Neither do we know reasons and motivations behind the variance within and between teachers in terms of their adoption of different instructional moves. Therefore, this proposed symposium aims to fill in the gap by examining teachers' growth in orchestrating collaborative small group and whole class discussions, and the impact of such changes on students' learning. We raise the following questions:1) What are the theoretical and methodological challenges of measuring teacher's scaffolding in dialogic rich learning environment, including both small-group and whole-class discussions?2) What are the impacts of teacher scaffolding on students' learning?3) How might we leverage evidence to better support teachers' effectiveness and competence in scaffolding? Collectively, the four studies presented in this symposium brings together scholars that are active in this emerging area of inquiry, using a variety of methodologies including systematic reviews, single case study, and microgenetic analysis. The set of four presentations also covers a range of different educational settings and content areas such as language arts, math, and science.

A mixed methods review: Teacher training and teachers' impact on collaborative learning

Presenting Author:Anouschka van Leeuwen, Utrecht University, Netherlands; **Co-Author:**Jeroen Janssen, Utrecht University, Netherlands

Teachers play a crucial role in fostering the interactions during collaborative learning that are beneficial for student learning. At the same time, providing adequate guidance is a demanding task for teachers. Teachers thus need to be properly prepared for implementing collaborative learning. Research investigating teacher guidance strategies during collaborative learning, as well as how teacher training influences teacher ability to effectively guide collaborative learning, show considerable variation concerning research questions and research methodology. The present review study therefore aimed to provide an overview of these two research areas. A mixed methods review approach was used. The search query led to 98 relevant studies, which were split into summary phrases and each assigned a weight by judging the study's quality. The results show that several aspects of teacher behavior in particular show a positive influence on student collaboration, for example focusing on the content space at meta level or at the relational space, prompting or questioning students, and providing control to students. Furthermore, providing teachers with training generally leads to increased skills to support collaborative learning. However, for a number of aspects of teacher behavior the amount of evidence concerning teacher training is very low. Especially training that stimulates teachers to focus on particular student activities is scarce, which at the same time are effective guidance strategies. The results of this review study may be used to formulate best practices for teachers for guiding collaborative learning, as well as future directions for research and development of teacher training programs.

Teachers' Transition from Recitation to Collaborative Reasoning

Presenting Author:Jingjing Sun, University of Montana, United States; **Co-Author:**Hong Li, Beijing Normal University, China; **Co-Author:**Jie Zhang, University of Houston, United States; **Co-Author:**Julia Jackson, University of Montana, United States

Chinese teachers are constantly under the pressure of preparing children to perform well on the high-stake tests. Little do we know whether and how teachers can successfully transition from the paradigm of "teaching for testing" to the paradigm of "teaching for thinking." There is a critical need for a comprehensive understanding of how to support teachers' transitions from recitation to alternative instructional methods that promote students' thinking and authentic collaboration. The focus of this study is to address this need by examining two Chinese teachers' transition from recitation to an intellectually stimulating and personally engaging discussion method called Collaborative Reasoning. Preliminary findings from microgenetic analysis of two baseline lessons and 62 CR discussion transcripts showed that, both teachers significantly decreased their speaking turns from recitation to Collaborative Reasoning. The two teachers varied in their use of different types of scaffolding moves, with one primarily used prompting and the other used management moves. Findings suggested that factors such as teacher motivation, and students' immediate and delayed responses may contribute to teachers' variation in scaffolding collaborative discussions.

Towards the Development of Students' Capacity for Mathematical Discussion

Presenting Author:Hee-jeong Kim, Hongik University, Korea, Republic of

This study investigates how a middle school mathematics teacher supports students' ability of mathematical communication, specifically her efforts in fostering a mathematics discourse community. Data collection included a year-long observation of a seventh grade teacher's mathematics classrooms as well as teacher interviews. The teacher adapted three sets of research-based curriculum support materials over the school year. The observations involved instruction of these materials and regular instruction. Prior research has shown changes in teacher discourse and practice, therefore, preliminary analysis of this current study focuses on students' development of mathematical discourse and how the teacher supports this process. Methodological challenges and implications, including how to better scaffold students' ability of mathematical discourse and how to better support teachers' competence in scaffolding, will also be discussed during the session.

The Process of Change: Professional Growth in Dialogic Teaching in High School Science

Presenting Author:Sherice Clarke, University of California, San Diego, United States; **Co-Author:**Lauren B. Resnick, University of Pittsburgh, United States

In this paper, we report a case study (Mr. Nelson) of professional growth in dialogic science teaching. Over course of three years of observation, Mr. Nelson underwent a pedagogical metamorphosis, substantively transforming the way he used dialogue in his instruction to support student learning. We use microgenetic discourse analysis to examine the process of change in the way Mr. Nelson uses talk to support student learning over the three years. The findings show an inverse relationship between knowledge and reasoning in class discussion. The findings suggest that as Mr. Nelson shifted the way he positioned knowledge in class discussions, he increasingly shifted the nature of class discussion towards collaborative reasoning, and dialogic.

Session L 5

1 September 2017 10:15 - 11:45

Linna - K108

Symposium

Learning and Special Education

Tools for Examining Individual Differences in Learning: Latent variable mixture models

Keywords: Cognitive development, Conceptual change, Higher education, Mathematics, Numeracy, Problem solving, Quantitative methods, Student learning

Interest group: SIG 03 - Conceptual Change, SIG 05 - Learning and Development in Early Childhood, SIG 17 - Methods in Learning Research

Chairperson: Marian Hickendorff, Leiden University, Netherlands

Organiser: Marian Hickendorff, Leiden University, Netherlands

Discussant: Jake McMullen, University of Turku, Finland

In addition to quantitative individual differences, theories about learning often emphasize qualitative differences in students' knowledge, skills, and strategies. Furthermore, the pathways that learners follow are often hypothesized to occur in discontinuous ways. The analytical approach adopted to examine learning can have large effects on results, as well as our understanding of learning. While prevailing methods mostly focus on either quantitative or qualitative individual differences, the current symposium suggests a powerful supplemental toolbox for research on learning and instruction: latent variable mixture models, such as latent profile analysis and latent transition analysis. These models enable analysis of both qualitative and quantitative intra- and inter-individual differences simultaneously in a unifying framework. Consequently they are very well suited to analyze the two features that characterize learning: (a) qualitative individual differences in knowledge, skills, and strategies, and (b) learning pathways characterized by discontinuous change. In this symposium, four empirical studies will show how latent variable mixture models can inform on learning across domains and in a number of designs, including experimental, longitudinal, and cross-sectional studies of (1) the early mathematical skills of prematurely and full term born children (Hannula-Sormunen, Finland), (2) development trajectories of strategies for single-digit addition (Trezise, Australia), (3) pathways of children's analogy solving development after a training (Stevenson, The Netherlands), and (4) the growth of conceptual understanding in higher education (Flaig, Germany). The theoretical and educational significance of the contributions is discussed by Jake McMullen (Finland).

Conceptual Change in Higher Education Learning: A Latent Transition Analysis

Presenting Author: Maja Flaig, University of Trier, Germany; **Co-Author:** Bianca Simonsmeier, University of Trier, Germany; **Co-Author:** Anne-Kathrin Mayer, ZPID - Leibniz Institute for Psychology Information, Germany; **Co-Author:** Tom Rosman, Leibniz Institute for Psychology Information, Germany; **Co-Author:** Michael Schneider, University of Trier, Germany

An understanding of scientific concepts is a central learning goal of higher education. Research inside and outside higher education has shown that learners often do not only lack knowledge but also hold deeply entrenched misconceptions that exacerbate learning. Thus, conceptual change, that is, restructuring of prior knowledge is necessary in order to acquire academic concepts. Whereas the sources and dynamics of conceptual change are well investigated in school children, almost nothing is known about the relevance and processes of conceptual change in higher education. Therefore, we tracked the development of $N = 137$ undergraduate psychology students' concepts of human memory longitudinally over the course of two academic years. In a latent transition model with four measurement points we found four knowledge profiles that differed significantly in terms of misconceptions, everyday conceptions, and scientific concepts of human memory. A small number of well-ordered developmental paths captured the participants' transitions between these profiles over time. The paths indicate a general developmental trend towards more scientifically correct and integrated knowledge structures. The validity of the model results is supported by systematic associations of the profiles with an alternative test of memory understanding as well as with students' grade point average. The findings demonstrate that conceptual change is still a relevant learning process in higher education. Subsequent studies will have to test the generalizability of typical findings from conceptual change research with children to higher education. Our findings also highlight the usefulness of latent transition analyses for modeling longitudinal changes in multidimensional knowledge structures.

Using Latent Transition Analysis to Identify Patterns of Change in Math Strategies

Presenting Author: Kelly Trezise, The University of Melbourne, Australia; **Co-Author:** Robert Reeve, University of Melbourne, United Kingdom

Single digit addition (SDA) strategy sophistication is regarded as an index of math problem solving ability. The acquisition of SDA strategies tends to be well ordered: children initially use procedural counting-based strategies and later employ more conceptual-based strategies (e.g., decomposition) (Siegler, 2006). SDA strategy acquisition is usually analysed in terms of age; however, within-age strategy profiles tend to be variable. Paul and Reeve (2016) used latent class analysis to show that different patterns of SDA strategies could be identified, independent of age; and, moreover, these patterns had empirical and theoretical utility. These findings raise the issue whether different patterns of SDA strategy are stable or change over time, and whether these patterns are related to math problem solving abilities. To investigate this issue, we classified the SDA strategies (count-all, count-on, retrieval) of 215 children at 6, 7, 8, and 9 years. We used a latent transition analytic model (LTA) to analyse the relative proportion of the four strategies used on each test occasion. We used a step-three procedure to examine how strategy pathways predicted multiplication abilities at Age 10. The findings show that SDA developmental trajectories predict later math ability. In sum, the research reveals the importance of identifying patterns of early learning and what it tells us about education outcomes.

Learning to Solve Analogies: The Paths Children Take

Presenting Author: Marian Hickendorff, Leiden University, Netherlands; **Co-Author:** Claire Stevenson, University of

Amsterdam, Netherlands

Analogical reasoning is essential for acquiring and integrating new knowledge and skills. Although much research has focused on this important skill, children's paths from non-analogical to analogical reasoning remain unclear. In this study, 388 children (ages 5-11 years) solved a series of analogies within a pretest-training-training-posttest design, with training comprising either multiple tries (N=196) or tutoring feedback (N=192). Working memory tasks were also administered to examine its role in analogical reasoning development. We used latent transition analyses to identify qualitative individual differences in the paths children take in acquiring analogy solving skills. Five phases were identified: duplication, non-analogical, pre-analogical, partial analogical and correct analogical reasoning. Children's paths through these phases were not sequential; there was great variability both within and between children in the types of solutions they provided within each phase and how they progressed through these phases. Working memory was related to children's reasoning phase at pretest, but it was not related to their rate and path of change from pretest to posttest. Age and the type of feedback received during training were the clearest indicators of children's learning paths and rates of change. Our findings provide a rich addition to the literature on how analogical reasoning develops, and latent transition analysis is a powerful tool to detect these patterns.

Prematurely and full term born children's early mathematical skill profiles

Presenting Author:Minna M Hannula-Sormunen, University of Turku, Finland; **Co-Author:**Eero Laakkonen, University of Turku, Finland; **Co-Author:**Petriina Munck, University of Turku, Finland; **Co-Author:**Noona Kiuru, University of Jyväskylä, Finland; **Co-Author:**Pipary Pipary Study Group, University of Turku, Finland

Preterm birth is associated with low mathematical skills. This study on five-year-old Finnish children investigated whether mathematical skill profiles would differ between prematurely and full-term born children and how such profiles and other cognitive skills would be related. Mathematical skills included digit knowledge, spontaneous focusing on numerosity, arithmetic, counting and geometric skills. The investigated cognitive skills were phonological processing, working memory, instruction comprehension, speeded naming, inhibition and visuospatial skills. The participants were 119 preterm children with very low birth weight and 100 full-term born children. The results of latent profile analyses showed these groups' differences in both number and shape of latent mathematical skill profiles, indicating quantitative and qualitative disparities. After controlling for gestational weeks and maternal education, phonological processing, visuospatial working memory, speeded naming and inhibition were associated with prematurely born children's five mathematical profiles. Among full-term born children, only phonological processing and verbal working memory were related to their three mathematical profiles. A better understanding of prematurely born children's mathematical and other cognitive skill structures well before formal schooling, as provided by LPA, is beneficial for the development of diagnostic assessments and early intervention programmes that could prevent later difficulties of this at-risk population in learning mathematics.

Session L 6

1 September 2017 10:15 - 11:45

Main Building A - A32

Symposium

Higher Education

Measuring self-regulated learning: Theoretical considerations and practical applications

Keywords: Developmental processes, E-learning / Online learning, Educational Psychology, Educational Technology, Higher education, Instructional design, Learning analytics, Learning Technologies, Metacognition, Problem solving, Self-regulation

Interest group: SIG 16 - Metacognition

Chairperson: Philip Winne, Simon Fraser University, Canada

Discussant: Inge Molenaar, Radboud University Nijmegen, Netherlands

Self-regulated learning (SRL) is an important concept in higher education. Throughout the years, many different approaches have been taken to measure this construct. In this symposium we will highlight several innovative approaches to measuring SRL and how these approaches can be applied in empirical research. First, a review of the literature will highlight the approaches that have been taken to measuring SRL and how the use of self-report questionnaires compares to behavioral measures of SRL. This comparison indicated that operationalization is an important factor when considering the use of behavioral measures of SRL. The second contribution in the symposium considers the operationalization of different aspects of SRL when collecting trace data of students' learning in an online learning environment called nStudy. The third contribution discusses an empirical study using ecologically valid log files to assess SRL in blended learning environments. In the fourth contribution, the authors used sequence mining to empirically assess how SRL can be coupled with measures of scientific reasoning to assess monitoring during hypothesis testing in a game-based learning environment. The authors make the case that SRL should be investigated alongside other processes in order to get contextual information about how students use SRL processes during the task they are required to do. This symposium could make an important contribution to the field of higher education and SRL research in providing a step forward in reaching consensus about the measurement of this important construct.

Measuring self-regulated learning in higher education: A comparison of different methods

Presenting Author:Sanne Rovers, Maastricht University, Netherlands; **Co-Author:**Geraldine Clarebout, Maastricht University, Netherlands; **Co-Author:**Hans Savelberg, Maastricht University, Netherlands; **Co-Author:**Jeroen Van Merriënboer, Maastricht University, Netherlands

Self-regulated learning is an important construct in education that has often been linked to academic achievement. Despite this increasing attention, there has been disagreement about how it should be measured. Specifically, the use of only self-report questionnaires as a valid way of measuring SRL has been called into question. As a result of this, several researchers have advocated the additional use of more objective, behavioral measures of SRL, such as the use of software programs to create log files of behavioral indicators of students' use of self-regulatory strategies. An outstanding research debate concerns the extent to which it is possible to compare trace data measuring SRL to traditional ways of measuring SRL using self-report questionnaire data, and which of these methods provide the most valid and reliable indicator of SRL. In this review we will summarize the achievements in this area up to this point and discuss issues that remain open for the future. Directions are provided for future research in order to advance knowledge in the field.

Gathering and Analyzing Trace Data to Measure Cognition and Motivation in Self-Regulated Learning

Presenting Author:Philip Winne, Simon Fraser University, Canada

Trace data are observable representations of constructs that describe learners' cognition and motivation. Traces emerge as a learner goes about everyday studying activities. A full-faceted trace datum can be modeled as a 4-tuple: time of the event, information the learner operated on (e.g., selected), the operation applied and the context of the event. Well designed traces support strong inferences about cognition and motivation that generate a trace. Learning technologies can be designed to record trace data in ambient form, i.e., with minimal or no intrusion on a learner's usual studying approach. In a live demonstration of nStudy, a software system specifically developed to gather ambient 4-tuple trace data, I describe traces learners generate and provide interpretations associated with traces. Methods based in graph theory for analyzing trace data are described as means for advancing research on self-regulated learning across a timeline of traces. Several trace-based learning analytics are illustrated and challenges are noted about leveraging trace data to enhance achievement and advance learning science.

Learners' Characteristics and Self-regulatory Behaviour in Blended Learning Environments

Presenting Author:Stijn Van Laer, KU Leuven, Belgium; **Co-Author:**Jan Elen, KU Leuven - University of Leuven, Belgium

Blended forms of learning have become increasingly popular. However, it remains unclear under what conditions blended learning environments (BLEs) are successful. Studies suggest that BLEs challenge learners' self-regulation. Yet little is known about what self-regulatory behaviour learners exhibit in BLEs. This is problematic since this insight is needed for effective designing them. In view of elaborating a model for designing BLEs, the aim of this study was to investigate the relation between learners' ($n=25$) cognitive, motivational, and metacognitive characteristics and their self-regulatory behaviour in BLEs. To accomplish this, the observed BLE was described, a prior-domain-knowledge test and a survey (motivation and metacognition) were administered. Finally, log files were analysed for learners' self-regulatory behaviour. Results show that motivational and metacognitive characteristics make up 21.20% of learners' differences in self-regulatory behaviour, whereas cognition only was associated with 0.14% of the observed differences. Investigating the significance of each characteristic, prior-domain-knowledge was negatively associated with the consultation of content-pages. Value as a component of motivation showed learners' preference to either use forums (intrinsic orientation) or more links to assignments (extrinsic orientation). When learners valued tasks more they consulted more external resources. No significant association of expectancy or affect was found. Finally, learners' metacognitive beliefs about declarative, procedural and conditional knowledge were positively associated with the overall use of the BLE. The study shows the potential of ecologically valid log files to investigate learners' self-regulatory behaviour and it reconfirms that in designing BLEs specific learner characteristics need to be considered.

Sequence Mining to Measure SRL and Scientific Reasoning in a Game-Based Learning Environment

Presenting Author:Michelle Taub, North Carolina State University, United States; **Co-Author:**Roger Azevedo, North Carolina State University, United States; **Co-Author:**Amanda Bradbury, North Carolina State University, United States; **Co-Author:**Garrett Millar, North Carolina State University, United States; **Co-Author:**Megan Price, North Carolina State University, United States; **Co-Author:**Nicholas Mudrick, North Carolina State University, United States

Game-based learning environments (GBLEs) have been developed to foster effective self-regulated learning (SRL), as studies have shown that students are often ineffective at regulating their own learning (Azevedo et al., 2015). However, current models of SRL (e.g., IPT model) do not integrate SRL with the strategies required to complete the task (e.g., scientific reasoning), nor have studies investigated how students use these processes during gameplay with GBLEs. The goal of this study was to use sequential pattern mining and differential sequence mining to investigate monitoring during scientific reasoning by assessing patterns of how more and less efficient college students ($n = 64$) engaged in hypothesis testing (via testing food items) while playing Crystal Island, a GBLE that requires students to complete the game by solving the mystery of what illness infected inhabitants of the island. Results revealed that all participants tested equal numbers of relevant food items, however more efficient students had significantly fewer frequencies of sequences where they tested partially-relevant and irrelevant food items. These results have implications for designing adaptive GBLEs that scaffold students based on hypothesis testing behavior to ensure they are not guessing, and are using both SRL and scientific reasoning processes effectively during learning.

Session L 7

1 September 2017 10:15 - 11:45

Pinni B - B3107

Symposium

Instructional Design

History in the making. Interactions between historical competencies and writing performances

Keywords: Assessment methods and tools, History, Instructional design, Qualitative methods, Secondary education, Teaching / instruction, Writing / Literacy

Interest group: SIG 04 - Higher Education, SIG 06 - Instructional Design, SIG 12 - Writing

Chairperson: Jannet van Drie, University of Amsterdam, Netherlands

Discussant: Susan Goldman, University of Illinois at Chicago, United States

This symposium takes a disciplinary perspective on writing by bringing together quantitative and qualitative research on writing in history from Switzerland, Germany and the Netherlands. History is a literate discipline. Through writing students learn to participate in the cultural practice of the discipline of history. Writing is considered important to engage students in historical reasoning and is also used to assess students' knowledge and understanding. Writing in history is demanding, as students should combine knowledge of the past with historical reasoning abilities, taking in account the multi-perspective and constructive character of history. To improve classroom practices, more understanding of disciplinary aspects of writing in history is needed. This symposium aims to explore relationships between students' writing performances, historical thinking competencies and epistemic beliefs, as well as effects of different instructional approaches.

Study 1 investigates the interrelation between text-quality features in argumentative essays of future history teachers, their historical thinking competencies and beliefs about the nature of historical knowledge. The second and third study focus on instructional approaches enhancing text quality and disciplinary writing skills. In (quasi-)experimental designs effects of studying primary sources and their epistemic nature (study 2) and of domain-specific writing instruction (study 3) on high school students' writing are investigated. Study 4 presents outcomes of a qualitative analysis of how students revised their texts after receiving an instruction on concepts and strategies connected to constructing causal historical explanations. Implications for our understanding of writing in history and of instructional practices will be discussed.

Epistemic beliefs and historical thinking competency as pre-requisites for historical writing

Presenting Author:Monika Waldis, University of Applied Sciences Northwestern Switzerland, Switzerland; **Co-**

Author:Martin Nitsche, University of Applied Sciences of North-Western Switzerland, Switzerland

Narrativity is considered as the structural principle of history and it's acknowledgement as a result of historical thinking and learning (Ruesen, 1993). Furthermore students and history teachers are expected to feature historical reasoning abilities (van Drie et al., 2014) or narrative competence (Waldis et al., 2015). The latter shall be defined as a particular configuration of the learner's cognition and strategic repertoire which is necessary to select, analyze, interrogate, corroborate, and evaluate a variety of sources and accounts in order to understand, interpret and argue about history. Starting from an approach to assess student history teachers' narrative competence with an open-ended and material-based writing task, it is asked 1) which level of ability to write an historical argumentation as one part of narrative performance is reached, and 2) to what extend this performance score is associated with other relevant aspects such as epistemic beliefs about the nature of history and a general ability to think historically assessed with a competency test. Data collection took part in six universities of teacher education. From a sample of 175 students an argumentative text based on selected materials (sources and accounts) was collected. Additionally epistemic beliefs and general historical competency were assessed. Results point to rather heterogeneous narrative performance. The narrative constructivist position was correlated with the overall text score and with some sub-scores. However, in regression analyzes predicting narrative competency general historical competency was significant but the epistemic beliefs were not. Maintaining the relevance of the latter alternative assessment methods will be discussed.

The impact of different authentic instructional material on students'

Presenting Author:Nicola Brauch, University of Bochum, Germany; **Co-Author:**Marcel Mierwald, Ruhr University Bochum, Germany; **Co-Author:**Thomas Lehmann, University of Bremen, Germany

In history education, authentic materials such as primary sources (e.g., letters or diary entries) are considered as a possibility to foster students' historical reasoning and argument writing skills. This study aims to explore the impact of instructional materials with different degrees of authenticity on students' argument writing in history. We conducted a quasi-experimental study in a Reach out Lab to check the hypothesis that authentic material promotes the quality of students' written historical arguments compared to less authentic material. Students ($N = 150$) 11th graders from secondary schools) worked with instructional material, representing different grades of historical authenticity, in three experimental conditions (authentic sources, non-authentic textbook, non-authentic narrated). They were further instructed to answer a central historical question in an argument writing task at the end of the intervention by using the material at hand. Students then worked with primary sources and historical accounts in original text format (authentic), textbook format, and audio material format spoken by actors (both non-authentic). Additionally, we assessed interest, epistemological beliefs, and prior knowledge and used them as covariates. First results indicate that students in the authentic condition wrote essays of

medium structural quality. The domain-specific quality of their essays, however, was significantly below a medium level. We will compare the structural and domain-specific quality of essays with data from the other treatment groups to indicate whether authenticity has an effect on students' argument writing. Finally, we will discuss some considerations on how to promote students' argument writing skills with instructional material of different authenticity.

Domain-specific writing instruction in history: effects on products and processes

Presenting Author:Jannet van Drie, University of Amsterdam, Netherlands; **Co-Author:**Daphne van Weijen, University of Amsterdam, Netherlands

Writing in history places high demands on students, but not enough is known about how this can be taught effectively. Therefore, the effects of writing instruction in history on text quality, writing processes, and students' knowledge of writing, were investigated in a quasi-experimental study. This instruction was designed by a history teacher for use in his own classes, as part of a professional development program on improving writing across the domains. The teacher designed a lesson unit (5 lessons) in which writing instruction was combined with historical reasoning instruction. The lessons were based on several principles of effective writing instruction, including strategy-instruction, modeling, prewriting, and peer-interaction. Ninety-six 11th grade students, in two cohorts, participated in the study. Outcomes of the first cohort are promising. Students in the experimental condition wrote better quality texts and their knowledge of writing increased. Furthermore, their writing processes included more pauses, which suggests that they planned more during writing. Based on these findings we concluded that teachers appear able to integrate writing instruction in their history lessons, which can result in both better quality writing in history classes and more knowledge of writing.

Causal (re-)writing in history; working on (too) many levels?

Presenting Author:Gerhard Stoel, RICDE / University of Amsterdam, Netherlands; **Co-Author:**Jannet van Drie, University of Amsterdam, Netherlands; **Co-Author:**Carla Van Boxtel, University of Amsterdam, Netherlands

This qualitative study investigates which (second-order) concepts and strategies related to causal historical reasoning students integrate into their written explanations on the outbreak of the First World War after receiving a lesson-unit that focused on causal historical reasoning. The aim of the study is to better understand the relationship between (causal) historical reasoning and historical literacy and the demands made on students when expressing this reasoning into writing. Furthermore, we want to draw pedagogical implications for practice. Through a process of open and axial coding, we compared essay-revisions of 20 11th grade pre-university students with their original essays. Preliminary results indicate that, after the lesson-unit, students included more causal connections and elaborated their causal chains. Furthermore, students integrated more second-order concepts, although this was done in a somewhat mechanistic way, without providing arguments for their characterizations. Although students made more causal claims, these were seldom supported by evidence. Results also showed that the amount and type of causal reasoning was related to how students' structured their text. Essays organized in a more abstract, non-linear way integrated more analytical second-order concepts and included more argumentative moves, indicating some awareness of the constructed nature of historical causality. These results suggest that in order to write argumentative historical explanations, students must not only develop concepts and strategies related to causal historical reasoning, but also acquire knowledge of causal historical 'genres', as well as an epistemological understanding of historical knowledge as interpretation, in order to realize the need for argument and evidence.

Session L 8

1 September 2017 10:15 - 11:45

Pinni B - B4116

Symposium

Eye tracking as a method in learning and testing with different representations

Keywords: Assessment methods and tools, Comprehension of text and graphics, Computer-assisted learning, Instructional design, Learning Technologies, Mathematics, Mixed-method research, Multimedia learning, Problem solving, Reading comprehension

Interest group:

Chairperson: Juliane Richter, Leibniz-Institut für Wissensmedien, Germany

Discussant: Andreas Gegenfurtner, Germany

Tracking the movement of the eyes during a task reveals visual attention distribution, which is assumed to provide information about concurrent cognitive processes (eye-mind assumption, Just & Carpenter, 1980). The aim of the symposium is to present how different analysis approaches related to eye tracking measures can contribute to answer research questions related to instruction and testing with text and/or pictures in education. Presentation 1 uses multilevel and gaze-likelihood analyses to shed light on underlying processes of solving multiple-choice science items containing representational pictures that visualize item stem information. The processing of verbal mathematical tasks was investigated in presentation 2 with a large-scale sample of over 400 primary school students. Eye tracking data was analyzed relative to learner characteristics such as mathematical skill. In presentation 3 the effectiveness of an instructional intervention related to learning from an animation was investigated by means of a specific eye tracking measure aimed at

gaining insight into the quality of the resulting mental model. In presentation 4 eye tracking measures were assessed to study the expertise reversal effect related to multimedia learning using a moderated mediation model. The presentations provide insight into test takers' and learners' cognitive processing, which contributes to develop measures to adequately support learners in their effort related to knowledge acquisition and retrieval. Moreover, the different analysis approaches show advanced uses of eye tracking data while reflecting upon limitations of this process methodology.

The value of multilevel and gaze-likelihood analyses in eye-tracking studies: A multimedia example

Presenting Author:Marlit Annalena Lindner, Leibniz Institute for Science and Mathematics Education (IPN), Germany; **Co-Author:**Alexander Eitel, University of Freiburg, Germany; **Co-Author:**Benjamin Strobel, IPN Leibniz-Institut für die Pädagogik der Naturwissenschaften und Mathematik, Germany; **Co-Author:**Olaf Koeller, Leibniz Institute for Science and Mathematics Education, Germany

Our multimedia experiment investigated how adding a representational picture (RP) that visualizes text stem information in multiple-choice science items affects schoolchildren's item-solving behavior in educational testing (i.e., text-picture compared to parallel text-only items). Twenty-four items (twelve text-only and twelve text-picture items) were solved by each of the sixty-two participating students in a rotated within-subject-design. By presenting this study, we aim to exemplify (1) the potential of *multilevel analyses* to conduct inferential tests that take the complex hierarchical structure of eye-tracking data into account and (2) the potential of detailed *gaze-likelihood analyses* across processing time to trace how students' attend to different areas of interest (Aols) in the course of item solving. The multilevel analyses show that the time students spent fixating the added RP in text-picture items was compensated for by saving substantial reading time of the corresponding text and by spending less time on incorrect answer options. However, students still spent more time on studying the item stem as a whole (text + picture) in text-picture items, which probably enhanced their understanding, suggested by better performances in text-picture items (i.e., *multimedia effect in testing*). The gaze likelihood analyses further revealed that the RPs received particular attention right after item onset and in the later phase of item solving. Hence, comparable to learning, RPs seemingly served as initial mental scaffolds that supported students' comprehension but also their decision making. We discuss our findings with a focus on the implemented methods and their valuable potential for multimedia eye-tracking research.

Attention distribution when solving mathematic-textual tasks. An eye tracking experimental study

Presenting Author:Krzysztof Krejtz, University of Social Sciences and Humanities, Poland; **Co-Author:**Andrew T. Duchowski, Clemson University, United States; **Co-Author:**Marcin Karpiński, Education Research Institute, Poland; **Co-Author:**Małgorzata Zambrowska, Education Research Institute, Poland; **Co-Author:**Cezary Biele, National Information Processing Institute, Poland; **Co-Author:**Agata Kopacz, National Information Processing Institute, Poland; **Co-Author:**Izabela Krejtz, SWPS University of Social Sciences and Humanities, Poland

An extensive narration added to mathematical problems is popular pedagogical strategy to make them more engaging and attractive to students. However, primary school students' reading abilities can be a serious limitation to such tasks' comprehension. In the present study we used eye tracking method to gain insight into the attentional mechanism underlying solving mathematic-textual problems in relation to mathematical and reading abilities. Recordings of eye movement patterns during reading matched with traditional accuracy measures allowed us to explore the role of attention distribution while solving mathematical tasks accompanied by either short or long narrations. Children from primary schools ($N = 442$, 8 - 10 years old) participated in the eye tracking experiment. Their reading and mathematical skills were assessed before they solved mathematical tasks while their eye movements were monitored. Eye movements analyses revealed that mathematical skills yield better selection of relevant information from the long textual narration regardless of reading competencies while reading fluency may decrease the chance of such tasks' solving accuracy. Results are discussed in the context of children's cognitive functioning and the role of visual attention during mental modeling of mathematical problems. Finally, we provide some recommendations for teaching practitioners.

The effectiveness of compositional animation design: Evidence from eye tracking

Presenting Author:Jean-Michel Boucheix, University of Dijon, LEAD-CNRS, France; **Co-Author:**Richard Lowe, Curtin University, Australia

Learners have difficulty in decomposing conventionally designed animations to obtain raw material suitable for building high quality mental models. A composition approach to designing animations based on the Animation Processing Model was developed as a principled alternative to prevailing approaches. It provides learners with pre-decomposed material that is structured and sequenced to facilitate the relation building required for effective mental model construction. Study of a compositional animation that presented material in a contiguous fashion resulted in higher quality mental models of a piano mechanism than non-contiguous or control (conventional) versions. Relation building required to link pre-decomposed material was investigated with eye movements data analysis: a relational index measure was devised and used to assess mental model construction. This relational index showed that the compositional animation led to superior mental models because it particularly fostered relational processing.

Expertise reversal of the signaling effect: Evidence from eye tracking

Presenting Author:Juliane Richter, Leibniz-Institut für Wissensmedien, Germany; **Co-Author:**Katharina Scheiter, Leibniz-Institut für Wissensmedien, Germany

Multimedia integration signals highlight correspondences between text and pictures, which is supposed to support text-

picture integration and thus multimedia learning. A recent meta-analysis revealed that learners' prior knowledge moderates the signaling effect in that only learners with low prior knowledge (LPK) benefit (expertise reversal effect). In order to shed light on the underlying cognitive processes of the expertise reversal effect, we conducted an eye tracking study with students in middle school. They learned with a digital multimedia textbook in one of the two versions: (a) a basic version with mainly text signals (e.g., bold face), or (b) an extended version with additional multimedia integration signals that support text-picture integration (e.g., color coding). Results of a moderated mediation analysis revealed that eye tracking measures did not explain the expertise reversal of the signaling effect revealed in the current study. However, LPK learners fixated pictures longer, tended to make more text-picture transitions, and tended to have an overall lower cognitive load level, as indicated by the pupil diameter when learning with the extended version compared to the basic version. High prior knowledge (HPK) learners did not differ with respect to these measures although descriptively the pattern of results was reversed in comparison to the LPK group. Moreover, the more transitions learners performed in general the less influence prior knowledge had on recall performance. These results might be relevant for the design of multimedia material and the usage of individualized instructions in digital learning environments.

Session L 9

1 September 2017 10:15 - 11:45

Pinni B - B1100

Symposium

Teaching and Teacher Education

Focusing (on) Teacher Attention and Learning

Keywords: In-service teacher education, Learning approaches, Teacher Professional Development, Teaching / instruction

Interest group: SIG 11 - Teaching and Teacher Education

Chairperson: Hilary Hollingsworth, Australian Council for Educational Research, Australia

Discussant: Valeska Grau, Pontificia Universidad Católica de Chile, Chile

This symposium addresses the nature and function of teacher attention at times when the teacher is viewing a lesson taught by themselves or by another. The theme of this symposium concerns the role played by teacher attention in the process of professional learning. The four studies reported offer insights into teacher learning as a situated and cyclic process of attention, interpretation, decision, and action, punctuated and fueled by periods of reflection. [Author citation 2002] drew attention to the fundamental dynamic of reflection and enaction in their model of teacher learning. Central to this model is the concept of salient outcomes; those classroom events to which the teacher attaches significance. Judgments of salience determine the direction of the teacher's attention in class and reflect the teacher's knowledge and their system of values and beliefs, each of which is subject to change through their role in determining the objects of the teacher's attention, thereby generating the experiences that catalyze learning. This symposium addresses this recursive nature of teacher learning within and outside of classrooms, by providing distinct analytical perspectives on various combinations of the central constructs and by examining contemporary strategies by which teacher attention might be more productively guided. Each of the four studies offers insight into the objects of teacher attention when teachers observe and reflect on their practice or the practice of other teachers and the consequences of that attention for their learning.

Learning from Lessons: Studying the structure and construction of teacher knowledge

Presenting Author: Doug Clarke, Australian Catholic University, Australia; **Co-Author:** Man Ching Esther Chan, The University of Melbourne, Australia; **Co-Author:** David Clarke, The University of Melbourne, Australia; **Co-Author:** Anne Roche, Australian Catholic University, Australia

A central premise of this project is that teachers learn from the act of teaching a lesson and that this learning is evident in the planning and teaching of a subsequent lesson. In this project, the knowledge construction of mathematics teachers was examined utilising multi-camera research techniques during lesson planning, classroom interactions and reflection. Our goal is a refined understanding of classroom events that create opportunities for teacher learning. Findings from a pilot project are presented to illustrate the viability of the research design and the theoretical model. The analysis of the teacher interviews revealed interesting and important differences in both the objects of the teachers' attention and the teachers' consequent learning. Teacher learning is evidenced through teacher epistemic claims elicited in a sequence of structured interviews and through observed actions and teacher statements relating to adaptive practice. Documented forms of teacher learning included teacher statements regarding mathematical content and curriculum, new instructional strategies, the prior knowledge of the students, and the significance of particular elements of lesson structure. The research design creates conditions where teacher statements and actions reveal both those objects and events to which the teacher selectively attends and the meanings the teacher associates with those objects and events. The effectiveness of the research design in catalysing teacher reflection has significant potential for future adaptation to professional learning contexts.

Using head-mounted video to investigate the attentional focus of primary mathematics teachers

Presenting Author: Carmel Mesiti, University of Melbourne, Australia; **Co-Author:** Dan Jazby, The University of Melbourne, Australia; **Co-Author:** David Clarke, The University of Melbourne, Australia

Understanding what skilled performers attend to has been argued to be vital in understanding what makes skilled

performance possible. In education, teacher attention has not been a major focus of research. This study employs a head-mounted camera technique of data collection developed in research relating to firefighters. The attentional foci of an experienced and inexperienced teacher were investigated, to ascertain whether each teacher varied in terms of the phenomena that they attended to mid-lesson. While the inexperienced teacher focused their attention on student body language cues, the experienced teacher focused on students' mathematical representations – particularly representations which were anomalous. Further investigation of skilled teachers' attentional focus is argued to be of benefit, as it may enable the development of training methods that could reduce the time it takes for novice teachers to develop expertise.

Focusing teacher attention through the framing of salience: The structured stimulation of reflection

Presenting Author:Hilary Hollingsworth, Australian Council for Educational Research, Australia

Video provides a unique opportunity to capture some of the complexity of classroom practice, opening up possibilities for teacher professional learning through observations and analyses of practice. However, simply viewing video does not ensure teacher learning, and as Gaudin and Chaliès (2015) report, "... an important issue concerns how to facilitate substantive analysis of teaching practice with video so that it becomes a productive learning tool for teachers" (p.59). This presentation will report a promising process for facilitating such substantive analysis, one that involves the explicit focusing of teacher attention. Distinguishing features of *The Structured Stimulation of Teacher Reflection* process, include: the use of negotiated observational foci located within a theoretically and empirically grounded observation framework; the privileging of teacher agency in recognition of the personal nature and critical importance of salience to any learning; and, the use of video to focus teacher self-reflection and support and provoke teacher learning. It is suggested that one outcome of the structured stimulation of reflection process, through its juxtaposition of structure and agency, is the *framing of salience*; that is, the process explicitly focuses teacher attention on those personally salient outcomes to which they attach value providing opportunity to maximise consequent learning.

Focusing Teacher Attention and Learning through Culturally Embedded Lesson Study in the Philippines

Presenting Author:David Clarke, The University of Melbourne, Australia; **Co-Author:**Marlon Ebaegu, University of the Philippines Diliman, Philippines

Lesson Study has captured the attention of many international educators with its promise of improved student learning and sustained teacher learning. Lesson Study, however, has cultural underpinnings that a simple transference model overlooks. A culturally embedded approach attends to the existing cultural orientations and teacher values of host schools. Factoring in the school's cultural orientations (hierarchy, collectivism, long-term orientation, etc.) and what the teachers pay attention to in designing a good mathematics lesson (researching curriculum materials, anticipating student responses, etc.), this culturally embedded approach allowed the researcher to build on the teachers' existing cultural and values orientations and to focus their learnings on aspects of teaching and/or lesson planning that would help build up their capacity to engage in Lesson Study more meaningfully. This paper reports on the author's implementation of Lesson Study in two Philippine public secondary schools and the learnings teachers experienced as a result of their participation.

Session L 10

1 September 2017 10:15 - 11:45

Linna - K110

Symposium

Learning and Social Interaction

Frontiers in Understanding the Social Nature of Learning

Keywords: Conversation / Discourse analysis, Mixed-method research, Social aspects of learning and teaching, Social interaction, Student learning, Video analysis

Interest group: SIG 10 - Social Interaction in Learning and Instruction

Chairperson: Josephine Moate, University of Jyväskylä, Finland

Discussant: Roger Säljö, University of Gothenburg, Sweden

Many of the processes by which educational phenomena are experienced and by which the products of the learning process are enacted are essentially social. The institutions (e.g., schools) and the individuals (e.g., teachers), whose primary function is to promote learning, do so by means of social interaction. This symposium examines recent developments in the attempt to acknowledge, theorise and study those aspects of the process of learning that are fundamentally social in nature. Very different research paradigms have the optimisation of learning as their common goal: for example, neurological investigation of brain function, meta-analysis of instructional effect, and cross-cultural comparison of classroom practice. Each addresses a specific aspect of learning and its promotion but fails to provide explanation at the social level. Various attempts have been made to connect cognitive and sociocultural accounts of learning (cf Author, 2013; Sfard, Forman, & Kieran, 2001; Vygotsky, 1978). These attempts draw on theoretical, methodological and technical advances. For example, Author (2013) has recently invoked "the social brain" to assist in understanding the relationship between individual and collective thinking, while the development of the Science of Learning Research Classroom at the University of Melbourne offers new technical and capabilities and methodological affordances for the study of social interaction and its function in the process of learning. This symposium brings together four different perspectives that in combination illustrate aspects of the progress of the international research community in developing an integrated account

of the social nature of learning.

Entangled Modes of Social Interaction in Student Collaborative Problem Solving in Mathematics

Presenting Author:Man Ching Esther Chan, The University of Melbourne, Australia; **Co-Author:**David Clarke, The University of Melbourne, Australia

The Social Unit of Learning project aims to examine individual, dyadic, small group (four to six students) and whole class problem solving and learning in mathematics and the associated/consequent learning. The laboratory classroom employed in this study is equipped with 10 built-in video cameras and up to 32 audio channels. Intact Year 7 classes were recruited with their usual teacher in order to exploit existing student-student and teacher-student interactive norms. The project collected multiple forms of data, including student written products and high definition video and audio recording of every student and the teacher in the classroom. The simultaneous documentation of the actions and utterances of an entire class of students provides a complex data source affording multiple comparative options and giving methodological recognition to the authentic complexity of the social setting that is the classroom. Utilising multiple forms of data, our goal was to study the social deployment of student mathematical and negotiative expertise associated with learning products that included both written solutions and spoken forms of mathematical argumentation. Our analysis suggests that meaning negotiation in mathematics classrooms can be usefully distinguished as social, socio-mathematical, and mathematical. Use of the laboratory classroom allowed the detailed documentation of student engagement in each of these three negotiative foci in pairs and in small groups. Our analysis documents the ways in which all three modes co-exist in an entangled form in the negotiative interactions documented in the mathematics classroom, each with its own lexicon. We envisage all three as constitutive of learning.

What kinds of teacher-learner interactions promote learning and cognitive development?

Presenting Author:Neil Mercer, University of Cambridge, United Kingdom

For education to function effectively at the classroom level, the most productive forms of teacher-student interaction need to take place; identifying what those are has been a focus of educational research for some decades. – but what are its results? This paper will review evidence that classroom-based research has provided to inform us about which types of interaction are most effective for promoting children's curriculum learning, the development of their understanding and the development of their ability to reason. It will draw upon the findings of research by the author and colleagues and by other researchers internationally. Findings will be discussed which are related to (a) teacher-student interaction in whole class sessions; (b) teacher-student interaction with smaller groups of students (c) the mediation by teachers of students working independently in groups; and (d) teachers' interaction with individual students. It will also discuss the methods used in such research, including the consideration of whether randomized control trials do in fact represent the 'gold standard' for studies of the effectiveness of pedagogic interventions in the classroom, as has been commonly claimed in recent years.

Investigating the development of pedagogical understanding in response to cultural diversity

Presenting Author:Josephine Moate, University of Jyväskylä, Finland

This paper uses a dialogical approach to investigate the development of pedagogical understanding in response to an intensive programme (IP) addressing cultural diversity in education. The 10 day IP involved 32 student participants and 10 members of staff from 8 European universities hosted by the University of Jyväskylä, Finland. The participants were introduced to a range of different pedagogical approaches from drama and visual arts education, cultural geography and language education, educational theory and the history of education as well as cultural visits and activities. The data for this paper is based on the written accounts from the participants as they revisited their understanding of outsidership and insidership at the end of the IP and seeks to better understand the way in which the participants drew on their own experiences and relationships within and beyond the IP, educational theory and practice to negotiate their pedagogical understanding.

A person perspective in interest research: tracing multiple interests in multiple contexts over time

Presenting Author:Sanne Akkerman, Leiden University, Netherlands; **Co-Author:**Arthur Bakker, Utrecht University, Netherlands

Interest seems one of the most basic catalysts for learning and development. Yet interest research has been limited by focusing on single and predefined social contexts, typically a classroom context (e.g., mathematics classroom) determining the targeted object of interest (mathematics) to be developed in students under influence of this environment. Although insightful, such research has it has unintendedly portrayed the development of interest as a relatively linear process, neglecting personal-social dynamics resulting from emergence of multiple interests pursued in and across multiple social contexts. This paper presents results of four students followed for three years tracing all objects of interest emerging and developing in and outside formal educations. Results indicate that interest development is much more complex and fluid than currently theorized, leading to various questions and hypotheses deserving more substantial research.

Session L 11

1 September 2017 10:15 - 11:45

Main Building E - E221

Symposium

Homework: Parental assistance and children's academic outcomes

Keywords: Achievement, Motivation, Motivation and emotion, Parental involvement in learning, Primary education, Self-efficacy

Interest group: SIG 08 - Motivation and Emotion

Chairperson: Riikka Hirvonen, University of Jyväskylä, Finland

Discussant: Hilde Van Keer, Ghent University, Belgium

Parental assistance with homework is the most typical way of getting involved with children's schooling, however, its frequency and type may vary across countries. It has also been suggested that parental homework assistance promotes children's leaning and motivation, however, some research challenge this notion by suggesting that it depends on the type of parental homework assistance, the type of motivational and achievement-related child outcomes, and other parent (e.g., education, self-efficacy) and child (e.g., gender) characteristics. Drawing on the recent studies in four countries, papers in this symposium present new evidence on the frequency and type of parental homework assistance, preconditions of parental homework assistance, and its relation to the children's achievement and motivation. The first paper (Greece and Finland) compares parental homework assistance among Grade 4 students in Greece and Finland and offers insights into factors impacting parental homework assistance. The second paper (Finland) examines the relations between parental homework assistance and children's task-avoidant behaviour across Grades 2–4. The third paper (Estonia) investigates the relation between parental homework assistance, children's math achievement and motivation (math self-concept and task persistence) across Grades 3–6. The final paper (Germany) on Swiss data emphasizes the importance of distinguishing between the quantity and the quality of parental homework involvement and children's achievement across Grades 5–6. The discussant (UK) will highlight the importance of distinguishing between the frequency and various types of parental homework assistance, their prevalence across countries, and their differential relation to children's motivational and achievement outcomes.

Parental involvement in children's homework in Greece and Finland

Presenting Author: Anne-Elina Salo, University of Turku, Finland; **Co-Author:** Eleftheria Gonida, Aristotle University of Thessaloniki, Greece; **Co-Author:** Marja Vauras, University of Turku, Finland; **Co-Author:** Ioulia Ntousi Ntousi, Aristotelian University of Thessaloniki, Greece

In this paper, we discuss parental involvement in 4th graders' homework in Greece and Finland, examining parental self-efficacy (PSE), parents' feelings during homework, parental involvement in homework, parents' views on their child's difficulties at school, and child's performance level at school. Possible relations to parents' education and child's gender are also examined. The main aim is to compare parental involvement in Finland and Greece, and to offer insights into factors impacting parents' involvement in homework. This is important, as type and quality of involvement, as well as child's characteristics, are acknowledged to be influential in whether parental involvement in homework is beneficial for the child or not. Data consists of 239 (Greece) and 284 (Finland) fourth graders, and their parents. Analyses were completed using SEM models. Results indicated that in Greece the time parents spent assisting their children in homework was significantly higher than in Finland, and children were also assessed to be less independent in doing their homework. Neither parents' education nor PSE were directly related to parental involvement in either of the countries, but preliminary analyses imply that these influences may be mediated by other variables, such as parents' feelings during homework. In both countries, the feelings during homework were related to PSE, strong PSE leading to feelings of satisfaction, whereas low PSE to worry and anger. This study is expected to provide deeper understanding on the preconditions, as well as amount of parental involvement in homework in two different countries.

Parental homework assistance and children's motivational behavior

Presenting Author: Riikka Hirvonen, University of Jyväskylä, Finland; **Co-Author:** Jaana Viljaranta, University of Eastern Finland, Finland; **Co-Author:** Gintautas Silinskas, University of Jyväskylä, Finland; **Co-Author:** Eija Pakarinen, University of Jyväskylä, Finland; **Co-Author:** Marja-Kristiina Lerkkanen, University of Jyväskylä, Finland; **Co-Author:** Anna-Maija Poikkeus, University of Jyväskylä, Finland; **Co-Author:** Jari-Erik Nurmi, University of Jyväskylä, Finland

One type of parental involvement in children's schooling is homework assistance, such as help, monitoring and autonomy granting. Previous literature has mainly focused on the relationships between parental homework assistance and academic achievement and less attention has been given to children's motivation as an outcome of homework assistance. In this presentation, 363 Finnish children and their mothers participated in a study that examined the relations between parental homework assistance and children's motivational behavior, that is, task-avoidant behaviour from Grade 2 to Grade 4. The results showed, in general, that the more autonomy granting mothers reported, the less task-avoidant behavior children showed; and the less task-avoidant behavior children showed, the more autonomy granting their mothers provided later on. In addition, the more mothers helped and monitored their children, the more task-avoidant behaviour was reported; and the more task-avoidant behaviour children exhibited, the more mothers tried to help and monitor their children later on. Children's skill level in math and reading did not affect these associations. Altogether, the results indicate that not all homework involvement leads to positive outcomes. In addition, the relationship between homework assistance and motivational behavior is reciprocal over time: it is not only mothers' assistance that has an effect on children's motivation but also children's motivation affects how mothers act in homework situations. As a conclusion, it would be important to

help parents in finding appropriate ways to individually support their children who all might have different needs for parental involvement in their schooling.

Perceived parental involvement in homework and children's math performance and motivation

Presenting Author:Anna-Liisa Jögi, Tallinn University, Estonia; **Co-Author:**Eve Kikas, Tallinn University, Estonia; **Co-Author:**Gintautas Silinskas, University of Jyväskylä, Finland

The present study examined the longitudinal associations between child-perceived parental involvement in homework (i.e., control and support) and children's math performance and motivation (task-persistent homework behavior and math self-concept). Also, gender differences in these associations were investigated. Estonian children (249 boys, 263 girls) completed math performance tests and evaluated their self-concept in math in Grade 3 and Grade 6. Mothers (n = 420) evaluated children's task persistence during homework in Grade 3 and Grade 6. Children reported their perceptions concerning parental homework involvement in math in Grade 6. In all the analyses, children's general ability in Grade 3 and maternal education were controlled for. The results showed, first, that low self-concept in math predicted increased perceived parental control, which, in turn, predicted low math performance, low task persistence in homework situations, and low math self-concept. Second, perceived parental support was related to increased children's motivation (i.e., task persistence during homework) in Grade 6. Finally, child gender moderated associations between perceived parental control and motivation, suggesting that parental control was detrimental for boys' task persistence and math self-concept. The present study is one of the few studies that relate child-perceived parental involvement not only to children's performance but also to children's motivation, after accounting for children's general ability and maternal education. The results of the present study suggest that motivational and gender-related aspects should be emphasized when encouraging parents to get involved with their children's homework.

The need to distinguish between the quantity and quality of parental homework involvement

Presenting Author:Hanna Dumont, German Institute for International Educational Research (DIPF), Germany; **Co-Author:**Sandra Moroni, University of Bern, Switzerland

In research on parental homework involvement, studies analyzing its effects on students' achievement often come to mixed findings. In the present paper, the authors argue for the need to distinguish between the quantity and the quality of parental homework involvement. On the basis of longitudinal questionnaire data from 1,685 Swiss students in Grades 5 and 6, the research shows that completely different conclusions about the effectiveness of parental homework involvement were reached depending on which aspect was looked at: How often parents helped with homework was negatively associated with the development of achievement, whereas homework help that was perceived as supportive had positive predictive effects, and homework help perceived as intrusive had negative effects. Moreover, the results showed that effect sizes would have been overestimated if students' prior achievement and family background were not controlled.

Session L 12

1 September 2017 10:15 - 11:45

Main Building A - A4

Symposium

Cognitive Science

Scientific Reasoning: Domain-Specific or Domain General?

Keywords: Argumentation, Cognitive skills, Competencies, Intelligence, Reasoning, Science education

Interest group: SIG 26 - Argumentation, Dialogue and Reasoning

Chairperson: Frank Fischer, Ludwig-Maximilians-Universität (LMU), Germany

Discussant: Manfred Prenzel, Germany

This symposium will consider the nature of scientific reasoning and argumentation, both of which are often considered as the crucial skills that students need to master the challenges of a knowledge society in the 21st century. These skills have often been conceived of as broadly applicable and largely domain-general. However, the idea of domain-general skills has been challenged more generally from several directions. First, research in differential psychology has tended to showcase so-called "general cognitive abilities" (i.e. intelligence) as the single domain-independent factor in the explanation of variance of performance in cognitive tasks across fields, including scientific reasoning and argumentation. Second, research on scientific reasoning as problem-solving originating from cognitive psychology has emphasized the amount and quality of domain-specific experiences as a major explanatory variable for skilled performance. In particular, expertise research has provided strong evidence for the significant role of deliberate practice developing highly domain-specific excellence. Third, the situated cognition approach has advanced the idea that knowledge is rather bound in activities in specific contexts and cannot easily be transferred into different activities. The papers for this symposium which draw on both empirical and theoretical perspectives emerging from an invited conference held in 2016, will provide a focus for discussion and a consideration of the implications for practice.

What is the Value of General Knowledge of Scientific Reasoning?

Presenting Author:Clark Chinn, Rutgers University, United States; **Co-Author:**Ravit Golan Ducan, GSE-Rutgers University, United States

Many psychologists, educators, and philosophers have argued that reasoning is tightly interwoven with disciplinary knowledge (Duschl & Grandy, 2008). Others have argued that scientific reasoning and argumentation has domain-general as well as domain-specific components (Fischer et al., 2014). In this theoretical analysis, we present arguments that general knowledge of reasoning (even if it exists) lacks *value* in that it fails to enable people to make successful epistemic judgments about real problems in the absence of domain specific knowledge. Our core argument is that assessments used to assess transfer of reasoning in educational and psychological research almost always fall short of assessing performance on tasks representative of problem solving in the real world. We discuss five specific dimensions along which even the best assessments differ from real problems. These differences mean that successful application of a learned reasoning strategy on a simpler task will not carry over to a more complex task. Epistemic decision making “in the wild” lacks the friendly constraints (and sometimes even scaffolds) that facilitate successful transfer on assessments used in educational and psychological research. Thus, the *value* of general knowledge that enables such transfer is limited. It can indeed promote markedly better performance on lower-authenticity tasks requiring moderate knowledge, but this does not mean that performance will also improve on real tasks. However, we argue that general knowledge of reasoning has a different value: It allows learners to come to appreciate why communities that use these reasoning practices can be trusted.

Scientific Reasoning and Argumentation as Cross-Domain Competence

Presenting Author:Frank Fischer, Ludwig-Maximilians-Universität (LMU), Germany; **Co-Author:**Andreas Hetmanek, Technical University of Munich, Germany; **Co-Author:**Katharina Engelmann, Technical University of Munich (TUM), Germany; **Co-Author:**Ansgar Opitz, Ludwig-Maximilians-Universität (LMU), Germany

In this paper we develop a conceptualisation of scientific reasoning and argumentation (SRA) as cross-domain competence. In the first part we advance the theoretical claim that sees SRA as a network of script components on different levels of abstraction that are partly applicable cross-domain. Then, we present evidence from empirical primary studies and meta-analytic research. This provides evidence that cross-domain SRA explains variance in argumentation tasks beyond intelligence and specific content knowledge, can be measured fairly across domains, can be fostered across a variation of content domains, and can be separated from content knowledge. On these theoretical and empirical grounds, we conclude the paper with the sketch of a cyclical process model specifying the interplay of more general and more specific script components in solving particular SRA tasks as well as in the development of expertise in SRA. So far, empirical research does not cover these phenomena of interplay and development of script components on different levels of abstraction. Future research might fill this gap.

Scientific Reasoning: A product not a process?

Presenting Author:Jonathan Osborne, Stanford University, United States

What we teach about scientific reasoning has been bedeviled by a lack of clarity about the construct. Drawing on the insights emerging from a cognitive history of science, which looks at the products rather than the process of scientific reasoning, it will be argued that a conception of scientific reasoning based on six ‘styles of scientific reasoning’ offers better insights into what should be taught about science and scientific reasoning. Each ‘style’ requires its own specific ontological and procedural entities, and invokes its own epistemic values and constructs. Hence, scientific reasoning is domain dependent. Previous attempts to develop a coherent account of scientific reasoning have neglected the significance of either procedural knowledge, epistemic knowledge or both and overemphasized the role of experiment and hypothetico-deduction focusing on attempts to define the nature of such reasoning itself. In contrast, ‘styles of reasoning’ and its focus on the products of reasoning recognizes the need for all three elements of domain-specific knowledge, the complexity and situated nature of scientific practice, and the variety of scientific thought. Thus, the construct of ‘styles of reasoning’ offers a more coherent conceptual schema for the construct of scientific reasoning – one of the major goals of any education in the sciences – and something which domain-general accounts have notably failed to do.

Primary domain-general v. secondary domain-specific knowledge: Is there a link between the two?

Presenting Author:André Tricot, University of Toulouse, France; **Co-Author:**Florence Lespiau, University of Toulouse, France; **Co-Author:**Jean-Francois Bonnefon, Toulouse School of Economics, University of Toulouse, France

Secondary domain-specific knowledge is the kind of knowledge taught at schools. Effort, motivation and time are needed when learning this type of knowledge. Its acquisition is challenging when compared to domain-general, primary knowledge which is acquired easily, effortlessly and quickly. Our general hypothesis is that primary knowledge could be used as a “precursor” to enhance secondary knowledge learning. We conducted seven experiments to investigate the best way to introduce logical reasoning (conditional rules, syllogisms) to learners in order to enhance their performance and motivation. We varied the type of knowledge for each problem (primary or secondary) and the presentation order (primary or secondary knowledge presented first). Our findings showed that primary knowledge enhanced performance and motivation as well as the confidence in given responses while secondary knowledge undermined motivation and generated a feeling of conflict. Moreover, when primary knowledge was presented first, the deleterious effects of secondary knowledge decreased. The results seemed to suggest that primary knowledge should be taken into account in learning situations and not considered irrelevant as something which has been “already learned”.

Session L 13

Physical fitness, motor skills and academic performance in early and middle childhood

Keywords: Achievement, Cognitive development, Early childhood education, Neuroscience

Interest group:

Chairperson: Claudia Roebers, University of Bern, Switzerland

Discussant: Esther Hartman, Netherlands

There is an unchanged interest in the role of children's physical activity and motor skills for academic performance, both from the perspective of educators and from researchers. From an applied perspective, motor skills and physical fitness are considered to be important aspects for children's school readiness that should be targeted in early education programs. From a theoretical perspective, researchers have tried to better understand the link between motor and cognitive performance. Against the background of current findings, a neuropsychological explanation for the motor-cognitive performance link seems to best fit with the data. Thereafter, the association between motor and cognitive performance can be explained with activation in the same brain regions (prefrontal cortex, the basal ganglia, and the cerebellum). Moreover, the neuropsychological construct of executive functions, also associated with these same brain regions, was found to be responsible for the link between motor skills and academic performance. In the planned symposium, four large scale studies from three different countries (Mexico, Portugal and Switzerland) will be presented. All of them target physical activity and/or motor skills and academic performance in children aged 3 to 10 years. Consistently across studies, a significant impact of motor skills on academic performance was found. The studies differ in terms of additional constructs included into the prediction of academic performance and draw a differentiated pattern of results as to the underlying mechanisms of this motor-academic performance link, including executive functions, precursors of academic achievement, and leisure time activities.

Motor and Cognitive Skills: Structure and Early Links in Young Mexican Children

Presenting Author: Fabiola Figueroa Esquivel, University of Groningen, Netherlands; **Co-Author:** Mayra Mascareño, University of Groningen, Netherlands; **Co-Author:** Esther Hartman, Center for Human Movement Sciences, University Medical Center Groningen/University of Groningen, Netherlands; **Co-Author:** Jan-Willem Strijbos, University of Groningen, Netherlands; **Co-Author:** Roel J. Bosker, Rijksuniversiteit Groningen, Dept of Education and GION, Netherlands

The early childhood education (ECE) years are associated with rapid brain development and represent an important period in the acquisition of motor skills and cognitive skills, such as executive functions (EF) and pre-academic skills (Koziol et al., 2012; Willoughby et al., 2012). This study aimed to examine the measurement of these constructs throughout the preschool period (ages 3 to 6) on a Mexican sample and to explore their relations in this early stage. Configural invariance was found for the measures of executive functions (inhibitory control and working memory) and academic skills across the three grades of preschool. For motor skills, an exploratory factor analysis revealed a different structure than the one commonly found in standardized tests; after modeling this structure, configural invariance was also achieved. Preliminary results showed positive but marginally significant relations between pre-academic skills and the three domains of motor skills identified: fine motor skills, motor accuracy and dynamic motor skills. Executive functions and academic skills were also moderately and positively related. From the motor domains, only fine motor skills were significantly related to executive functions. These results support the presence of early relations between motor and cognitive domains on Mexican young children. Importantly, a different factorial structure of motor skills was observed in this particular sample. Future analysis will focus on exploring the longitudinal relations between these constructs.

Motor Skills, Executive Functions, and Basic Numerical Skills predict later mathematics achievement

Presenting Author: Venera Gashaj, University of Bern, Switzerland; **Co-Author:** Fred Mast, University of Bern, Switzerland

Recent research has shown close links between motor skills, executive functions and mathematical skills. Therefore, this study examined the interrelations between fine motor skills, executive functions, and basic numerical skills in kindergarten as well as their predictive value for mathematics achievement in second grade in a normative sample of 136 children. The results indicate that each of the predictors has a significant value for later mathematics achievement, however, when simultaneously estimated basic numerical skills are the most important predictor when considering the relative predictive power. This are the best predictor suggests that domain-specific factors seem to have a greater impact than domain-general factors.

Motor coordination and executive functions: Relative contributions to early academic achievement

Presenting Author: Claudia Roebers, University of Bern, Switzerland; **Co-Author:** Nicole Oberer, University of Bern, Switzerland

The idea that motor skills and cognitive development, as indexed for example, through school achievement are closely linked, is not new to the field but goes back to Piaget's theory assuming a biological base for both, motor and cognitive development. Recent research trying to uncover the underlying mechanisms responsible for this relation relatively consistently support a neuropsychological explanation. According to this, executive functions, a set of higher-order

cognitive processes including shifting, updating and inhibition mediate the link between motor coordinative skills and school achievement. It is unclear, however, which of these executive function subcomponents are more important than others. In the to-be-presented large-scale longitudinal study, kindergarteners' motor coordination and executive functions will be used to predict second grader's school achievement in terms of both mathematics and reading. Thereby, the specific focus will be laid on the single subcomponents of executive functions (updating, inhibition and switching) and their relative predictive power for predicting children's academic achievement, over and above motor skills. Results of the conducted path analyses suggest that – as expected – motor skills significantly contribute to the prediction of early school achievement. More precisely, motor skills were found to be more important for mathematics than for reading. And, of the three executive function subcomponents, updating was found to be the most important aspect for the prediction of academic performance. This pattern generalized to both, mathematics and reading. Findings will be discussed in terms of the underlying mechanisms and their relevance for tailoring early education programs.

Sedentary time and academic achievement in schoolchildren

Presenting Author: Luis Lopes, University of Porto, Portugal

This study aimed to examine the relationship between objectively measured sedentary time and direct and objective indicators of academic achievement (AA) in Portuguese children aged 9 and 10 years, accounting for accelerometer wear time, age, gender, body mass index, socio-economic status, mother education level, cardiorespiratory fitness, moderate-to-vigorous physical activity and motor competence. The sample comprised of 213 children's (51.6% girls) aged 9.46 ± 0.43 years, from the north of Portugal. Sedentary time was measured with accelerometry and AA was assessed using the Portuguese Language and Mathematics *National Exams* results. Multilevel Linear Regression models were fitted to assess regression coefficients predicting AA. Results showed that objectively measured total sedentary time was not associated with AA, after adjusting for potential confounders. Although, motor competence was significantly associated with AA.

Session L 14

1 September 2017 10:15 - 11:45

Main Building E - E222

Symposium

Scientific Reasoning from Childhood to University: New Assessment Approaches for New Insights

Keywords: Argumentation, Assessment methods and tools, Cognitive development, Cognitive skills, Conceptual change, Quantitative methods, Reasoning, Science education

Interest group:

Chairperson: Peter Edelsbrunner, ETH Zurich, Switzerland

Discussant: James Pellegrino, University of Illinois at Chicago, United States

Basic experimentation skills are in the focus of educators and learning researchers because they represent important steps in cognitive development, and at the same time preconditions for more advanced scientific reasoning. The symposium brings together four projects in which assessment approaches to scientific reasoning that go beyond traditional interview- or multiple-choice-based methods are applied to examine significant questions from new perspectives. Peteranderl and colleagues train primary school students in experimentation. They apply an elaborate assessment which provides a detailed overview of the training's impact on the prevalence of students' misconceptions about experimentation. Schwichow applies structural equation modeling to examine students' development of the control of variables-strategy throughout adolescence. The models provide insights into relations of this domain-general skill with domain-specific knowledge. Edelsbrunner and colleagues compare students' understanding of the control of variables-strategy between multiple-choice- and open answer-items. Application of latent class analysis reveals information about distinct answer patterns that would be hidden in sum score analysis. Osterhaus and colleagues apply latent class analysis on university students' strategies in interpreting contingency tables. They find unexpected answer patterns, and intriguing divergent results in comparison to self-report measures. The four contributions partially overlap in methods and questions but all of them have special measurement and statistical scaling characteristics that emphasize the importance of putting thought into assessment in research on scientific reasoning. The studies with their special approaches reveal partially unexpected insights into students' scientific reasoning that raise implications for learning and teaching in science education and beyond.

Assessment of misconceptions about experimentation in primary school children

Presenting Author: Sonja Peteranderl, ETH Zurich, Switzerland; **Co-Author:** Anne Deiglmayr, ETH Zurich, Switzerland;

Co-Author: Ralph Schumacher, ETH Zurich, Switzerland; **Co-Author:** Peter Edelsbrunner, ETH Zurich, Switzerland; **Co-**

Author: Elsbeth Stern, ETH Zurich, Switzerland

A core component of scientific reasoning is the ability to design conclusive, un-confounded experiments, and to interpret and evaluate the obtained data, summarized as experimentation skills. This research focuses on the assessment of misconceptions about experimentation in primary school students. Our focus is on the "control of variables" strategy (CVS), a core skill in planning, conducting, and evaluating scientific experiments for testing causal hypotheses. A paper-based test for children in primary school (5th and 6th grade) was developed to assess students' understanding of CVS, and particularly their misconceptions as represented in incorrect experimentation strategies. Our assessment of $N = 180$ students (M (age)

= 12 years, $SD = 0.5$) during an experimentation skills training shows that the different types of test items are reliable. The results from the assessment provide detailed information about development in students' misconceptions from before to after the training. For example, we find that while the number of students who incorrectly vary no or all variables decreases after the training, the number of students who vary the wrong variable slightly increases. Our results inform about students' learning during an experimentation skills training and we discuss implications for training design in order to support students' overcoming of misconceptions about experimentation. The study indicates that going into details in assessments offers valuable information about students' learning about experimentation.

The development of domain-general reasoning skills and their dependency on domain-specific knowledge

Presenting Author:Martin Schwichow, University of Education Freiburg, Germany

The control-of-variables strategy (CVS) incorporates the important domain-general scientific reasoning skills of designing and interpreting controlled experiments. Therefore, CVS is a prominent concept in numerous science standards. It consists of the four sub-skills: (a) understanding the indeterminacy of uncontrolled experiments, (b) planning, (c) identifying, and (d) interpreting controlled experiments. However, studies on the development of CVS skills are restricted to one or two CVS sub-skills and content from everyday life. This intends that CVS is a domain-specific reasoning strategy but ignores that students' reasoning skills depend on the content of the reasoning tasks. The cross-sectional study with $N = 1013$ German high school students investigates the development of the whole CVS construct from 5th to 13th grade (ages 9 to 22) and its dependency on domain-specific content knowledge. The raw data from a CVS and a physics knowledge online test were transformed into person ability measures by utilizing the Rasch model before they were analyzed by structure-equation modeling (SEM). Results of the SEM show that students' CVS skills depend on their domain-specific knowledge about the content of the experiments but not on their grade, as there is only a direct effect of grade on physics knowledge. This is surprising, as no CVS item requires any physics knowledge. An explanation for this finding is that the development of domain-general scientific reasoning skills and domain-specific knowledge "bootstrap" one another. Implications of this finding for science teaching are discussed.

Argumentation about the Control of Variables-Strategy: A large-scale Study in Primary School

Presenting Author:Peter Edelsbrunner, ETH Zurich, Switzerland; **Co-Author:**Anne Deiglmayr, ETH Zurich, Switzerland

The development and training of the control of variables-strategy (CVS) have been studied using qualitative assessments, often interview-based, and using quantitative assessments, mostly multiple-choice-based. We aimed at combining the strengths of both approaches by examining on a large-scale cross-sectional basis primary school students' argumentative understanding of CVS. $N=3018$ first to sixth graders (mean age=9.11, $SD=1.48$) received five multiple-choice questions and also five open questions in which they had to provide short written explanations for their judgments of the quality of experimental designs. Applying latent class analysis on students' multiple-choice-answers and on their coded open answers, we found three answer patterns. The frequency of a class in which students were not able to answer any questions correctly decreased across grades (grade 1: 87% of students, grade 6: 17%). The frequency of students able to answer the multiple-choice-items correctly but not the open items increased slightly across grades (grade 1: 12%, grade 6: 25%). The frequency of students who could answer all questions correctly increased strongly, from 1% in the first grade to 58% in the sixth grade. These results provide a cross-sectional overview, showing that in sixth grade more than half of students possess understanding of the principles underlying control-of-variables-strategy and also the ability to express their understanding in short written explanations. The results also show that multiple-choice-assessments do not differentiate between the mere understanding and explicit proficiency in CVS, which represents an imperative skill in collaborative inquiry.

How to know whether two variables are related? Modeling reasoners' strategies in data interpretation

Presenting Author:Christopher Osterhaus, University of Munich, Germany; **Co-Author:**Jackie Magee, University of Wisconsin-Madison, United States; **Co-Author:**Andrea Saffran, LMU Munich, Germany; **Co-Author:**Beate Sodian, Ludwig-Maximilians-Universität (LMU), Germany; **Co-Author:**Martha Alibali, University of Wisconsin-Madison, United States

People often have difficulty interpreting data presented in contingency tables. A study involving 109 college students investigated which strategies people use when making judgments about this type of data. To describe reasoners' strategies, we used two distinct approaches, the analysis of self-report and a latent class approach. The latent class analysis revealed three distinct strategies: (1) compute conditional probabilities (40%); (2) compare two cells (23%); and (3) anchor and compare (37%), which is a suboptimal, heuristic four-cell strategy in which reasoners try to hold constant two cells and they base their final judgment on the other two cells. The analysis of self-report revealed, in accordance with the results of the latent class analysis, a large heterogeneity in the self-reported strategies. Whereas 35% and 11% of all participants consistently reported the conditional-probabilities or the two-cell strategy, respectively, the majority of reasoners (54%) either used none of the strategies in a consistent manner or they reported the use of alternative strategies. Interestingly, the results of the latent class approach and the analysis of self-report did not converge: Participants who consistently reported the use of the conditional-probabilities strategy solved, on average, only 54% of the items correctly, and the latent class analysis classified merely a third of them as users of this most adequate strategy, which should result in perfect performance. We discuss these findings with respect to differences between strategy report and strategy use, and we suggest several factors that may bring about the differences between these two aspects of performance.

Session L 15

1 September 2017 10:15 - 11:45

Pinni B - B1096

Symposium

Instructional Design, Learning and Social Interaction, Teaching and Teacher Education

Critical Thinking in Higher Education: A Closer Look at Teachers and Students

Keywords: Attitudes and beliefs, Citizenship education, Higher education, Instructional design, Metacognition, Peer interaction, Reasoning, Reflective society, Science education, Teaching / instruction

Interest group: SIG 06 - Instructional Design, SIG 11 - Teaching and Teacher Education, SIG 26 - Argumentation, Dialogue and Reasoning

Chairperson: Anita Heijltjes, Avans university of applied sciences, Netherlands

Organiser: Lara van Peppen, Erasmus University Rotterdam, Netherlands

Organiser: Eva Janssen, Utrecht University, Netherlands

Discussant: Jan Elen, KU LEUVEN, Belgium

Fostering students' critical thinking (CT) skills is one of the major ambitions of higher education. Not only because CT-skills positively relate to learning outcomes, but also because a lack of CT-skills can result in erroneous decisions that may have serious consequences, both in daily life and in highly complex professional domains. To realize this ambition, however, teachers in higher education need to possess CT-skills themselves, feel confident teaching CT, and need to know which teaching methods are effective. In this symposium, we address these aspects of teaching CT in higher education. The first and second contribution focus on effective instructional strategies for fostering CT. The first contribution presents results of a study on the effects of self-explaining during practice with CT tasks (focusing on avoiding reasoning biases) on learning and transfer. The second contribution will elaborate on the effects of structured reflection to foster critical thinking in medical diagnosis. The third and fourth contributions focus on acquiring new insights into (pre-service) teachers' CT-skills. The third contribution presents the results of a descriptive study on the relationships between teachers' CT-skills, dispositions, and attitudes towards teaching CT in higher education. The fourth contribution will elaborate on a different component of CT, namely, pre-service teachers' capacity to develop independent opinions, and in particular to challenge social or peers' ideas. Finally, our discussant – expert in the field of instructional psychology and CT in higher education – will discuss the four contributions and will provide some interesting and critical comments.

Effects of Self-explaining on Learning and Transfer of Critical Thinking Skills

Presenting Author: Lara van Peppen, Erasmus University Rotterdam, Netherlands; **Co-Author:** Peter Verkoeijen, Erasmus University Rotterdam, Netherlands; **Co-Author:** Anita Heijltjes, Avans University of Applied Sciences, Netherlands; **Co-Author:** Eva Janssen, Utrecht University, Netherlands; **Co-Author:** Denise Koopmans, Utrecht University, Netherlands; **Co-Author:** Tamara Van Gog, Utrecht University, Netherlands

Fostering students' critical thinking (CT) skills is an important objective of higher education. However, little is known about effective teaching methods, especially regarding one important aspect of CT: avoiding biased reasoning. Recent research on learning to avoid reasoning biases has shown that explicit instructions combined with practice are effective for learning but not for transfer. Because self-explaining (i.e. explaining ones reasoning process) during practice has proven promising for promoting transfer in other tasks, we investigate whether it also fosters learning and transfer on 'heuristics and biases tasks'. Seventy-nine first-year students of a Dutch University of Applied Sciences completed a pretest with eight 'heuristics and biases' reasoning tasks across four categories (base-rate, conjunction, Wason selection, and syllogistic reasoning tasks). After the pretest they received instructions on two of the four task categories (base-rate and Wason or conjunction and syllogism, this was counterbalanced between participants). They then practiced these tasks either with (self-explaining condition) or without (no self-explaining condition) self-explanation prompts that asked them to motivate their answers. This was followed by an immediate and delayed (two weeks later) posttest on all four task categories, to measure effects on learning (performance on practiced tasks) and transfer (performance on non-practiced tasks). Results showed that instruction and practice had a positive effect on learning and transfer as measured by multiple-choice performance (i.e. pretest to posttest increase). Surprisingly, self-explaining had a negative effect on learning tasks (but not on transfer tasks) on the posttest when considering the full (i.e., motivated) answers.

Personal or Social Responsibility? Challenging Social Ideas as a Component of Critical Thinking

Presenting Author: Maria Pilar Jimenez-Aleixandre, University of Santiago de Compostela, Spain; **Co-Author:** Blanca Puig, University of Santiago de Compostela, Spain; **Co-Author:** Pablo Brocos, University of Santiago de Compostela, Spain

There is consensus in acknowledging critical thinking (CT) as an important goal in education, but there are different views about its meaning, components, and how to promote it. Authors (2012) proposed a characterization of the components of CT, including: 1) the use of epistemic criteria in evidence evaluation; 2) the disposition to seek reasons and to evaluate the reliability of sources; 3) the capacity to develop independent opinions and to challenge socially established ideas; and 4) the capacity to analyse and criticize discourses that justify inequalities and asymmetries; being these last two components related to critical theory. This paper focuses on component 3: the capacity to develop independent opinions, and in

particular to challenge social or peers' ideas. The research objective is to examine their own perception of personal and social responsibility, and of their capacity to make independent decisions on a socio-scientific issue by pre-service teachers (N=85). First we discuss this component in connection with Facione's (1990) consensual definition of CT as purposeful, self-regulatory judgment, and with the skills identified in that panel, in particular evaluation. Studies documenting the need for peer group approval, especially in adolescence, and the difficulties experienced for challenging or overcoming socially established ideas, are revised. Second, we analyse participants' written and oral arguments about sustainable and healthy diets (vegetarian versus meat), in terms of the self-reported social influence in their opinions and decisions. The results point to a substantial weight of socially established ideas and to a shifting of responsibility about sustainability onto society.

Critical Thinking in Medical Diagnosis: Structured Reflection Remedies Error and Fosters Learning

Presenting Author:Tamara Van Gog, Utrecht University, Netherlands; **Co-Author:**Josepha Kuhn, Erasmus MC, Netherlands; **Co-Author:**Sylvia Mamede, Erasmus MC, Netherlands; **Co-Author:**Pieter van den Berg, Erasmus MC, Netherlands

The first part of this talk consists of a review of the effects of structured reflection on medical diagnosis. We will highlight some key empirical studies that have shown that structured reflection is not only an effective tool for remedying diagnostic error in physicians, but also for fostering diagnostic competence in medical students. An open question, however, is whether students or residents cannot only learn more about diseases by engaging in or observing structured reflection, but can also learn the method itself and apply it in diagnosing future, unrelated cases. We are currently conducting an empirical study that addresses this question, which will be presented in the second part of the talk. In this experiment, 120 general practice residents' are randomly assigned to one of three conditions in the learning phase: (1) no reflection (control); (2) engaging in structured reflection; (3) studying modeling examples of structured reflection. It is hypothesized that studying examples will require less mental effort during the learning phase, and will foster diagnostic (less errors) and reflective competence compared to the other conditions, and that engaging in structured reflection will be more effective than not doing so (i.e. control < structured reflection < modeled structured reflection). The results of this study will contribute to the development of guidelines for fostering critical thinking in medical education, which may be applicable in other professional domains as well.

Teachers' Critical Thinking Skills, Dispositions, and Attitudes towards Teaching in Higher Education

Presenting Author:Eva Janssen, Utrecht University, Netherlands; **Co-Author:**Wietse Meulendijks, Utrecht University, Netherlands; **Co-Author:**Tim Mainhard, Utrecht University, Netherlands; **Co-Author:**Anita Heijltjes, Avans University of Applied Sciences, Netherlands; **Co-Author:**Lara van Peppen, Erasmus University Rotterdam, Netherlands; **Co-Author:**Tamara Van Gog, Utrecht University, Netherlands

Fostering students' critical thinking (CT) skills is one of the major ambitions of higher education. Not only because CT-skills positively relate to learning outcomes, but also because a lack of CT-skills can result in erroneous decisions that may have serious consequences, both in daily life and in highly complex professional domains. Effective CT instruction places great demands on teachers educating it. They need to possess CT-skills themselves and also feel confident teaching CT. Aim of the present study was to gain more insight into the relationships between teachers' CT-skills, dispositions, and attitudes towards teaching CT (i.e., perceived importance and own perceived competence). A total of 242 higher education teachers completed an online questionnaire, which addressed these variables. Teachers were classified into three domains of teaching to explore whether this affected their skills, dispositions, and attitudes. Results indicated that teachers in the technology domain performed best on the CT-task, followed by teachers in the domain of economics, and teachers in the domain of health, respectively. Teachers' CT dispositions partly predicted performance on the CT-task. The results did not reveal an interaction effect between domain of teaching, dispositions, and performance on the CT-task. Teachers' attitudes toward teaching CT did not differ across teaching domains, but were positively related to their CT dispositions. The implications of these findings and directions for future research will be discussed.

Session L 16

1 September 2017 10:15 - 11:45

Linna - Väinö Linna (K104)

Symposium

Instructional Design

Effects of explicit and implicit guidance on external and self-regulation through conflict awareness

Keywords: Argumentation, Collaborative Learning, Computer-supported collaborative learning, Instructional design, Knowledge creation, Reflection, Self-regulation, Student learning, Video analysis

Interest group: SIG 06 - Instructional Design

Chairperson: Daniel Bodemer, University of Duisburg-Essen, Germany

Organiser: Dimitra Tsovaltzi, Saarland University, Germany

Organiser: Daniel Bodemer, University of Duisburg-Essen, Germany

Organiser: Melanie Erkens, University of Duisburg-Essen, Germany

Organiser: Sven Heimbuch, University of Duisburg-Essen, Germany

Organiser: Thomas Puhl, Saarland University, Germany

Organiser: Lenka Schnaubert, University of Duisburg-Essen, Germany

Organiser: Armin Weinberger, Saarland University, Germany

Discussant: Christa Asterhan, Hebrew University of Jerusalem, Israel

The symposium brings together state-of-the-art research from two research directions: guidance (explicit and implicit) and regulation processes of learning (external and self-regulation). Researchers from both research areas across the globe will present their work and identify connections and common research questions by help of an integrational model. The model is a first attempt to address the differential effects of explicit and implicit guidance by taking into consideration the modes of regulation they represent. It introduces conflict awareness as a possible mediator between guidance and regulation processes, which could systematically explain corresponding learner behavior and learning outcomes. The symposium brings an alternative perspective into the long-standing question of how much and what kind of guidance is needed (Kirschner & Clark, 2006 ; Hmelo-Silver, Duncan, & Chinn, 2007) and seeks to bridge research from (socio)-cognitive conflict (Asterhan et al, 2010) and instructional design (Bodemer, 2011; Hadwin, Järvelä, & Miller, 2011; Puhl, Tsovaltzi & Weinberger, 2015; Stegman, Kollar, Weinberger & Fischer, 2016). A short introduction of the model will set the scene. Individual contributions will present empirical research addressing assumptions of the model, and may argue for altering or extending the model. The discussant is an expert in a key component of the model: (socio)-cognitive conflict. She will lead the presenters and the audience to critically assessing the model, bringing together the impulses of the presentations. Overall, the symposium will pinpoint areas of empirical research that require scrutiny before a more comprehensive model can be derived that poignantly represents the identified research questions.

Implicit guidance by fostering conflict awareness in collaborative learning scenarios

Presenting Author: Lenka Schnaubert, University of Duisburg-Essen, Germany; **Co-Author:** Melanie Erkens, University of Duisburg-Essen, Germany; **Co-Author:** Sven Heimbuch, University of Duisburg-Essen, Germany; **Co-Author:** Daniel Bodemer, University of Duisburg-Essen, Germany

Implicit guidance within collaborative learning provides information on conditions of learning learners may utilise and thus heavily builds on individual skills. It does not explicitly specify activities appropriate under these circumstances. One important trigger of learning within collaborative settings is the individual awareness of inter- or intra-personal conflicts. To investigate how group awareness information fosters conflict-related regulation processes, we conducted a series of experiments in different contexts. In a four-group randomised experiment ($N = 130$ dyads) we visualised intra- and interpersonal conflict information and found that dyads relied on the visualised information when deciding what material needed further attention. However, we did not find effects on learning outcomes. Another two-group randomised experiment ($N = 54$) in which we extracted knowledge from text further revealed that the support of intrapersonal conflicts influences communication behaviour and increases knowledge. In another three-group randomised experiment ($N = 81$) we investigated how observed interpersonal controversies in Wiki discussions are processed. We found that the provision of controversy awareness visualisations on discussions heavily influenced selection behaviour, reading intensity and contribution behaviour. Although we did not find direct effects on the learning outcome, we found positive influences on the contribution quality. In conclusion, implicit guidance through visualisations seems to support various forms of inter- and intrapersonal conflict awareness. However, effects on learning outcomes vary. While implicit guidance seems to support learners in identifying a need for action, more explicit forms of guidance might be needed to support appropriate handling of conflicts for learners without sufficient self-regulatory skills.

Promoting Socially Shared Regulation in collaboration: Implicit guidance of strategic planning

Presenting Author: Rebecca Edwards, University of Victoria, Canada; **Co-Author:** Allyson Hadwin, University of Victoria, Canada; **Co-Author:** Mariel Miller, University of Victoria, Canada; **Co-Author:** Shayla Starcheski, University of Victoria, Canada

Shared planning is a critical, but challenging, aspect of successfully regulating collaboration. Although explicit guidance can support planning, effects may not extend to performance. As such, this study examined the effect of different types of implicit guidance on groups' shared planning for a collaborative task. By providing groups with visualizations of their members' individual plans, we aimed to help groups become aware of differences and interact more meaningfully with planning scripts. Groups were assigned to one of three implicit guidance conditions (numeric, non-numeric, or no-visualization). The effect of condition was examined for (a) accuracy of shared task perceptions, (b) discussion quality, and (c) collaborative task performance. Results indicated groups provided with non-numeric visualizations engaged in more transactive planning discussion and constructed more accurate shared task perceptions than groups provided with numeric or no visualization. Group performance did not significantly differ across condition. Implications for guidance of regulation is discussed.

Applying a macro-script to enhance teacher education students' collaborative knowledge construction

Presenting Author: Essi Vuopala, University of Oulu, Finland; **Co-Author:** Piia Naykki, University of Oulu, Finland; **Co-Author:** Jaana Isohätälä, University of Oulu, Finland; **Co-Author:** Sanna Järvelä, University of Oulu, Finland

Training teacher education students' collaborative learning skills, including productive participation in collaborative knowledge construction, is to prepare them to the 21st century. One way to promote effective collaborative knowledge construction is the use of macro-script that explicitly guide learners during their learning processes. Although much is known about the effects of scripts in collaboration, there is a lack of research conducted in authentic learning contexts

within an extended period of time, especially using video-observation and process-oriented methods. This study investigates, based on video observations (25 hours), how teacher education students ($N = 20$) use a macro-script, which supports strategic collaborative learning, and how they collaboratively construct knowledge by contrasting cases in which groups used the script either actively or passively. The results show that there was a significant difference between the groups in macro-script use, pointing out that collaborative knowledge construction processes varied between the groups who used the script actively or passively.

Effects of Fading Out Collaboration Scripts on Argumentation and Learning Outcomes in Facebook

Presenting Author: Thomas Puhl, Saarland University, Germany; **Co-Author:** Essi Vuopala, University of Oulu, Finland; **Co-Author:** Tarja-Riitta Hurme, University of Turku, Finland; **Co-Author:** Armin Weinberger, Saarland University, Germany

Social Media like Facebook have been used in blended learning concepts for argumentation and may provide an opportunity to facilitate argumentative processes in computer-supported collaborative learning (CSCL) scenarios. Collaboration scripts can be implemented in social networking sites, to provide additional information, and explicitly guide learners to formulate sound arguments, spot conflicts, review and co-construct arguments. In the field of scripting, there is not much evidence on how fading scripts influence processes of argumentative knowledge construction over time, which has been considered an indication of reflection processes and script internalization. Therefore, this field study ($N = 39$) aims to collect evidence about supporting argumentation processes through collaboration scripts by changing the degree of explicit guidance. In a within design, we first compared a script with predefined roles to manage processes, induce and resolve conflicts. Additional sentence openers intended to make the guidance more explicit. This combination of instructional elements was compared with a subsequent roles-only script, and finally with no script support at all. We found effects for explicit guidance on processes of argumentative knowledge construction, but not on domain-specific knowledge outcomes. We show and discuss how explicit guidance fosters productive argumentation practices and how fading out guidance reduces quality of arguments.

Session L 17

1 September 2017 10:15 - 11:45

Virta - 113

Symposium

Learning and Social Interaction

Analysing productive classroom and professional dialogues across contexts using different tools

Keywords: Argumentation, Assessment methods and tools, Collaborative Learning, Conversation / Discourse analysis, Pre-service teacher education, Primary education, Social interaction, Teacher Professional Development, Video analysis

Interest group: SIG 26 - Argumentation, Dialogue and Reasoning

Chairperson: Sara Hennessy, University of Cambridge, United Kingdom

Discussant: Alina Reznitskaya, Montclair State University, United States

Research on productive dialogue across educational contexts has received increasing attention over the decades. While theoretically there seems to be considerable consensus on the features that characterize productive forms of dialogue, measuring them in valid and reliable ways becomes more challenging. This symposium aims to bring together different approaches of capturing productive dialogue across contexts. Four papers describe development and application of different instruments used for this purpose by focusing on different contexts: classroom, teacher education and teacher professional development. The first paper describes a coding scheme developed for the analysis of teacher and student argumentation in peer-group work in Chile. The second paper describes the evolution of a new coding scheme for analysing teacher-orchestrated dialogue in primary schools in the UK. The third paper presents the development and trialling of a coding scheme for identifying at scale features of productive dialogue in teacher team meetings in schools in Israel. Similarly, the fourth paper focuses on the quality of teacher feedback and presents the coding of pre-service teachers' peer-interactions in an online learning environment. Comparisons between the four coding schemes will shed light on the different affordances of each tool. The roles of validity and reliability will be discussed in relation to these comparisons. Synthesizing this work can provide insights into the methodological challenges faced in this field, but also into common approaches that can be used across contexts in future work.

The development of a coding scheme to analyse collaborative group argumentation

Presenting Author: Antonia Larrain, Universidad Alberto Hurtado, Chile; **Co-Author:** Paulina Freire, Universidad Alberto Hurtado, Chile; **Co-Author:** Patricia López, Universidad Alberto Hurtado, Chile; **Co-Author:** Valeska Grau, Pontificia Universidad Católica de Chile, Chile

There are good theoretical reasons to think that arguing with peers facilitates learning: first, the activity of supporting and opposing ideas should foster knowledge construction, promoting the social negotiation and revision of ideas. Second, counter-argumentation, and the critical evaluation of ideas, involve meta-cognition and should promote meta-cognitive processes. However, although there is some experimental evidence supporting the relationship between peer-group argumentation and disciplinary learning, more causal evidence is needed. The problem is that empirical research does not necessarily converge in how argumentative language is conceptualised, or indeed how it is analysed. This paper sets out to present the development and evaluation of a coding scheme for analysing peer-group argumentation. Following the triadic

unit of Leitao (2000), we develop a coding scheme for identifying students' and teachers' utterances. We reached inter-judge agreement for all codes except one (which was dropped). Eight teachers and fourth-grade classrooms (aged 9–10 years) and 187 students participated in the study. Four teachers were invited to teach a thematic unit (forces and movement), with lesson plans especially developed to foster argumentation in the classroom (intervention group). All the students were evaluated individually once before and twice after the lessons (immediate and differed post-evaluations) on disciplinary learning. Three lessons and small group-work activity were videotaped and analysed. The results show that peer-group argumentative interactions predicted delayed learning gains.

Coding productive dialogue in whole-class primary school settings in the UK

Presenting Author:Maria Vrikki, University of Cambridge, United Kingdom; **Co-Author:**Christine Howe, University of Cambridge, United Kingdom; **Co-Author:**Sara Hennessy, University of Cambridge, United Kingdom; **Co-Author:**Neil Mercer, University of Cambridge, United Kingdom; **Co-Author:**Lisa Wheatley, University of Cambridge, United Kingdom

The present paper discusses our strategy for identifying and coding optimal forms of classroom dialogue. This work builds on the extensive research conducted over the past few decades, suggesting that certain forms of dialogue are optimal for student learning (Howe & Abedin, 2013). Such forms include interaction that stimulates thinking, building on ideas and justifying opinions. This work is part of a two-year large-scale project taking place in England and involving 75 primary school teachers in Year 6 classes. Each teacher had three lessons from mathematics, literacy or science videorecorded. Transcripts of lessons have been evaluated in two ways: 1) systematic coding for the presence of 'dialogic moves' at the turn level using an adapted version of the Cam-UNAM Scheme for Educational Dialogue Analysis (Hennessy, Rojas-Drummond et al., 2016); and 2) ratings of student participation in sequences of acts across each lesson. Combinations of these measures were considered as indices of dialogicality and were used to rank teachers across a 'dialogic spectrum' of low, medium and high dialogicality. Independent evaluations of this categorization from experts in the field are discussed in relation to the validity of our coding strategy. In addition, inter-coder agreement analyses are considered. Implications of our work are discussed in relation to the methodological contribution in the field, as well as teacher professional development that could use our indices of dialogicality to foster optimal forms of dialogue.

Productive teacher discourse in school-based team meetings: toward a systematic coding system

Presenting Author:Miriam Babichenko, Hebrew University of Jerusalem, Israel; **Co-Author:**Christa Asterhan, Hebrew University of Jerusalem, Israel; **Co-Author:**Mirit Israeli, Ben-Gurion University of the Negev, Israel; **Co-Author:**Adam Lefstein, Ben-Gurion University of the Negev, Israel

There is increasing interest in teacher dialogue about practice and its role in professional development, but most of this research consists of in-depth, qualitative analyses of select cases that have been collected at off-campus and disciplinary-specific professional development initiatives. In the present contribution, we report on our efforts to develop a systematic coding scheme to capture at scale features of productive dialogue in in-school teacher team meetings. Based on an extensive literature review we define productive teacher dialogue as: (a) rich in inquiry oriented pedagogical reasoning, (b) interactive, and (c) focused on the connections between teaching, student thinking and disciplinary content. The coding scheme was developed in an iterative process based on teacher team meeting protocols from a variety of settings, all collected in a district-wide, large-scale intervention project in Israel. The coding scheme will form the basis for ongoing and future descriptive research (what does dialogue in teacher team meetings look like?) and comparative research (what are the conditions for productive dialogue?).

Coding feedback in an online- and video- based learning environment during a field experience

Presenting Author:Susi Klaß, Friedrich Schiller University Jena, Germany; **Co-Author:**Marc Kleinknecht, Leuphana University of Lüneburg, Germany; **Co-Author:**Alexander Groeschner, Friedrich Schiller University Jena, Germany

Feedback is a crucial aspect for effective teacher-student interactions and productive classroom dialogue. To enable teachers in giving feedback, it is relevant that teachers have practical experiences and feedback competence, for example by addressing different levels of feedback (i.e., process-orientation, self-regulation). Therefore, it is important to address how to learn about the nature of feedback in pre-service teacher education. Recently, online-based approaches have been developed to promote video-feedback. Previous video research emphasizes on the analysis-level of observations. In this study, we investigate the coding of pre-service teachers' feedback comments in a newly developed online- and video-based learning environment. Fifty-eight pre-service teachers participated in the study during a five-month field experience. Each one of them video-recorded one of their own lessons. In the online-based tool, the teachers provided a 5-8 minute video excerpt and commented on their own and others' teaching. In total 232 feedback comments were provided and coded by two independent raters with regard to the task-, process-, self-regulated and self-level (ICC > .70). Furthermore, we coded the level of analysis in the feedbacks (describing, explaining, predicting). The findings show that most of the comments addressed the self-regulated level. Only a few comments addressed the task level of feedback during teacher-student interactions. From a qualitative aspect, most of the codings were describing. Only a few comments linked the level of describing with pre-service teachers' knowledge (explaining) about feedback. In the presentation we will provide coding examples and discuss methodological issues as well as implications for future research.

Session L 18

1 September 2017 10:15 - 11:45

The role of executive functions in academic learning

Keywords: Achievement, Cognitive skills, Comprehension of text and graphics, Developmental processes, Educational Psychology, Mathematics, Misconceptions, Neuroscience, Numeracy, Reading comprehension, Reasoning, Science education, Teaching approaches

Interest group: SIG 22 - Neuroscience and Education

Chairperson: Grégoire Borst, University Paris Descartes, France

Organiser: Grégoire Borst, University Paris Descartes, France

Discussant: Patrice Potvin, Université du Québec à Montréal, Canada

New discoveries in developmental psychology, educational science and cognitive neuroscience bring us closer to understanding how typically developing children, adolescents and young adults learn in life, at all levels of the school system. Such learning processes have been studied not only in controlled environment but also in the context of important academic knowledge acquisition such as in mathematics, science, and problem solving in these fields. The aim of the present symposium is twofold: (a) to present novel findings in the fields of developmental psychology, educational science and cognitive neuroscience on the role of executive functions (i.e., working memory, inhibition, flexibility) in academic learning (mathematics, science, and problem solving) and (b) to discuss how these findings can shape education in the future for instance by designing pedagogical executive function interventions to help students overcome systematic difficulties. In particular, the four presentations will inform (a) on the role of executive function in conceptual change processes involved in the learning of scientific and mathematical concepts (presentation 1), (b) on the influence of inhibition and working memory on mathematical achievement (presentation 2), (c) on the role of inhibition in conceptual change about the concept of energy (presentation 3) and (d) on the effect of different executive function interventions on problem solving performance (presentation 4).

Executive function in conceptual change involved in the learning of science and mathematics concepts

Presenting Author:Stella Vosniadou, National and Kapodistrian University of Athens / Flinders University of Australia, Greece; **Co-Author:**Dimitris Pnevmatikos, University of Western Macedonia, Greece; **Co-Author:**Nikos Makris, Democritus University of Thrace, Greece

In a series of studies we investigated the role of Executive Function (EF) in the construction and employment of science and mathematics concepts in primary and secondary school students. Executive Function was measured using two computer based, reaction time, Stroop like Inhibition and Shifting tasks. Conceptual change was measured using two specially designed computer-based reaction time Science and Mathematics Conceptual Understanding and Conceptual Change (CU&C) tasks. Significant correlations between performance in the EF and CU&C tasks were obtained. Regression analyses showed that the participants' scores in the EF tasks predicted their performance in the CU&C tasks, even after controlling for age and intellectual ability, both when using accuracy and reaction time as dependent measures. It is argued that EF play a crucial role in the conceptual understanding and conceptual change processes involved in the learning of science and mathematics.

Direct and indirect influences of executive functions on mathematics achievement

Presenting Author:Camilla Gilmore, Loughborough University, United Kingdom; **Co-Author:**Lucy Cragg, University of Nottingham, United Kingdom

Achievement in mathematics is predicted by an individual's domain-specific factual knowledge, procedural skill and conceptual understanding, as well as domain-general executive function skills. In this study we investigated the extent to which executive function skills contribute to these three components of mathematical knowledge, whether this mediates the relationship between executive functions and overall mathematics achievement, and if these relationships change with age. Two hundred and ninety three participants aged between 8 and 25 years completed a battery of mathematics and executive function tests. Domain-specific skills partially mediated the relationship between executive functions and mathematics achievement: Inhibitory control within the numerical domain was associated with factual knowledge and procedural skill, which in turn was associated with mathematical achievement. Working memory contributed to mathematics achievement indirectly through factual knowledge, procedural skill and, to a lesser extent, conceptual understanding. There remained a substantial direct pathway between working memory and mathematics achievement however, which may reflect the role of working memory in identifying and constructing problem representations. These relationships were remarkably stable from 8 years through to young adulthood. Our findings help to refine existing multi-component frameworks of mathematics and understand the mechanisms by which executive functions support mathematics achievement

Is Inhibition Involved in Conceptual Change Learning from Refutation Text?

Presenting Author:Sonia Zaccoletti, University of Padova, Italy; **Presenting Author:**Lucia Mason, University of Padova, Italy; **Co-Author:**Irene-Anna Diakidoy, University of Cyprus, Cyprus; **Co-Author:**Barbara Carretti, University of Padova, Italy; **Co-Author:**Sara Scrimin, University of Padova, Italy

Conceptual change is usually conceived as the revision of alternative or intuitive conceptions about a phenomenon. However, recent research has also documented that after conceptual change has occurred, misconceptions are not replaced and continue to influence problem solving and reasoning, thus they need to be inhibited. This study examined the role of the executive function of inhibition and text type for reading-induced conceptual change learning about energy. Inhibition implies the ability to block predominant but inappropriate responses automatically activated by a stimulus. Eighty-one fourth and fifth graders were randomly assigned to the condition of standard text, or the condition of refutation text in a pre-test, post-test, and delayed post-test design. Findings revealed that students progressed from pre to post-test and maintained the gained knowledge at delayed post-test regardless of text read. Inhibition, as measured by response times, uniquely predicted conceptual change learning at delayed post-test over and above reading comprehension, prior knowledge, and short-term conceptual learning. However, the magnitude of the association between inhibition and conceptual change learning was only significant for refutation-text readers. The study indicates that the latter are more likely to activate inhibitory control which reduces or eliminates the misconception interference.

Interventions based on different aspects of executive functions improve problem solving performance

Presenting Author:Reuven Babai, Tel Aviv University, Israel; **Co-Author:**Enav Shalev, Tel Aviv University, Israel; **Co-Author:**Ruth Stavvy, Tel Aviv University, Israel

Students encounter difficulties when solving problems in science and mathematics such as when solving incongruent problems of the well documented comparison of perimeters task. Many students believe that shapes with a larger area must have a larger perimeter. Findings consistently show that for incongruent problems students' accuracy of responses is lower and reaction time is longer than for congruent problems. The presented study addressed these difficulties by applying two interventions each aimed at activating a different aspect of executive functions, namely 1) inhibitory control mechanisms and 2) use of appropriate solution strategies. 122 sixth graders were randomly divided into three groups: warning, strategy, and control groups. In the warning group, students' inhibitory control mechanisms were activated by providing an explicit warning regarding the task. In the strategy group an appropriate decision-making solution strategy how to solve the task was demonstrated to the students. The results indicated that both types of interventions improved students' performance. The explicit warning appeared to activate inhibitory control mechanisms and thus helped to improve students' performance. The strategy intervention suggested a logical and systematic way to compare the perimeters and thus improved students' performance. It should be noted that, although both interventions significantly improved students' accuracy for incongruent problems, the congruity effect was still significant in both. The study suggests that both aspects of executive functions are important for problem-solving in science and mathematics. The findings also point to the possibility of improving students' problem-solving abilities by simple interventions as was done here.

Session L 19

1 September 2017 10:15 - 11:45

Pinni B - B3117

Symposium

Teachers' reflection as a collaborative process

Keywords: Case studies, Collaborative Learning, Computer-supported collaborative learning, Design based research, In-service teacher education, Pre-service teacher education, Qualitative methods, Reflection, Teacher Professional Development, Teaching / instruction

Interest group: SIG 11 - Teaching and Teacher Education

Chairperson: Marc Clarà, University of Barcelona, Spain

Discussant: Patrick Danaher, University of Southern Queensland, Australia

Reflection is nowadays broadly accepted as a central process in teacher education and teacher professional development. Consequently, much research has been devoted to understand what reflection is, how it works, and how preservice and inservice teachers can improve their reflection processes. The majority of this research, however, has conceptualized reflection as an individual process, and sometimes, even as a process that preservice teachers must conduct basically alone. In contrast, several studies have shown that when assistance is provided, and especially when knowledgeable others are involved, preservice teachers engage in more successful reflection. In this vein, some current approaches have proposed that reflection may be best conceptualized as a social phenomenon. From this view, the focus is put on collaborative reflection from the idea that reflection is a dialogical process that needs the contrast with others' views, perspectives and observations. The aim of this symposium is to examine and discuss this idea. To this aim, the symposium proposes firstly a paper which examines some theoretical and methodological implications of this idea. Then two papers will present empirical studies on collaborative reflection: in one paper, dyadic collaborative reflections between one teacher educator and fifteen preservice teachers are analyzed; in the other, the authors study collaborative reflection involving, at the same time, fifteen preservice teachers and their teacher educator. Finally, one paper will present research on the design and development of an online platform to foster processes of collaborative reflection involving preservice teachers, early career teachers and experienced teachers.

Reflection as primarily social: A Vygotskian perspective

Presenting Author:Alfredo Jornet Gil, University of Oslo, Norway

Learning and instruction researchers have become increasingly aware of the value of considering the social aspects as being central, and not just peripheral, to thinking and learning. Yet, recent reviews show that most of the existing research on *reflection*—a thinking competence central to learning—continues to take the individual thinker (whether thinking alone or in groups) as the minimal unit of analysis. How does a conceptualization of reflection as something that exists as social relation differ from a conceptualization of reflection as something that goes on within the individual mind? And what would we gain, as theorists and as educators, from such a conceptualization? In this paper I address these questions by articulating an analytical position that builds upon L. S. Vygotsky, for whom any higher psychological function, before becoming a function, it was the social relation between two people. I ground the premises and implications of this position using empirical materials from a participatory ethnography at an arts-based school in which teachers engage in joint reflective sessions. In the analyses I show how, through the reflective sessions and everyday praxis, the school members' (reflective) awareness of their own praxis manifests first *in and as* social situations, and only latter as individual realizations. Changes in teaching/learning practice emerge as the result of a reflective practice that cannot be reduced to any of the individual members.

Supporting a dyadic process of reflection on literacy experiences: A framework for teacher educators

Presenting Author:Andrea Gelfuso, University of Central Florida, United States

Reflection is a widely used pedagogy in teacher education. Although there is consensus that reflection is important for preservice teacher learning, the large corpus of empirical literature on reflection seems not to agree on what reflection is or how to support preservice teachers as they engage in a dyadic reflection process with a teacher educator. This study examined the moves made by a teacher educator as she facilitated 15 dyadic reflection processes with 15 preservice teachers. The findings describe those moves and how they helped the preservice teachers to create 'warranted assertabilities' about literacy teaching and learning. A framework for facilitating a dyadic reflection process is offered.

How collaboration improves preservice teachers' reflection: A case study

Presenting Author:Teresa Mauri, University of Barcelona, Spain; **Co-Author:**Marc Clarà, University of Barcelona, Spain; **Co-Author:**Rosa Colomina, Universidad de Barcelona, Spain; **Co-Author:**Javier Onrubia, Faculty of Psychology, Spain; **Co-Author:**Agurtzane Martínez, University of Mondragón, Spain; **Co-Author:**Rosario Cubero, University of Sevilla, Spain

Although research has found that, in general, collaboration improves preservice teachers' reflection, it has been also found that this effect largely depends on how collaboration is undertaken. However, the aspects of collaboration that promote the improvement of reflection are currently unclear. This paper explores this issue by means of a case study of collaborative reflection involving 14 preservice teachers and one teacher educator during five weekly sessions. We analyze the improvement of preservice teachers' reflection, the organization of collaborative reflection, and the specific contingent interventions by the teacher educator. We find a change in the orientation of preservice teachers' reflection, from looking for solutions to looking for explanation. This change seems to be related to a four-phase pattern of collaborative reflection, more dialogical in the initial phases and more monological in the last ones, and to specific contingent interventions by the teacher educator, more focused on promoting an orientation towards explanation in the first two sessions, and on fostering the improvement of the explanations provided by the preservice teachers in the last three sessions.

Design principles that support collaborative reflection in online groups of teachers

Presenting Author:Nick Kelly, Queensland University of Technology, Australia

This presentation describes design principles for developing small groups that support collaborative reflection, within large online communities of teachers. To realise the potential of online communities for teachers there is a need to design for large networks that have the benefits of convergence and scale; whilst also supporting collaborative reflection – an important form of support (Authors, 2015). The presentation describes findings from three years of design-based research developing the large online community *TeachConnect* and its supporting platform. Small groups of teachers without a pre-existing relationship can form trusted communities online in which meaningful collaborative reflection can occur. However, creating conditions for this is challenging, as revealed through the first three cycles of platform design, implementation and testing in the research on TeachConnect. The work has led to three transferable design principles of online groups for collaborative reflection that are currently being implemented and tested in the fourth cycle: (a) the need for a group to have a clear focus; (b) the need for transparency of roles and of teaching context; and (c) the need for alignment between (a) and (b).

Session L 20

1 September 2017 10:15 - 11:45

Linna - K103

Symposium

Cognitive Science

Knowledge acquisition in multilingual settings: Close look on Content & Language Integrated Learning

Keywords: Bilingual education, Experimental studies, Language (Foreign and second), Mathematics

Interest group: SIG 21 - Learning and Teaching in Culturally Diverse Settings

Chairperson: Henrik Saalbach, University of Leipzig, Germany

Discussant: Tarja Nikula, University of Jyväskylä, Finland

Within this symposium we will take a closer look at the intricate relationship between language and knowledge representation. From a more cognitive perspective, we particularly ask, how language proficiency interacts with arithmetic solving in mathematics among high school students and whether arithmetic learning depends on whether the language of instruction matches the language of later application (e.g., testing) or whether the circumstance of a mismatch is related to cognitive costs. To explore the educational consequences of the laboratory findings, we investigate the influence of language-specific knowledge acquisition on academic performance within an actual Content and Language Integrated learning (CLIL) program. These questions are highly relevant for educational practice as CLIL programs receive increasingly popularity around the globe but in Europe in particular. However, these programs often lack empirical evidence on the consequences of multilingual learning and teaching on knowledge representation and academic performance. To this aim, research presented in the proposed symposium examines multilingual learning from multiple perspectives. The first contribution will focus on how proficiency in two languages interacts with arithmetic problem solving. The second speaker will report a study which explores the cognitive mechanisms of so-called Language-Switching Costs which occur when switching languages across learning and retrieval of arithmetic knowledge. The third and fourth speakers examine the actual school performance within real CLIL and Language Integrated Learning settings will be discussed to improve.

Solving arithmetic problems in first and second language

Presenting Author:Amandine Van Rinsveld, University of Luxembourg, FLSHASE, Luxembourg; **Co-Author:**Christine Schiltz, Université du Luxembourg, Luxembourg; **Co-Author:**Martin Brunner, Freie Universität Berlin, Germany; **Co-Author:**Karin Landerl, University of Graz, Austria; **Co-Author:**Sonja Ugen, University of Luxembourg, Austria

Solving arithmetic problems is a cognitive task that heavily relies on language processing. One might thus wonder whether this language-reliance leads to qualitative differences (e.g., greater difficulties, error types, etc.) in arithmetic for bilingual individuals who frequently have to solve arithmetic problems in more than one language. The present set of studies investigated how proficiency in two languages interacts with arithmetic problem solving throughout language acquisition in adolescents and young adults. Additionally, we examined whether the number word structure that is specific to a given language plays a role in number processing over and above bilingual proficiency. We also provide new insights into the role of the language context in arithmetic problem solving. We addressed these issues in a German–French educational bilingual setting, where there is a progressive transition from German to French as teaching language. The results suggest that language proficiency is crucial for the computation of complex additions, whereas simple additions can be retrieved equally well in both languages. Furthermore, additional error analyses showed more errors on the decade or on the unit digit depending on the language of the task. However, providing a language context seems to enhance performances only in the non-dominant language. Taken together, our study provides important new information on how language context impacts arithmetic in bilinguals. It also allows drawing more general conclusions on the importance of language context when solving arithmetic problems in a second language and may have implications for math teaching and learning environments.

Language-dependent knowledge acquisition: Mechanisms underlying language-switching costs

Presenting Author:Christian Hahn, University of Leipzig, Germany; **Co-Author:**Henrik Saalbach, University of Leipzig, Germany; **Co-Author:**Clemens Brunner, University of Graz, Austria; **Co-Author:**Lennart Schalk, ETH Zurich - Research on Learning and Instruction, Switzerland; **Co-Author:**Roland H. Grabner, University of Graz, Austria

Given the increasing number of bilingual education programs in Europe and beyond, the question if knowledge is represented in a language-dependent way has gained high practical importance. First studies have revealed that content learned in one language will be retrieved and applied more slowly and less accurate when participants have to switch the language from instruction to testing (i.e., language-switching costs, LSC). In two experiments, we investigated to what extent LSC are a function of the arithmetic operation as well as the kind of knowledge, and what are the underlying cognitive mechanisms. In experiment A (n=40), students learned arithmetic facts of three different operations over a period of four days. In experiment B (n=35), students acquired procedures and facts in a novel arithmetic task. Participants of both experiments were tested in the trained and untrained language while measuring RT and accuracy as well as collecting strategy reports. The results a) replicate LSC using auditory stimuli, b) show that the number of trials for which participants reported to translate numbers before responding significantly predicted the size of the individual LSC, c) reveal LSC mainly for pure arithmetic fact retrieval, not for trained procedures, and d) indicate that individual differences in language-proficiency, intelligence profile, and math fluency were unrelated to the size of LSC. The implications of these findings for (bilingual) mathematics learning and cognition will be discussed.

Does Language Background Matter? Majority- and Minority-language Skills in Dual Immersion

Presenting Author:Johanna Fleckenstein, Leibniz Institute for Science and Mathematics Education / University of Kiel, Germany; **Co-Author:**Jens Möller, University of Kiel, Germany; **Co-Author:**Jürgen Baumert, Max Planck Institute for Human Development, Germany

Dual immersion is a form of bilingual education in which two languages are used to teach students from different language backgrounds. Its goal is for minority- and majority-language students to reach high levels of academic achievement and proficiency in both languages. The present study investigates whether this goal is achieved in a German dual-immersion

program (Berlin's Europe School; SESB) and in how far students' language background and test language play a role. Findings indicate that the achievement of $N = 617$ SESB secondary level students' in the majority language German is at least comparable to conventionally taught students. The relationships between the two test languages are generally strong, but differ according to language background. Minority-language students are shown to be more balanced in terms of bilingual proficiency than majority-language students. The results are discussed with respect to the transfer of academic skills in bilingual settings and implications for dual-immersion practice.

Effects of dual immersion: Reading comprehension and Math

Presenting Author:Jens Möller, University of Kiel, Germany; **Co-Author:**Johanna Fleckenstein, Leibniz Institute for Science and Mathematics Education / University of Kiel, Germany; **Co-Author:**Sandra Preusler, Christian-Albrechts-Universität zu Kiel, Germany; **Co-Author:**Jürgen Baumert, Max Planck Institute for Human Development, Germany

Berlin's Europe School (Staatliche Europa-Schule Berlin, SESB) is a dual-immersion program which provides bilingual instruction for students with different first languages, i. e. German and one of nine partner languages (English, French, Greek, Italian, Polish, Portuguese, Spanish, Russian, Turkish). Half of the students in each class speak German as their L1, the other half speak the partner language as their L1. In the evaluation of the SESB, in grade 4, achievement tests were administrated with $N = 769$ students from the SESB and $N = 684$ students from the control group of conventionally taught students. SESB students overall reached the same level of German reading comprehension and math skills than monolingual taught students did. Second, controlling for background variables like SES, gender, migration background, L1 and intelligence did not change the picture. In math, students with a migration background were better at SESB compared to the control classes. Students with German as L1 and bilingual students outperformed students with one of the partner languages as L1. Results indicate that the dual immersion program of the SESB does not lead to disadvantages for students' German reading and math skills although German serves as the language of instruction in only 50 % of the subjects at SESB.

Session L 21

1 September 2017 10:15 - 11:45

Pinni B - B1097

Symposium

Higher Education

Feel, teach, learn - How emotions fuel learning and teaching in Higher Education

Keywords: Emotion and affect, Experimental studies, Higher education, Multicultural education, Quantitative methods, Student learning, Teaching / instruction

Interest group: SIG 04 - Higher Education

Chairperson: Robert Kordts-Freudinger, Paderborn University, Germany

Discussant: Liisa Postareff, University of Helsinki, Finland

Educational situations are saturated with emotional experiences. They influence both students' and teachers' cognition, their motivation and behavior. Hence there is a need for research on students' and teachers' emotions in order to understand the complex processes of teaching, learning and their interactions. Educational practice and intervention programs will likely benefit from this research. The main purpose of this symposium is to advance the knowledge base on emotions in higher education. The symposium will combine multiple perspectives on students' emotions (contributions 1-2) as well as on teachers' emotions (contributions 3-4). The first contribution discusses how study environments can lead to more positive and less negative emotional experiences and how emotions experienced in the university context are related to students' overall life satisfaction and study commitment. The second contribution examines how emotions can profoundly influence learning processes. The authors investigate effects of positive-activating, positive-deactivating, negative-activating and negative-deactivating emotions, induced via performance feedback, on text-based learning. The third contribution examines the impact of lecturer's emotional display on how their personality is judged by students in different cultural-educational contexts. The fourth and final contribution researches the individual variability of higher education teachers' emotions and how they are affected by appraisals. The research methodologies applied in the four studies range from cross-sectional questionnaires through experimental and online studies to experience-sampling designs. Results, limitations, relevance for education and directions for future research will be discussed in the symposium.

Teacher education students' emotions and their relevance for study commitment and life satisfaction

Presenting Author:Gerda Hagenauer, University of Bern, Switzerland; **Co-Author:**Michaela Glaeser-Zikuda, University of Erlangen-Nuremberg, Germany; **Co-Author:**Barbara Moschner, Carl von Ossietzky Universität Oldenburg, Germany; **Co-Author:**Nikoletta Lippert, University of Erlangen-Nuremberg, Germany; **Co-Author:**Melanie Bonitz, University of Erlangen-Nuremberg, Germany

Based on the self-determination theory (Deci and Ryan 2002), this study seeks to explore whether a study environment that provides relevant conditions for students' basic psychological need-satisfaction can lead to more positive and less negative emotional experiences. It also addresses the question how emotions experienced in the university context are related to students' overall life satisfaction and study commitment. German students in teacher education programmes ($N = 792$)

participated in a questionnaire study. The results (estimated by path-modelling) reveal that students' emotions can be predicted by a variety of environmental conditions associated with different basic psychological needs. Altogether, the model is able to explain 28.5 % of the variance in positive emotions and 39.6 % in negative emotions. The strongest predictor of students' positive and negative emotions was the perceived relevance of the study material, a factor related to the need for autonomy. This perceived relevance also had a direct impact on study commitment. Furthermore, a positive relationship with peers was of importance for positive and negative emotions as well as for overall life-satisfaction. As expected, emotions at university predicted life-satisfaction and study commitment, with a particularly strong association between positive emotions and study commitment. The results point out the necessity to support study conditions that facilitate the fulfilment of students' basic psychological needs in order to foster students' emotional wellbeing and enhance study commitment.

As the Mood Takes You: An Experimental Study of Emotions & Cognitive Processes during Text Learning

Presenting Author:Kristina Loderer, Ludwig-Maximilians-Universität (LMU), Germany; **Co-Author:**Christof Kuhbandner, University of Regensburg, Germany; **Co-Author:**Reinhard Pekrun, Ludwig-Maximilians-Universität (LMU), Germany

Extracting, organizing, and integrating information from texts is a staple form of learning across all scholastic levels, but especially in higher education. Given that prior research on emotions and cognitive processing in learning contexts has been primarily correlational or employed artificial rather than ecologically valid emotion induction techniques, but nevertheless demonstrating that emotions can profoundly influence learning processes, this study experimentally examined effects of positive-activating, positive-deactivating, negative-activating, and negative-deactivating emotions, successfully induced via performance feedback, on text-based learning. In line with the control value theory of achievement emotions (Pekrun & Perry, 2014) we expected positive-activating emotions to be particularly conducive to relational learning (i.e., integrating information) as assessed through a test measuring participants' recall of conceptually related information after studying a scientific text about different cosmological models (Chan et al., 2006). In contrast, we expected negative-deactivating emotions to foster more detail-oriented, item-specific processing and deactivating emotions, particularly of negative valence, to impede learning altogether. Results of our 2x2 between-subjects experiment ($N = 96$ psychology undergraduates) revealed that, contrary to our initial hypotheses, but in line with resource allocation models positing that positive-deactivating states take up less cognitive resources that are required for complex learning (Meinhardt & Pekrun, 2003), comparatively lower levels of activation were conducive to relational, integrative learning, whereas higher activation led to more detail-oriented, local processing. Descriptively, the former was most pronounced in the positive-deactivating condition. Implications for practice and avenues for future research are discussed.

Are angry lecturers perceived as understanding? Culture, emotion display, and personality judgement

Presenting Author:Julia Mendzheritskaya, Goethe-Universität Frankfurt, Germany; **Co-Author:**Miriam Hansen, Goethe-Universität Frankfurt, Germany

Previous research revealed that university lecturers display negative emotions more or less authentically depending on the cultural-educational practices they are familiar with (Hagenauer, Gläser-Zikuda, & Volet, 2016; Mendzheritskaya, Hansen, & Horz, 2015). In the present study we examined the impact of lecturer's emotional display on how lecturer's personality is judged by students in different cultural-educational contexts. University students in Germany ($N = 148$) and Russia ($N = 136$) participated in an online study with vignettes describing lecturers while giving negative achievement feedback during consultation hours. We varied the valence of the lecturer's emotional display (no emotion vs. pity vs. anger) in the vignettes. The participants judged the lecturer's personality by rating on a five-point Likert scale 10 items regarding the lecturer's conscientiousness, cautiousness, and understanding, dimensions taken from the IPIP (Goldberg et al., 2006). Results revealed that the judgements of lecturer's conscientiousness and understanding after failure feedback is different for students in Russia compared to Germany and varies significantly between angry and neutral valence of the lecturer's emotional display. In both student groups the lecturer was considered more conscientious, cautious, and understanding in the pity than in the no emotion or anger condition. One further exemplary result is that German compared to Russian students perceived the lecturer as less understanding in the anger condition.

Higher education teachers' emotions: an intraindividual analysis on emotions and their antecedents

Presenting Author:Katharina Thies, Ostwestfalen-Lippe University of Applied Sciences, Germany; **Co-Author:**Robert Kordts-Freudinger, Paderborn University, Germany

This study investigates higher education teachers' emotions in the moment they occurred, and theoretically relevant appraisal dimensions, i.e. value, self-determination, time-pressure, control. Applying an Experience-Sampling method (ESM), $N = 50$ higher education teachers reported their current emotions and appraisals in various work activities (including teaching and research activities) during two weeks in winter term 2015-16. A total of $N = 1691$ state assessments were collected. The participants reported positive emotions, such as enjoyment and satisfaction, as more often, compared to negative emotions, such as frustration. Taking into account the two level structure of the data, a high amount of variance was found on the within-level for all emotions (up to 70%). Random coefficients models were computed for each emotion, clustered by the teachers, for which the appraisal dimensions were introduced as level-1 predictors. Significant r^2 were found for all emotions (e.g. surprise $r^2 = .28$, frustration $r^2 = .24$), indicating that high amounts of the variances in the emotions can be explained by the appraisal measures. In addition, the analyses yielded significant correlations between emotions and appraisals: Appraisals of value and of self-determination were related to positive emotions, whereas time-

pressure and control appraisals were related to negative emotions. Taking methodological limitations into account, the study replicated previous theory and research. With the application of the ESM, this paper discusses directions for future research on higher education teachers' emotions and for practice-oriented interventions.

Session L 22

1 September 2017 10:15 - 11:45

Main Building A - A06

Symposium

Early numerical competencies in relation to informal / home experiences

Keywords: Cognitive skills, Competencies, Mathematics, Numeracy

Interest group: SIG 05 - Learning and Development in Early Childhood

Chairperson: Sophie Batchelor, Loughborough University, United Kingdom

Discussant: Tijs Kleemans, Radboud University Nijmegen, Netherlands

There is growing evidence to suggest that children's informal home numeracy experiences are related to their early numerical skills (Swarchuk, Sowinski & LeFevre, 2014). There is also evidence to suggest a relationship between children's early numerical skills and their tendency to focus on the numerical aspects of their environment (a construct called Spontaneous Focusing On Numerosity; SFON) (Hannula & Lehtinen, 2005). This symposium brings together these two distinct but related research areas which, up until now, have mainly been studied independently. Four empirical papers will look at the relationship between children's early numerical competencies and their informal home experiences; with competencies defined both in terms of knowledge/skills (Papers 1, 3, and 4) and dispositions/SFON (Papers 2 and 4). Together, the four papers comprise data from five countries (England, Belgium, the Netherlands, Cyprus and Ecuador). As such, findings come from 3-5-year-old children from a diverse range of cultural and educational backgrounds. Paper 1 presents a variety of measures of the home numeracy environment, including questionnaires, text messages and observations of parent/child number talk. Papers 2 and 3 focus more specifically on children's number talk (a measure that was found to be most predictive of children's numeracy performance in Paper 1). Paper 4 uses SES as an index of the home environment and it complements the first three papers by focusing both on numerical knowledge/skills and on dispositions/SFON. The theoretical, methodological and educational significance of the contributions will be discussed by Tijs Kleemans, an expert in the field of home numeracy research.

Exploring links between different measures of home numeracy environment and children's number skills

Presenting Author: Amy Bennett, Loughborough University, United Kingdom; **Co-Author:** Camilla Gilmore, Loughborough University, United Kingdom; **Co-Author:** Matthew Inglis, Loughborough University, United Kingdom

Previous research into the relationship between home numeracy activities and children's mathematics performance has primarily focused on measuring the home numeracy environment using questionnaires. In this study, we examined different methods for measuring children's home experiences and the link to their early number skills. Children's home numeracy environment was measured using a traditional questionnaire, via a novel text message approach and through observation of play. We aimed to examine a) the relationship between the three measures and b) the extent to which each measure related to children's mathematics performance. We found that the two self-report measures (questionnaire and text messages) were significantly correlated to each other but neither correlated with the observational measure. Surprisingly, the only measure that correlated with children's mathematics performance was their level of number talk during observed play. This suggests that the activities that parents do with their children may not be directly related to children's number skills, instead child's number talk may play an important role.

Children's SFON in relation to their numerical utterances during informal picture book reading

Presenting Author: Sanne Rathé, KU Leuven, Belgium; **Co-Author:** Joke Torbeyns, KU Leuven, Belgium; **Co-Author:** Bert De Smedt, KU Leuven - University of Leuven, Belgium; **Co-Author:** Minna M Hannula-Sormunen, University of Turku, Finland; **Co-Author:** Lieven Verschaffel, KU LEUVEN, Belgium

Children's informal home numeracy experiences are uniquely predictive of early numerical development. Research to date, however, has primarily focused on children's early numerical abilities and did not yet explore the association between children's informal numeracy experiences and their spontaneous focusing on numerosity (SFON). This SFON tendency is hypothetically related to children's numerical practice and reflections during informal activities and play. The present study tested the assumed association between SFON in experimental tasks and informal activities by studying children's SFON as measured by two experimental tasks, i.e., a behavioral and a verbal SFON task, in relation to their numerical utterances during informal picture book reading. Sixty-five kindergartners were individually interviewed during two separate sessions. In a first session, they completed a behavioral SFON Imitation task, a visuo-motor buffer task, and a verbal SFON Picture task. In a second session, they participated in an informal picture book reading activity, in which they were invited to spontaneously comment on the pictures of a picture book. Based on previous findings, we expected to find a positive association between children's SFON in the verbal task and the frequency of their numerical utterances during picture book reading, but not for the behavioral task. Confirming our hypotheses, children's SFON in the verbal task (but not in the behavioral task) was significantly associated with the frequency of their numerical utterances during informal picture book reading. Theoretical and educational implications of these findings are discussed.

The role of picture book reading in early mathematics learning

Presenting Author: Iliada Elia, University of Cyprus, Cyprus; **Co-Author:** Marja van den Heuvel-Panhuizen, Utrecht University, Netherlands; **Co-Author:** Athanasios Gagatsis, University of Cyprus, Cyprus

Using picture books is a key component of young children's informal experiences and activities in kindergarten. Stories narrated in a book may contain mathematics, and as such they offer children opportunities to encounter mathematics. The present contribution addresses the role of picture books in kindergartners' learning of mathematics with a focus on number-related aspects of children's thinking. This topic is approached from different perspectives, based on an overview of various studies we have recently carried out, which aimed to provide insight into the power of picture books to contribute to children's early mathematical development. Firstly, we briefly discuss a framework of picture book characteristics that support young children's learning of mathematics. Then, we analyse succinctly children's spontaneous mathematics-related utterances, with a focus on the number-related utterances, which occur during the reading of a picture book. This is followed by a deeper look at the influence of the pictures in a picture book which is written for teaching a specific number competence, namely counting backwards.

SES-related differences in Ecuadorian kindergartners' early numerical abilities and SFON

Presenting Author: Joke Torbeyns, KU Leuven, Belgium; **Co-Author:** Gina Bojorque, KU Leuven, Belgium; **Co-Author:** Jo Van Hoof, KU LEUVEN, Belgium; **Co-Author:** Daniël Van Nijlen, KU LEUVEN, Belgium; **Co-Author:** Lieven Verschaffel, KU LEUVEN, Belgium

Young children's home environment importantly contributes to their early numerical abilities development. Up to now, empirical evidence on the relation between children's home environment and their spontaneous focusing on numerosity (SFON) and on the relation between the former and early numerical development in general in developing countries is non-existent. We investigated the contribution of entering kindergartners' home environment, i.e., SES, to their early numerical abilities and SFON in a developing country (Ecuador), controlling for children's intelligence, working memory, and age. At kindergarten entry, 355 5-year-olds solved a test battery addressing their early numerical abilities (Ecuadorian Test of Early Number and Arithmetic [Bojorque et al., 2015] and the Tools for Early Assessment in Math [Clements & Sarama, 2011]), SFON (Elsi Bird Imitation task [Hannula & Lehtinen, 2005]), intelligence, and working memory. In line with previous findings, we observed large inter-individual differences in Ecuadorian children's early numerical abilities and SFON at kindergarten entry. Moreover, Ecuadorian kindergartners' SES was positively related to their early numerical abilities but not their SFON. Our results complement current theoretical models on early numerical development and its relation to children's SES in general and in developing countries in particular, and point to the need for focused interventions on young children's informal learning experiences at home in developing countries.

Session L 23

1 September 2017 10:15 - 11:45

Main Building D - D13

Symposium

Teaching and Teacher Education

Teachers' adaptive resilience process at different career stages

Keywords: Attitudes and beliefs, Competencies, In-service teacher education, Motivation, Pre-service teacher education, Quantitative methods, Teacher Professional Development

Interest group: SIG 11 - Teaching and Teacher Education

Chairperson: Marold Wosnitza, RWTH Aachen University, Germany

Discussant: Susan Beltman, Curtin University, Australia

Teaching is a very emotionally demanding profession with increasing social demands. Therefore, to ensure high quality teaching, it is important to take into account teacher well-being and work satisfaction to secure their commitment. In addition, the study of teacher resilience highlights that it is an important factor in teaching and teacher effectiveness and commitment. Resilience is a broad concept with a lot of definitions and perspectives, not only in the educational context but also in many different professions. The aim of this symposium is to study the concept of resilience as a dynamic process across different career stages and in different countries. The symposium starts with a study on the development of the concept of resilience in the teaching context. The rest of the studies focus on (1) resilience in Spanish pre-service teachers programs in order to improve their personal and professional competencies, (2) Canadian novice teachers' development of their resilience during their first two years of induction, and (3) teachers' resilience and commitment in Portuguese and German teachers. A better understanding of the resilience process teachers undergo in different career stages can help to improve initial teacher education and professional development programs as well as evidence the need to foster resilience in educational leadership contexts.

The development of a generic resilience model and its application to the teaching profession

Presenting Author: Jennifer Schwarze, RWTH Aachen University, Germany; **Co-Author:** Marold Wosnitza, RWTH Aachen University, Germany

The importance of resilience in learning and working environments has become evident over the last years. This led to a

variety of conceptualisations and definitions of resilience and research focussing on and investigating specific aspects of this complex construct. Albeit these varieties of conceptualisations, operationalisations and definitions, there are key elements that distinct resilience from other constructs, and are generic to every resilience process. In this theoretical paper a model of individual resilience is presented, that focuses on these key elements, which are: the existence of *antecedents* of resilience, a *resilience process* that is conceptualised as an appraisal process that is influenced by internal and external resources at disposal, and a *resilient outcome* which is relative to a *point of reference* before the occurrence of the antecedent, namely any as stressful appraised event or situation. This resilience model is embedded in a context model, which shapes the setting and therefore influences the resilience process. This generic model is applied to teacher resilience, by inserting factors found to be important in research on teacher resilience into each key element of the model. This allows a comparison of teacher resilience with e.g. students' resilience and helps to identify the specificities of different resilience processes in educational contexts and thus allows in a second step to identify the elements where personal resilience might be enhanced.

Mentor teachers' perceptions of Spanish pre-service teachers' personal and professional competencies

Presenting Author: Gloria Gratacos, C.U. Villanueva, Spain; **Co-Author:** Marilú Barceló, C.U. Villanueva (affiliated with Universidad Complutense de Madrid), Spain; **Co-Author:** Inmaculada Rodriguez, C.U. Villanueva (affiliated with Universidad Complutense de Madrid), Spain; **Co-Author:** Miguel Alonso, C.u. Villanueva (affiliated with Universidad Complutense de Madrid), Spain

From the very beginning of the European Higher Education Area (EHEA) in 2010, key competencies were introduced in Teacher Education programs. School placements, also known as *practicum*, were recognized as having an important role in Initial Teacher Education. The *practicum* gives pre-service teachers the opportunity to contextualize their theoretical knowledge and learn how to manage in real educational contexts. This study focuses on the mentor teachers' perceptions of pre-service teachers' personal and professional competencies, in order to improve them through the evaluation by said mentors. Two questionnaires were developed by the Practicum Department of a private university in Spain as quality indicators in the new Teacher Education Degree, after being revised to meet EHEA requirements: (1) personal and professional competencies from the mentor teachers' perspective, and (2) pre-service teachers' *practicum* satisfaction level. A total of 31 mentor teachers and 31 pre-service teachers participated in the survey. Although results showed highly rated personal and professional competencies by mentor teachers, the aspects less valued highlight the importance of working on class management and taking into account the development of social skills, self-regulation, problem-solving abilities, and empathy. Satisfaction grades were very high and confirmed, from a pre-service teachers' perspective, the usefulness of the *practicum* to put in practice what they have learnt and to be aware of their competencies and interpersonal abilities. We conclude that becoming resilient and becoming competent have some strong links and therefore, it would be very useful to take into account resilience-building activities in the *practicum* context.

Overcoming teacher induction challenges: The resilience process of Canadian novice teachers

Presenting Author: Mylene Leroux, Université du Québec (Outaouais), Canada

Recent research shows an increased interest in teacher resilience to promote positive adaptation to counteract negative consequences related to teacher induction hurdles. This proposal, relying on a chapter in a forthcoming international edited book (Leroux, in press), outlines some results (five participants) of a longitudinal study exploring the development of 23 Canadian novice teachers' resilience. Relying on questionnaires and a semi-structured interview, the risk and protective factors they experienced during their first two years of induction were identified, and different indicators of their psychological health as new teachers were analyzed. After a thorough analysis of these five cases, we can affirm that most of the participants are managing relatively well despite the challenges they face. Even if risk indicators are readily apparent for them, at least four of the beginning teachers seem to adapt quite positively. These outcomes provide a better understanding of the developmental process of novice teachers' resilience during their first years and suggest directions to improve teacher education and induction.

Impact of individual and contextual factors on Teachers' Resilience and Commitment

Presenting Author: Joana Pipa, University of Lisbon, Portugal; **Co-Author:** Francisco Peixoto, ISPA - Instituto Universitário / CIE - ISPA (Research Center in Education), Portugal; **Co-Author:** Marold Wosnitza, RWTH Aachen University, Germany; **Co-Author:** José Castro Silva, ISPA-Instituto Universitário, Portugal; **Co-Author:** Vera Faust, RWTH Aachen University, Germany; **Co-Author:** Jennifer Schwarze, RWTH Aachen University, Germany

Teacher resilience and teacher commitment are key variables to understand why some teachers remain in their profession and others prematurely leave it. Teacher resilience has been often described as a quality for sustaining teacher commitment or as a dynamic process, where teachers' personal characteristics interact over time with contextual factors. In this paper we aimed to test a model proposed by the ENTREE project and evaluate how the different variables considered (capacities, beliefs and contextual factors) interact and relate with teacher's resilience and commitment. Secondly we aim to analyse the differences in the relationships between the variables among Portuguese and German teachers. Participants were 378 teachers from Germany and Portugal, who responded to a survey comprising measures of resilience, commitment, personal life, rumination, school support, self-efficacy, and administrative and policy demands. The results showed that there is an interplay between capacities, beliefs and contextual variables related to teacher's resilience and commitment. Moreover findings indicated that capacities and beliefs have stronger impact on resilience whereas contextual

factors have stronger effects on teachers' commitment. These results highlight the necessity of an integrative perspective on the phenomenon of teacher's resilience and commitment.

Session L 24

1 September 2017 10:15 - 11:45

Main Building A - A07

Symposium

Cognitive Science

On the trajectories of rational number learning

Keywords: Cognitive development, Conceptual change, Educational Psychology, Mathematics, Misconceptions, Numeracy, Primary education, Secondary education, Student learning

Interest group: SIG 03 - Conceptual Change

Chairperson: Wim Van Dooren, KU LEUVEN, Belgium

Discussant: Andreas Obersteiner, University of Education Freiburg, Germany

Rational numbers are a mathematical concept full of complexities. A full understanding of them requires mastering various representations, their numerical magnitude, how to operate with them, and understanding their dense nature on the number line. Rational number fluency requires a conjunction of both procedural and conceptual knowledge, including a toolbox of working strategies and a sense of why these work. Recent research both in Mathematics Education and Educational Psychology has brought up several important insights for instruction. One of the recurring issues is students' tendency to overgeneralize insights previously acquired in the context of natural numbers. This Natural Number Bias has been broadly documented, but many questions are still unanswered. The contributions of this symposium tackle topics related to the evolution of rational number understanding as well as explore new depths in particular knowledge stages. Overall, these contributions provide novel data on critical aspects of rational number learning, using sophisticated methodologies. Knowledge of learning trajectories, both at the macro level looking at the overarching components of rational number knowledge and the micro level exploring specific strategies such as gap thinking that may lead students to more appropriate forms of reasoning if treated in a pedagogically conscious manner, has important implications for planning instruction. Additionally, the research presented here also remarks the necessity of secondary school teachers to take into account aspects of rational number learning, such as the long-lasting effects of disengagement between fractions' conceptual and procedural knowledge, and learners' difficulty in thinking about non-natural numbers even in algebraic tasks.

Evaluating congruency and gap effects in fraction comparison

Presenting Author: David Maximiliano Gomez Rojas, Universidad de Chile, Chile; **Co-Author:** Mabel Urrutia, Universidad de Concepción, Chile; **Co-Author:** Pablo Dartnell, Universidad de Chile, Chile

Several studies on the cognitive bases of the learning of fractions have reported the relevance of *congruency effects* in learners' reasoning, referring to the often-reported result that smaller error rates and shorter response times occur when reasoning about fractions as a mere juxtaposition of natural numbers leads to a correct answer. This framework seems useful for understanding errors made by learners in their first steps learning fractions, where they have a weak concept of fraction as an entity in itself, and confuse the fraction with the natural numbers that compose it. However, it is unclear how relevant the congruency dimension is for studying fraction understanding beyond this initial stage. In the present work, we extend previous studies by presenting a fraction comparison task where not only the congruency dimension is controlled, but also the applicability of *gap thinking*, a reasoning strategy where learners indirectly estimate a fraction's magnitude by subtracting the numerator from the denominator. We first show that the relation between congruency and gap applicability is not straightforward and needs to be considered, and then provide results from an empirical fraction comparison study with 83 young Chilean adults. Our data show significant gap effects, namely significant differences between items in which gap thinking turns out to be helpful, uninformative, or misleading. These results suggest that reasoning strategies need to be taken into account in addition to low-level dimensions such as congruency, in order to have a complete picture of fraction understanding development.

Individual differences in fractions' conceptual and procedural knowledge at the secondary level

Presenting Author: Xenia Vamvakoussi, University of Ioannina, Greece; **Co-Author:** Maria Bempeni, University of Ioannina, Greece; **Co-Author:** Stavroula Pouloupoulou, Athens University of Economics and Business, Greece

We constructed and calibrated an instrument targeting a wide range of aspects of conceptual and procedural fraction knowledge. We used this instrument in a quantitative study with 138 secondary students (7th and 9th graders). Cluster analysis revealed four distinct student profiles: Students who were either strong or weak with respect to both types of knowledge; students who were stronger with respect to conceptual knowledge; and students who were stronger with respect to procedural knowledge. These findings support the hypothesis that there are individual differences in the way students combine the two types of knowledge, which remain salient at the secondary level.

From a naïve towards a scientifically correct concept of rational numbers: A longitudinal study

Presenting Author: Jo Van Hoof, KU Leuven, Belgium; **Co-Author:** Lieven Verschaffel, KU Leuven, Belgium; **Co-**

Author:Tine Degrande, KU Leuven, Belgium; **Co-Author:**Wim Van Dooren, KU Leuven, Belgium

Understanding rational numbers is of critical importance in mathematics and in other fields of science. However, they frequently constitute a stumbling block for learners. This is often attributed to the “natural number bias”, which is the tendency to (inappropriately) apply natural number properties in tasks with rational numbers (Ni & Zhou, 2005). In this study we followed the conceptual change from a naïve natural-number-based concept of a rational number towards the scientifically correct concept of 201 upper elementary school children during two crucial years of their acquisition of rational number understanding. A latent transition analysis on these longitudinal data revealed six developmental states that allowed to differentiate between learners with a naïve, partial, or good understanding of the three aspects of rational number understanding that were distinguished in our test. Learners were found to first develop an increased understanding of the numerical size of rational numbers. Afterwards, they developed an increased understanding of operations with rational numbers. Finally, learners developed an increased understanding of the dense structure of rational numbers. Moreover, results showed that the understanding of decimal numbers precedes the understanding of fractions.

Natural Number Bias when reasoning with rational numbers and unknown operands

Presenting Author:Courtney Pollack, Vanderbilt University, United States; **Co-Author:**Konstantinos Christou, University of Western Macedonia, Greece; **Co-Author:**Jo Van Hoof, KU Leuven, Belgium; **Co-Author:**Wim Van Dooren, KU Leuven, Belgium

When reasoning about numbers, students are susceptible to a natural number bias (NNB), in which they misapply properties of natural numbers when reasoning about non-natural numbers. The NNB also arises when students reason about unknown quantities or the effects of arithmetic operations with natural numbers. The present study examined the NNB when students solve algebraic equations involving multiplication or division with a rational number and an unknown (e.g., $7.5 : _ = 4.3$). Equations varied on number and operation congruency; unknown operands were either natural or rational numbers, and operations were either consistent (e.g., a product is larger than its operand) or inconsistent (e.g., a product is smaller than its operand) with natural number arithmetic. In a response-time paradigm, 77 adults viewed equations and determined whether a number could make the equation true. Results suggested a NNB: accuracy was highest for problems that had natural number unknowns and were congruent with natural number arithmetic, and lowest for problems with rational number unknowns and were incongruent with natural number arithmetic. Interestingly, accuracy was higher for rational number problems designed to trigger associations with natural number arithmetic (e.g., $4.3 : _ = 8.6$ may evoke ‘2’) than problems that were not. Accuracy differed between multiplication and division; however, there were no differences in response time. Findings suggest the NNB led to decreased student performance on problems requiring rational number reasoning. To help counteract the NNB, teachers can help students develop intuitions for working with rational numbers.

Session L 25

1 September 2017 10:15 - 11:45

Virta - 114

Invited Symposium

Culture, Morality, Religion and Education

Migration and education for democratic citizenship

Keywords: Citizenship education, Cultural diversity in school, Culture, Informal learning, Instructional design, Morality, Multicultural education, Qualitative methods, Social interaction

Interest group: SIG 13 - Moral and Democratic Education

Chairperson: Dorit Alt, Kinneret College on the Sea of Galilee, Israel

Organiser: Hermann J. Abs, University of Duisburg-Essen, Germany

Organiser: Dorit Alt, Kinneret College on the Sea of Galilee, Israel

Discussant: Karin Heinrichs, Otto-Friedrich-University Bamberg, Germany

Migration within and across nation-states is a worldwide phenomenon that raises complex and difficult questions about citizenship, human rights, democracy, and education. The increasing ethnic, cultural, language, and religious diversity in nation-states throughout the world has raised new possibilities about educating students for effective citizenship. Citizenship education theorists contend that because of global migration nations must rethink and reconceptualize citizenship education (Bank, 2015). This symposium presents and discusses several approaches for effective education for democratic citizenship. The first paper deals with aspects of informal citizenship education practices, and their ability to reduce or strengthen differences between ethnic minority and majority students. The second paper investigates manifestations of democratic values in the teaching and interaction processes within a training programme for refugees and immigrants students in Norway. This study is focused on the set of values of the students and on the role of trust among the students and the teacher to leverage student's willingness to share knowledge and experiences and to take part in different kinds of activities in the classroom. The third paper deals with acculturation in the school context that can facilitate or hinder the implementation of education for democratic citizenship approaches aiming at social cohesion, mutual understanding, intercultural dialogue, and solidarity. The final paper shows how a constructivist teaching and learning approach of VaKE (Values and Knowledge Education), that combines values and knowledge education, can be used in the

context of migration and education for democratic citizenship.

Ethnic Differences in Citizenship Competences among Middle School Students

Presenting Author:Anke Munniksmä, University of Amsterdam, Netherlands

The current study examines (1) to what extent ethnic minority and majority students differ on three aspects of citizenship: social connectedness, norm-conform behavior, and out-group attitudes, and (2) whether aspects of informal citizenship education practices reduce or strengthen these group differences. Data come from The Arnhem School Study. 1219 students (from 63 classrooms within 12 middle schools) filled in questionnaires in fall, winter and spring of the first school year. Findings reveal that students become more socially connected during the first school year, out-group attitudes become less positive and they increasingly like behavior that is not norm-conform. The latter is particularly the case among ethnic minority students in classrooms where the numerical majority is native Dutch. These findings underscore the need for attention for students who might not fit in with their classmates. Furthermore, it signals that citizenship education is a challenging but yet important task for middle schools.

MANIFESTATIONS OF DEMOCRATIC VALUES IN LANGUAGE TEACHING FOR GROWN-UP REFUGEES AND IMMIGRANTS

Presenting Author:Aslaug Kristiansen, University of Agder, Norway

The study presented is aiming to investigate manifestations of democratic values in the teaching and interaction processes within the classrooms of a Norwegian second language training programme for refugees and immigrants students. The focus in the study is set on the values of student participations and on the worth of trust among the students and the teacher. It is assumed that a certain degree of trust is necessary for student's willingness to share knowledge and experiences and to take part in different kinds of activities in the classroom. Teachers presumably play a crucial role in building and establishing trustworthy relationships. But how can a climate of trust be established in the class of refugees and immigrant students? The main research question: 1) Which sort of student's participation can be identified in class? 2) What are the characteristics of the participations and 3) Under which conditions does participation unfold? The data consists of two weeks of participant observations in two advanced classes, as well as and by follow-up interviews of the teacher and of students. Preliminary results show different sorts of student participations mostly initiated by the teachers, but not always. The degree of student involvement was influenced by different factors like how long they had been in the class, the actual topic and the student's own attitudes on schooling from their homeland. The actual teacher's ideas and attitudes seem to be of particular importance, besides their way of organizing teaching processes.

Migration and education for democratic citizenship. Experiences with VaKE

Presenting Author:Alfred Weinberger, Pädagogische Hochschule der Diözese Linz, Austria; **Co-Author:**Jean-Luc Patry, University of Salzburg, Austria; **Co-Author:**Sieglinde Weyringer, University of Salzburg, Austria

The purpose of this paper is to present a quasi-experimental study and a field report examining the constructivist teaching and learning approach VaKE (Values and Knowledge Education), which combines values and knowledge education, in the context of migration and education for democratic citizenship. The research question of the quasi-experimental study was whether learning with VaKE can change pre-service teachers' traditional beliefs about values education in the context of migration. The experimental group (N = 85) learned according to VaKE while the control group (N = 36) learned according to a traditional dilemma discussion. Both groups discussed the same dilemma dealing with whether refugees should be punished for not taking part in values courses that aim to transmit values to the migrants. Participants' written arguments were content-analyzed for pre- and posttest. The research question of the field report was whether VaKE can be applied to promote democratic attitudes in refugees. Participants were ten adolescent refugees from different African countries who learned according to VaKE discussing a dilemma whether norms and rules in a fictive society should be determined by one leader or by discourse involving all persons. Oral discussions were analyzed in an unsystematic way. The results of the quasi-experimental study indicate that beliefs can be changed with VaKE towards a more advanced view while in the control group now changes could be found. The results of the field report show that participant's democratic attitudes can be influenced positively. Implications will be discussed.

Minority Youths' Acculturation in the School Context and Education for Democratic Citizenship (EDC)

Presenting Author:Elena Makarova, University of Applied Sciences and Arts Northwestern Switzerland, Switzerland; **Co-Author:**Dina Birman, University of Miami, United States

In multicultural schools, EDC is interrelated with the acculturation process that young people undergo through contacts with individuals from different cultural backgrounds. Individuals who favour an integration strategy in their acculturation and who develop a bicultural identity are also more likely to be successfully adjusted to both cultural contexts and to possess socio-cultural competencies in both cultures. In terms of EDC, a sense of multiple belongings and intercultural competencies are desirable outcomes. Consequently, schools need to facilitate the cultural transition of minority youth by supporting students' positive attitudes and orientation towards both their heritage culture and the majority culture. Moreover, schools are challenged to combat prejudice and discrimination against students from ethnic minority backgrounds, factors that negatively affect these students' adaptation in the school context as well as the implementation of EDC goals. This paper presents the findings from an integrative review of 348 peer-reviewed articles on acculturation in the school context, focussing on characteristics of the context that can support or hamper the bicultural adjustment of minority youth. Moreover, our analysis sheds light on the characteristics of the school context that can facilitate or hinder the implementation of EDC

approaches aiming at social cohesion, mutual understanding, intercultural dialogue, and solidarity.

Session L 26

1 September 2017 10:15 - 11:45

Main Building A - A2A

Invited Symposium

Culture, Morality, Religion and Education

The Moral Dimension of Religious Education

Keywords: Morality, Multicultural education, Religious studies, Teaching / instruction

Interest group: SIG 19 - Religious and Spiritual Education

Chairperson: Ulrich Riegel, University of Siegen, Germany

Discussant: Laura Hirsto, University of Eastern Finland, Finland

Moral education is an important dimension of religious education. According to Glock & Stark, every religious tradition comprises norms and values to offer orientation in daily life. It is the task of religious education to inform and to familiarize the next generation with these norms and values. Moral education, however, is not the core dimension of religious education. First of all, religious education is about religious doctrine and religious practice. In modern society this relationship between moral education and religious education often is contested. There are some voices claiming that religious education gives way to moral education. In a secular society, ethics is the common ground of civil society rather than religion. Other voices want to turn religious education into moral education on religious grounds. Since European culture is built on Christianity, Christianity is a core resource of European morality and therefore should be taught at public school. Finally, there are voices that opt for integrative religious education with a strong focus on living together in peace. In a religiously plural society it is essential that adherents of different world views learn to accept each other and to take the perspective of other beliefs. The SIG 19-Invited Symposium will discuss the relationship between moral education and religious education. It will develop different scenarios how moral education could be realized within the frame of religious education. Further on, it will elaborate how the particular type of religious education (denominational vs. integrative) does affect the moral dimension of this education.

Value Learning Trajectories: Theory, Method, Context

Presenting Author: Liam Francis Gearon, University of Oxford, United Kingdom; **Co-Author:** Arniika Kuusisto, University of Helsinki / University of Warwick, Finland

The aim of this paper is to consolidate currently disparate efforts to understand how individuals develop values through a variety of learning experiences. Utilizing life history method and an ecological approach into value learning and individual agency in life course development, our research question is: what are the factors and mechanisms influencing the individual's value system construction and the role of agency on one hand, and socialization and education in the other? Our paper will provide some examples of this from two empirical data sets. First of all, we bring on some perspectives of religious minority youths' agentic value negotiations between the primary socialization setting of the home on one hand and their mainstream school context on the other. Secondly, we present some views of Finnish RE professionals on the aims of RE in the societal setting from the perspectives of their personal values and life trajectories.

Value education in RE: Competencies and success criteria

Presenting Author: Konstantin Lindner, University of Bamberg, Germany

Value education is a central topic in religious education throughout Germany. What is so specific about learning with and about values in this denominationally oriented subject, however? RE wants to provide students with knowledge of values, Christian or religious foundations of those values and following consequences for the students' personal conducts of life. At the same time RE aims at offering experiences requiring value based acting: In the framework of lessons, students are to be enabled to act in value based settings and to reflect their behavior, reasoning on the grounds of Christian or religious arguments amongst others. On the basis of these considerations, the presentation will explore which process and content oriented competencies are to be striven for in RE. It will also put criteria for measuring the success of value education in RE to a discussion.

Moral Dilemmas in Iranian schools identified by students

Presenting Author: Nasibeh Hedayati, University of Helsinki, Finland; **Co-Author:** Elina Kuusisto, University of Helsinki, Finland; **Co-Author:** Kirsi Tirri, University of Helsinki, Finland

This article examines moral dilemmas in the context of Iranian schools identified by students ($N = 340$). Iran is an Eastern country in which the educational system has been under the influence of spiritual and moral principles of Islam since the Islamic revolution in 1979. This dominance of religious-political ideology of Islamic Republic makes Iran a unique context to study moral dilemmas.

The data was gathered from one female and one male lower secondary school in Tehran in 2016. The students (female

$n=175$, male $n=165$) were 12 to 16 years of age who wrote about unfair situations they had experienced at school. Students' moral dilemmas were analyzed with deductive content analysis in which Tirri's (1998, 1999) four categories were utilized as an analytical framework. The empirical findings reveal that moral dilemmas identified by Iranian female students have five main themes: 1. *Harassing*, 2. *Punishnet*, 3. *Professional responsibility*, 4. *Peer relations*, and 5. *Religious matters*. These main themes were also categorized according to who was unfair: 1. *Teacher*, 2. *Staff*, 3. *Student* and 4. *Other (parents, school bus driver)*. The boys and girls show differences regarding their moral concerns. Physical punishments were more common among male students than female. Instead, religious moral dilemmas were only identified by female students. The paper discusses main categories and subcategories and how boys and girls are different in their moral concerns

Beliefs in Afterlife: The Role of the Religious Background

Presenting Author:Dimitris Pnevmatikos, University of Western Macedonia, Greece; **Co-Author:**Triantafyllia Georgiadou, University of Western Macedonia, Greece

Although children grasp the essential aspects of the death concept very early, a significant number of children and adults continue to attribute certain capacities to dead agents, indicating the continuation of the existence. The continuation of the existence might lead to a representation of the dead agents as conscious entities. The present study aimed to investigate this hypothesis examining whether individuals attribute to the dead agents aspects of the *stream of consciousness* (James, 1950), and what is the role of the immediate religious context on the emergence of these beliefs. One hundred sixty children and young adults (80 females), divided equally into four age groups from six to 12 years old and a group of young adults participated in the study. Half of the participants in each age group were religiously committed. Participants interviewed individually with a vignette and a questionnaire that explored the endorsement of perceptual, psychobiological and emotional capacities, desires, and communication aspects of a dead agent as well as the dead agent's personal consciousness and control of these states. Moreover, participants were asked to provide a justification for their answers. A TwoStep Cluster Analysis identified three clusters that could indicate three distinct concepts of the afterlife. The clusters' profiles are further analyzed from a developmental perspective and with regard to participants' religiosity.

Session L 27

1 September 2017 10:15 - 11:45

Main Building D - D11

Invited Symposium

Meet the EARLI Journal's Editors

Keywords: Action research, Case studies, Comparative studies, Content analysis, Qualitative methods, Quantitative methods, Student learning, Teaching / instruction

Interest group: SIG 01 - Assessment and Evaluation

Chairperson: Äli Leijen, University of Tartu, Estonia

Discussant: Äli Leijen, University of Tartu, Estonia

EARLI publishes three peer-referred journals which are all available for free readership to all members; Learning and Instruction, Educational Research Review and the newest open access journal Frontline Learning Research. Additionally, the EARLI book series, New Perspectives on Learning and Instruction is designed to communicate the high quality research on learning and instruction to a broader audience of researchers and post-graduate students in education and psychology. Earli members are fully encouraged to submit their current research on the association's journals.

The Meet the EARLI Journals' Editors symposium aims to inform the EARLI members for the journals that the association publishes and they are in the members' service. Additionally, the editors will inform the audience for the specific aims of each journal, how to select the right journal to publish their research and they will betray some of the secrets for a successful submission to the journals.

Learning and Instruction

Presenting Author:Jan Vermunt, University of Cambridge, United Kingdom

As an international, multi-disciplinary, peer-refereed journal, Learning and Instruction provides a platform for the publication of the most advanced scientific research in the areas of learning, development, instruction and teaching. The journal welcomes original empirical investigations. The papers may represent a variety of theoretical perspectives and different methodological approaches. They may refer to any age level, from infants to adults and to a diversity of learning and instructional settings, from laboratory experiments to field studies. The major criteria in the review and the selection process concern the significance of the contribution to the area of learning and instruction. This is an audience-initiated session and participants are invited to raise any question or issue they feel pertinent.

Educational Research Review

Presenting Author:David Gijbels, University of Antwerp, Belgium

Educational Research Review is an international peer-refereed journal aimed at researchers and various agencies interested to review studies in education and instruction at any level. The journal welcomes different types of systematic review-studies, theoretical contributions and shorter forum - papers but does not publish original empirical investigations.

Frontline Learning Research

Presenting Author:Erno Lehtinen, University of Turku, Finland

Earli decided to found a new journal in order to open more publishing opportunities for high level manuscripts. The particular aim was to explore open access publishing and emphasize innovative and risk-taking research in the field of learning and instruction. Frontline Learning Research (FLR) is an open-access electronic-only journal that publishes articles on issues and trends occurring internationally in research on learning and educational sciences. FLR is a forum for multidisciplinary research on learning and learning environments and it aims at enhancing new theoretical and methodological approaches in learning sciences. FLR also welcomes commentaries aimed at triggering discussion about important theoretical and methodological questions about the published articles. In the Conference we will discuss more deeply about the guiding principles of FLR and help participants to recognize what features make manuscripts innovative and risk-taking.

EARLI Book Series New perspectives on Learning and Instruction

Presenting Author:Mien Segers, Maastricht University, Netherlands; **Co-Author:**Isabel Raemdonck, Université Catholique de Louvain, Belgium

New Perspectives on Learning and Instruction is the international, multidisciplinary book series of the European Association for Research in Learning and Instruction (EARLI) and is published by Routledge.

The aim of the series is to present to the scholarly community high quality, theoretically-driven research on a specific theme in the domain of learning and instruction. Books that are published in the series are innovative, attempting to forge new conceptions of the field. Originality, scientific merit, and significance for the field are what guide the series. Both edited collections and sole-authored texts that meet these criteria are considered for publication.

In addition, in 2017, the EARLI Book Series will start with the publication of state-of-the-art edited books. They provide an essential introduction to the state-of-the-art in a specific field in the domain of Learning and Instruction. These fields are represented by the Special Interest Groups of EARLI and Emergent Field Groups. The main structure of each state-of-the-art book is as follows. First, each book begins with an outline of the field's relevant historical, conceptual and theoretical backgrounds. Second, each book presents an up-to-date series of high-quality original empirical articles representing the main research topics in the specific field. Third and finally, it presents new directions for research.

The focus of the Book Series is on European work, however, contributions from non-European researchers and non-members of the European Association for Research in Learning and Instruction are invited. The series is designed to appeal to a wide audience of researchers and post-graduate students in education and psychology.

Latest Book: Jindal-Snape, D., & Rienties, B. (eds.) (2016). Multi-dimensional Transitions of International Students to Higher Education A new title will soon be released: Kyndt, E., Donche, V., Trigwell, K., and Lindblom-Ylänne, S. (eds.) (2017). Higher Education Transitions. Theory and Research.

Session M 1

1 September 2017 12:00 - 13:30

Main Building C - C1

Roundtable

Assessment and Evaluation, Teaching and Teacher Education

RT: Assessment and Teacher Education

Keywords: Assessment methods and tools, Conceptual change, Design based research, Educational Psychology, Goal orientation, History, Motivation, Reflection, Secondary education, Teaching / instruction

Interest group: SIG 01 - Assessment and Evaluation, SIG 11 - Teaching and Teacher Education

Chairperson: Christine Kreuzer, Ludwig-Maximilians-Universität (LMU), Germany

Teachers' views on preparing students for university

Keywords: Conceptual change, Goal orientation, Secondary education, Teaching / instruction

Presenting Author:Merel van der Wal, Radboud University Nijmegen, Netherlands; **Co-Author:**Paulien Meijer, Radboud Teachers Academy, Netherlands

Students going through the transition from secondary education to university education can encounter problematic changes due to a change in expectations of their study skills, understanding, self-directedness and transfer of knowledge.

Interviews with three teachers from pre-university tracks are analyzed to understand the type of activities are used to prepare students for university. Subsequently, these activities are linked to mechanisms of boundary crossing. Preliminary results show that pre-university track teachers mention activities related to four mechanisms of boundary crossing. This way of looking at teaching in pre-university education can help to see and create learning opportunities where boundaries are encountered.

Assessing historical thinking: developing formative assessment tasks for historical causal reasoning

Keywords: Assessment methods and tools, Design based research, History, Secondary education

Presenting Author:Uddhava Rozendal, University of Amsterdam, Netherlands; **Co-Author:**Carla Van Boxtel, University of Amsterdam, Netherlands

Formative assessment tasks that measure historical thinking abilities, such as causal reasoning, in the secondary school classroom are still scarce. The aim of this study is to develop such tasks. The design of these tasks was based on an earlier developed model of cognition of historical causal reasoning. In total, five different formative assessment tasks were designed and subsequently tested in the history classroom. Participants included eight teachers and their respective students in secondary education in the Netherlands. We endeavored to include the tasks as much as possible in the regular curriculum. Several types of data were collected. First, all student responses that were produced while administering the tasks. Second, videotaped think-aloud-sessions with up to two random students from each class. Third, a short student questionnaire on their interest and ability and history and how they experienced the task. Finally, fourth, a teacher's log, in which they reflected on the implementation of the task. Data analysis will take place in winter 2016/2017. This study contributes to the improvement of assessment practices in history education in secondary schools by designing and testing instruments that teachers can use in the classroom. Simultaneously, this study sheds further light on the progression of historical causal reasoning of high school students.

Fostering a more motivating approach to assessment through video-based reflection

Keywords: Assessment methods and tools, Educational Psychology, Motivation, Reflection

Presenting Author:Christa Krijgsman, Ghent University, Belgium; **Co-Author:**Tim Mainhard, Utrecht University, Netherlands; **Co-Author:**Jan van Tartwijk, Utrecht University, Netherlands; **Co-Author:**Lars Borghouts, Fontys University of Applied Sciences, Netherlands; **Co-Author:**Leen Haerens, Ghent University, Belgium

Teaching strategies such as goal clarification and providing progress-oriented feedback are considered effective subcomponents of assessment that is aimed at improving learning. Self-Determination Theory suggests that goal clarification and progress-oriented feedback stimulates volitional types of motivation. However, it is unclear if teachers can be trained to implement such strategies in an efficient way, to benefit students' motivational experiences. The present study will investigate whether a training on 'motivating assessment' is effective for changing a) the teachers' practice, and for enhancing b) students' motivational experiences for physical education. Thirty teachers and their students will be randomly assigned to one of three groups. The first intervention group will receive an evidence-based one-day long training only. The second intervention group will take part in the one-day long evidence-based training and four additional individualised video-based reflection sessions. Specifically, teachers will self-reflect on their assessment strategies using an online video-reflection tool. The control group will be provided with the opportunity to participate in the training after the study has ended. Pre-intervention, intermediate and post-intervention, validated questionnaires will be used to measure perceived autonomy and competence and quality of motivation. An instrument to measure goal clarification and feedback will be developed for this study. Simultaneous, a subsample of 12 teachers will be filmed to observe the application of the assessment strategies. The researchers seek to elicit a discussion about this study's design, the employed measures, and how the intervention is shaped.

Session M 2

1 September 2017 12:00 - 13:30

Main Building A - A34

Roundtable

Culture, Morality, Religion and Education, Developmental Aspects of Instruction, Teaching and Teacher Education

RT: Learning and Teaching in Culturally Diverse Settings

Keywords: At-risk students, Citizenship education, Cultural diversity in school, Literacy, Multicultural education, Parental involvement in learning, Primary education, Science education, Social aspects of learning and teaching, Teacher Professional Development

Interest group: SIG 21 - Learning and Teaching in Culturally Diverse Settings

Chairperson: Judith Harackiewicz, University of Wisconsin-Madison, United States

Negotiating inclusive citizenship of Muslims through school-family partnership in Finland and Sweden

Keywords: Citizenship education, Cultural diversity in school, Parental involvement in learning, Multicultural education

Presenting Author:Inkeri Rissanen, University of Tampere, Finland

In Finland and Sweden, polarization through increasing social, economic, and cultural divides damages the development of a healthy society. Religious diversification and the increasing political significance of religion are influencing the on-going renegotiation of citizenship, and Muslims have been posited as the critical case of multiculturalism. Schools are central spaces for the negotiation and development of citizenship, and family engagement in schools is known to increase the achievement and well-being of the students throughout their life. For immigrant families, the school is often the primary place through which they connect with society. School-family partnership can be a key factor in the integration process of immigrant Muslims; however, it is rarely researched as such. The data of this study include semi-structured interviews with principals (n=10 in both countries) and Muslim parents (n=8 in Sweden, n=9 in Finland). Through analyzing negotiations related to the central values of inclusive citizenship: justice, recognition, self-determination and solidarity (Kabeer 2005; Lister 2007), the study aims to answer its main research question: "How is the inclusive citizenship of Muslims developed through school-family partnerships?". The preliminary results depict negotiations related to 1. religious rights 2. recognition

of identities 3. parents vs. school's authority over the children. In the analysis, attention is also paid to the strategies used in these negotiations in different school communities, the role of the Muslim teachers as mediators, as well as to the impact of the different contextual factors in Finland and Sweden for these negotiations and their outcomes.

Literacy development of Roma children over the summer break: Is it more than a socio-economic issue?

Keywords: At-risk students, Literacy, Primary education, Social aspects of learning and teaching

Presenting Author:Dacian Dolean, Babes-Bolyai University, Romania; **Co-Author:**Crina Damsa, University of Oslo, Norway

This experimental research examines the growth of reading skills among Roma children and their non-Roma peers over a summer break. Empirical evidence points out to the potential detrimental effects of summer break on children's reading skills coming from disadvantaged socio-economical and ethnical backgrounds and speaking languages with inconsistent orthography. However, while most of the studies were conducted in US, it is not clear whether they apply to European countries and whether they pertain to consistent orthographies. In this study, the reading skills of 469 Roma and non-Roma children learning to read the consistently orthographic Romanian were assessed at the end of the 1st grade and at the beginning of 2nd grade. Results indicated that a) overall, reading skills improved significantly over the summer; b) reading rate did not varied significantly as a function of socio-economic status (SES); c) reading rate of non-Roma children increased significantly compared with their Roma peers, even after accounting for SES. The findings help refine our knowledge on how reading skills change over the summer break as a function of the degree of orthographic consistency, SES and ethnicity.

Teacher perspectives on science literacy in multilingual classrooms – multidisciplinary explorations

Keywords: Cultural diversity in school, Literacy, Science education, Teacher Professional Development

Presenting Author:Maaïke Hajer, HU University of Applied Sciences Utrecht, Netherlands; **Presenting Author:**Clas Olander, Malmö University, Sweden; **Presenting Author:**Birgitte Lund Nielsen, VIA University College, Denmark; **Co-Author:**Russell Tytler, Deakin University, Australia; **Co-Author:**Zuraini Ramli, Sultan Idris Education University, Malaysia

How can different disciplinary perspectives meet and lead to a deeper understanding of science literacy learning in an educational design approach? Especially in multilingual settings, science teachers need an understanding and a repertoire to move between daily and scientific discourses and to connect new concepts and wordings to students' daily knowledge and language in the language of instruction (Jakobsson, Mäkitalo & Säljö 2009). Understanding this learning and teaching of science literacy requires a multidisciplinary approach. In this international Roundtable session we present and discuss short video clips from teacher discussions and classroom data from the Swedish Science and Literacy Teaching (SALT) project. In specific the Clarke & Hollingworth (2002) model of teacher growth is used while analyzing. The model distinguishes between teachers *personal domain* of knowledge and beliefs, *practice domain* of experimenting in the classroom, *domain of consequence* including salient student outcomes and the *external domain* of school based professional development. Having previewed the selected video clips, presenters from two other multilingual contexts give their comments on the analytical approach drawing on their own research in science teaching in multilingual settings. The audience is invited to actively discuss the contributions of different disciplines to the analyses of these concrete science classroom data. Clarke, D. & Hollingsworth, H. (2002). Elaborating a model of teacher professional growth. *Teaching and Teacher Education* 18, 948-967. Jakobsson, A., Mäkitalo, Å., & Säljö, R. (2009). Conceptions of knowledge in research on students' understanding of the greenhouse effect: Methodological positions and their consequences for representations of knowing. *Science Education*, 93(6), 978-995.

Session M 3

1 September 2017 12:00 - 13:30

Main Building A - A31

Poster Presentation

Learning and Instructional Technology, Teaching and Teacher Education

PO: Teacher Education and Educational Technology

Keywords: Action research, Assessment methods and tools, Content analysis, E-learning / Online learning, Educational policy, Educational Technology, Emotion and affect, Higher education, History, In-service teacher education, Learning Technologies, Lifelong learning, Mixed-method research, Physical Sciences, Researcher education, Science education, Secondary education, Teacher Professional Development, Teaching / instruction, Technology

Interest group: SIG 07 - Learning and Instruction with Computers, SIG 11 - Teaching and Teacher Education

Chairperson: Markus Sauerwein, German Institute for International Educational Research (DIPF), Germany

Attitudes towards using App Inventor in schools. German teachers' perspectives

Keywords: Educational Technology, In-service teacher education, Teacher Professional Development, Technology

Presenting Author:Armin Weinberger, Saarland University, Germany; **Co-Author:**Lara Johanna Schmitt, Saarland University, Germany

Programming and computational thinking can be regarded key competencies to be taught in school. Constructionist approaches foresee visual programming languages such as Scratch for pupils to develop software. In a similar vein, App Inventor allows creating Android apps, which may be particularly incentivizing for young learners. However, there are contradictory findings on how teachers are able and willing to utilize novel educational technology in their classroom practice. We investigate teachers' perspectives on App Inventor, identifying the perceived potentials and limitations. All in all, teachers appreciated App Inventor's pedagogical approach, but would need more support in getting to know its technical and pedagogical features. To that end, we are currently setting up a long-term training to support instructors in engaging with App Inventor.

Research and Status in Colleges of Education: The Teacher Educators' Perspective

Keywords: Educational policy, Higher education, Researcher education, Lifelong learning

Presenting Author:Osnat Rubin, MOFET Institute, Israel

Less prestigious than universities, seeking to enhance their status, academic research has captured a central role in teacher training colleges. In an era in which the teacher training system is experiencing tension and confusion regarding its identity and status, an understanding of the teacher training model that integrates teaching and research must be broadened. This study employed a Mixed-Methods methodology to explore teacher educators' perceptions of the researchers' identity. On the qualitative phase of the study, two focus groups interviews were conducted, each of which consisted of 20 participants. The participants were teacher-educators, who participated in a Specialization Program in Research and Evaluation, at the MOFET institute- a unique center for the research and development of programs in teacher education. Findings show the ambivalence of teaching and researching and the dilemmas it brings about. Category analysis revealed three aspects of the teacher educator as a researcher: *a learning individual*, *a good teacher*, and *an academic climber*. These categories informed a quantitative scale, including Likert-scale items regarding the properties of the teacher-educator researcher. At the quantitative phase of the study participated 264 teacher-educators from 10 colleges. Findings indicate the centrality of the researcher as a learner and the importance of sharing. Gender and position differences were found. The study reveals perceptions of teacher-educators regarding the researcher's identity and his place in the college of education, and identifies characteristics that might develop the unique identity of teacher-educators in the academia. Findings and implications for decision-makers will be presented.

Evaluating Usability Dimensions of a Mobile Augmented Reality App for History Learning

Keywords: Educational Technology, Emotion and affect, History, Learning Technologies

Presenting Author:Susanne Lajoie, McGill University, Canada; **Co-Author:**Jason Harley, University of Alberta, Canada;

Co-Author:Amanda Jarrell, McGill University, Canada; **Co-Author:**Tara Tressel, McGill University, Canada; **Co-**

Author:Laura Pipe, McGill University, Canada; **Co-Author:**Eric Poitras, University of Utah, United States

As technology becomes more ubiquitous and handheld devices more common there is great potential for augmented reality (AR) applications to foster learning about the world around us both in and outside of the classroom. The studies of location-based AR in history education focus on the development and usability of these systems, but fail to relate usability ratings with outcomes such as learning or relevant psychological states, such as emotions. Relatedly, these studies are rarely guided by educational and/or psychological theories. This paper contributes to addressing this gap by examining the relationship between 43 learners' usability ratings of the [Blinded] mobile AR app for history learning, and their post-test knowledge scores and emotions. Preliminary findings suggest that multimedia properties constitute a particularly important usability factor to attend to in the design and optimization of mobile AR apps for history learning, though all examined usability factors represent relevant considerations given their positive correlations with enjoyment, curiosity, and post-test knowledge. Low mean levels of negative emotions, and high mean levels of usability scores across factors, positive emotions, and high knowledge post-test scores suggest that the mobile AR app is well-designed from a usability perspective and effective in fostering historical learning and positive emotions during interactions.

Educational Technology in Personalized Schools: A survey and case studies in Swiss Secondary Schools

Keywords: Educational Technology, Mixed-method research, Secondary education, Teaching / instruction

Presenting Author:Regina Schmid, Schwyz University of Teacher Education, Switzerland; **Co-Author:**Dominik Petko, Schwyz University of Teacher Education, Switzerland

Despite good infrastructure in Swiss schools, digital technologies are still rarely used in teaching. This has often been attributed to an incompatibility between new digital opportunities and traditional teaching culture. Thus, a shift towards open and self-directed pedagogies has been proposed in order to address this issue. To examine this assumption, the study analyses pupil questionnaires from N=31 secondary schools with an emphasis on open and personalized learning concepts. The sample is part of a longitudinal research project in schools with personalized learning concepts in Switzerland. Compared to ICILS data 2013 from Switzerland (8th grade, n=3225: 34% using computer at least weekly), computers are more frequently used by pupils in personalized schools (8th grade, n=621: 79% weekly ICT-use). To explain this finding, qualitative case studies of the three schools with the highest use of computer were conducted. The results suggest that pupils' choice of their own learning methods is a strong enabler of an intensified use of technology.

e-Learning in Secondary School Physics Investigations

Keywords: Action research, E-learning / Online learning, Physical Sciences, Secondary education

Presenting Author:Darcy Fawcett, Gisborne Boys' High School, New Zealand

This presentation will discuss and evaluate the use of e-learning by students and teachers at a New Zealand secondary school during their Physics investigations. The presentation will include: (1) an introduction to the e-learning environment – teacher and student use of Google Classroom for resource sharing and management; teacher use of screen-casts for concept teaching and Google Forms for concept testing with automated feedback; student use of Google Sheets, Plot.ly and Google Docs for data manipulation, graphical analysis and report writing; teacher use of the Goggle Docs and Sheets comment features for feedback; (2) an evaluation of assessment results reporting significant gains in student outcomes; (3) changes introduced for the following year; (4) discussion from the floor.

A system for automatic speech recognition and observation of classroom interactions

Keywords: Assessment methods and tools, Content analysis, Science education, Teacher Professional Development

Presenting Author:Daniela Caballero, Universidad de Chile, Chile; **Co-Author:**Hanna Kronholm, University of Jyväskylä, Finland; **Co-Author:**André Mansikkaniemi, Aalto University, Finland; **Co-Author:**Jouni Viiri, University of Jyväskylä, Finland; **Co-Author:**Roberto Araya, Universidad de Chile, Chile; **Co-Author:**Pasi Pertilä, Tampere University of Technology, Finland; **Co-Author:**Tuomas Virtanen, Tampere University of Technology, Finland; **Co-Author:**Mikko Kurimo, Aalto University, Finland

In this project we develop and study computational methods that can convert speech into text, but also to analyze the contents and the quality of classroom talk, and at the same time, allow observing classroom interactions. Classroom talk analysis is essential when studying teaching and learning. Particularly, the quality of classroom talk, for example, questions posed by teacher, and the richness of the concepts used in the classroom directly affect learning. Classroom observations provide valuable information which helps teachers to improve their daily practices, such as how time is distributed in different activities. However, analysing classroom talk manually is time consuming, and data analysis and immediate feedback of the observed classroom is almost impossible due to the way data is collected (pen-and-paper) and the amount of information. The aim is to develop a system which collects information of the classroom, and which every teacher can use to study his or her own teaching, and to get feedback in forms of charts and graphs quickly after the lesson. The system consists of an Android smartphone, the application and an external microphone. The talk is transformed to text by automatic speech recognition (ASR) analysis methods. In the presentation we will show the developed application, some data collected in schools and preliminary results of speech recognition.

Session M 4

1 September 2017 12:00 - 13:30

Main Building E - E222

Poster Presentation

Cognitive Science, Developmental Aspects of Instruction, Instructional Design, Learning and Social Interaction

PO: Learning and Development in Early Childhood

Keywords: Assessment methods and tools, At-risk students, Cognitive development, Early childhood education, Educational attainment, Educational policy, Language (L1/Standard Language), Literacy, Motivation, Out-of-school learning, Parental involvement in learning, Primary education, Quantitative methods, Reasoning, Science education, Social interaction, Student learning, Teaching / instruction, Writing / Literacy

Interest group: SIG 05 - Learning and Development in Early Childhood , SIG 10 - Social Interaction in Learning and Instruction

Chairperson: Charalambos Charalambous, University of Cyprus, Cyprus

Preschool from Age Two: The perspectives of parents and teachers

Keywords: Early childhood education, Educational policy, Quantitative methods, Teaching / instruction

Presenting Author:Adriana Wiegerová, Tomas Bata University, Czech Republic; **Co-Author:**Peter Gavora, Tomas Bata University, Czech Republic

Preschools in the Czech Republic have traditionally provided education for children between the ages of three and six. This research responds on the new initiative of the Ministry of Education in the Czech Republic which issued a positive standpoint concerning acceptance of two years old children to preschools if conditions are favourable. This study concentrates on a sample of preschools which provide education for children from age two and parents of these children. The purposes of the study are threefold: (1) To identify the key motives of parents to enrol their children into preschool and their view of the preschool's education programme; (2) To find out how teachers adopt their processes to meet the developmental requirements of two years old children; (3) To determine the degree by which facilities and infrastructure of preschools are appropriate for the provision of safe, healthy and learning-oriented setting for young children. The sample consists of 15 preschools in the Zlin Region of the Czech Republic which provide education for children from age two to six. Preschools were selected to represent downtown areas, suburbs, and villages in the region. Three research methods were used: a questionnaire for parents, a questionnaire for teachers and a preschool setting description form. Final data will be presented at the conference.

Developing combinatorial reasoning among third grade pupils

Keywords: Cognitive development, Primary education, Reasoning, Science education

Presenting Author:Zsófia Gabriella Szabó, University of Szeged, Hungary; **Co-Author:**Erzsébet Korom, University of Szeged, MTA-SZTE Science Education Research Group, Hungary

The study looks at combinatorial reasoning, which is a skill playing an important role in problem solving, and experimental and scientific reasoning. Even though the fostering of thinking skills is an important task, few training programs focus on the development of combinatorial reasoning in a science context. The aim of our research was to develop a training program for the improvement of combinatorial reasoning in science and to analyse its effectiveness among third grade Hungarian students. Our training program is based on Csapó's (1988) theoretical model and focuses on the development of six combinatorial operations. It contains 54 combinatorial tasks, with a story line embedded in a science context. The training experiment was led by the students' regular teachers, who used our methodology. To assess the effectiveness of the 6-8-week program, we assigned students to experimental (N=92) and control (N=73) groups, and measured their combinatorial reasoning competence with an online test (Csapó, Pásztor & Molnár, 2015) before and after the training program. The results show that combinatorial reasoning improved significantly in both groups. The mean improvement in the experimental group (17.9%) was more than twice the size of improvement in the control group (8.2%). The effect size of the training program was moderate (Cohen's $d=0.57$), and the program had a greater impact on students having lower initial skills. Our findings indicate that the combinatorial reasoning training program had the desired effect, and the science context could be successfully combined with combinatorial operations.

Individual and environmental factors interacting in vocabulary of elementary school children

Keywords: At-risk students, Language (L1/Standard Language), Parental involvement in learning, Social interaction

Presenting Author:Christian Müller, Goethe-University Frankfurt, Germany; **Co-Author:**Sebastian Poloczek, Bristol University, United Kingdom; **Co-Author:**Bettina Retzbach, Goethe-Universität Frankfurt, Germany; **Co-Author:**Gerhard Buettner, University of Frankfurt, Germany

The present study examined interactions effects of individual and environmental factors on predicting expressive vocabulary of mono- and bilingual elementary children and with special focus on effects of family language input and interactions with IQ. As individual factors non-verbal intelligence scores and short-term memory of words and non-words were assessed. As environmental factors, measures for social-economic-status and family language input regarding usage of society's language at home were chosen. The sample consisted of 148 German elementary school children aged six to nine years. By structural equation models and stepwise regression, we found linear associations on predicting expressive vocabulary by all assessed individual and environmental factors (except for sex). Family language input at home in particular was highly related to vocabulary development. Additionally, interactions for non-verbal intelligence and family language whilst controlling other factors in this population were found suggesting that the impact of the ratio of German being spoken in the family on vocabulary development was less pronounced in children with higher non-verbal intelligence and particularly strong in those with a lower non-verbal IQ.

Oral text abilities of children attending kindergarten: development of a measurement instrument

Keywords: Early childhood education, Language (L1/Standard Language), Student learning, Writing / Literacy

Presenting Author:Iris Dinkelmann, Thurgau University of Teacher Education, Switzerland; **Co-Author:**Katharina Kirchhofer, Thurgau University of Teacher Education, Switzerland; **Co-Author:**Claudia Hefti Christ, Thurgau University of Teacher Education, Switzerland; **Co-Author:**Dieter Isler, Thurgau University of Teacher Education, Switzerland

Based on theoretical assumptions and recent research, no one questions the importance of higher level literacy abilities as needed for reporting experiences or inventing stories for successful academic learning. These abilities - we conceptualize them as "oral text abilities" - develop long before formal reading and writing instruction takes place in school. However, they considerably vary across children depending on their familial background. Although there is clear empirical support for the assumption that these abilities can be fostered systematically in formal education, recent research shows a lack of awareness and instructional practice among kindergarten teachers. As we plan to conduct an intervention study (testing effects of intervention on oral text abilities), in this pre-study, we develop an instrument to measure oral text abilities of kindergarten-aged children. Approximately 110 four- to six-year olds are videotaped while retelling a silent animated movie in a standardized setting. The videos will be transcribed and the anonymous transcriptions will be rated on a five-point Likert-scale (manual-based). Our poster (a) will document collection, rating as well as analysis procedures, and (b) will report the results concerning the factorial structure of the instrument.

Playful assessment of cognitive development in young children

Keywords: Assessment methods and tools, Cognitive development, Early childhood education, Educational attainment

Presenting Author:Corrie Urlings, Maastricht University, Netherlands; **Co-Author:**Karien Coppens, Maastricht University School of Business and Economics, Netherlands; **Co-Author:**Lex Borghans, Maastricht University School of Business and Economics, Netherlands

School achievement tests and observations can be time consuming and it is debated which aspects of development are precisely measured with tests and how objective observations are. The current study moves away from these traditional assessments of cognitive ability by exploring the potential use of play to assess cognitive development. We will focus specifically on executive function in young children aged 5-6 years old. For this purpose a wooden maze is transformed into an 'assessment tool'. A combination of the new measurement instrument, a standardized test battery and children's

school test scores will give an insight into the exploratory research question whether and to what extent it is possible to assess (an aspect of) cognitive development using play. Results of the pilot study will be reported, which will be used to set up a larger experiment.

Print exposure, independent reading and reading fluency among Finnish school-aged children

Keywords: Literacy, Motivation, Out-of-school learning, Quantitative methods

Presenting Author:Hanna Pöyliö, Niilo Mäki Institute, Finland; **Co-Author:**Paula Salmi, Niilo Mäki Institute, Finland; **Co-Author:**Mikko Aro, University of Jyväskylä, Finland

In the present study 310 students from grade levels 2 to 5 (age $m=9,6$ yrs, $sd=1,15$) filled out a daily activity diary for one week. The reading-related activities were then analyzed and divided into two groups: independent reading and print exposure. Independent reading consisted of book reading, magazine/newspaper and comic reading. Print exposure consisted of homework, reading from a device and watching tv programs with subtitles. The reading fluency of the students was measured before filling out the diary, same as motivation measured by a task-value scale. In this study girls were more fluent than boys. There was no difference between girls and boys in how much they spend reading independently in overall, but girls reported spending more time reading books and boys reading more comics. There was no difference in overall print exposure either but boys reported spending more time on watching TV with subtitles. Print exposure did not correlate significantly with reading fluency whereas the independent reading did. The students with least amount of independent reading got the least amount of print exposure and were the slowest readers. 55 % of them were boys. Children who are motivated in reading are likely to read independently and that way gain more practice than children who are unmotivated (Mol & Bus, 2011). Boys' lack of interest towards reading and their reading fluency is discussed in the presentation.

Session M 5

1 September 2017 12:00 - 13:30

Pinni B - B3110

Roundtable

Higher Education

RT: Higher Education

Keywords: Educational policy, Higher education, Informal learning, Out-of-school learning, Pre-service teacher education, Problem-based learning, Student learning, Survey Research, Teacher Professional Development, Teaching approaches

Interest group: SIG 04 - Higher Education

Chairperson: Marloes Nederhand, Erasmus University Rotterdam, Netherlands

Evolution of international traineeships in a South European University

Keywords: Higher education, Informal learning, Out-of-school learning, Survey Research

Presenting Author:Josepa Alemany-Costa, Pompeu Fabra University, Spain; **Co-Author:**Xavier Perramon, Universitat Politècnica de Catalunya, Spain

This work intends to study the effects of international internships on the employability of recent graduates of a public South European university, the type of employment achieved and the relationship with the knowledge and skills acquired during the internships. A survey was conducted during the international internship and a new survey has been administered one year later in order to follow the situation immediately after the internship and after a few years in terms of employability. This survey includes different aspects such as: relationship between theory and current job, type of employment and labour contract, and soft skills used in the current work. The expected results will show the relationship between the international internships and the graduate international employability.

The Goals of Problem-based Learning through the Eyes of Educational Staff

Keywords: Higher education, Student learning, Teaching approaches, Problem-based learning

Presenting Author:Gerry Geitz, Stenden University of Applied Sciences, Netherlands

Problem-based learning finds its foundation in problems teachers encountered within medical educational programs in Northern-America. These problems are nowadays still valid and it can be questioned whether the intended goals linked to this student-centered approach are achieved. In this study the perspective of educational staff is chosen to learn more about their implicit or explicit educational goals within a PBL-environment. Out of the data 12 intended goals were identified, insights were gained on the achieved goals and to what extent they contributed to the development of constructivistic, self-directed, collaborative and contextual learning. There seems to be a discrepancy in the perceptions of educational staff in terms of intended goals and the contribution of PBL to constructivistic, self-directed, collaborative and contextual learning. Future research directed at influencing the intended goals of staff might be worthwhile in order to optimize the effectiveness of PBL.

Why students go abroad (and so many others don't): Exploring teacher candidates' motives

Keywords: Educational policy, Higher education, Pre-service teacher education, Teacher Professional Development

Presenting Author:Frederik Ahlgrimm, University of Potsdam, Germany; **Co-Author:**Sebastian Heck, Universität Potsdam, Germany

While there is a positive claim for internationalization both in school and higher education, the percentage of teacher candidates participating in exchange activities is perceivably lower than the average students' share in German universities. One possible explanation may be found in national or regional restrictions of teacher education programs. Other studies point out that institutional, economical, and personal factors play key roles. To understand motives of teacher candidates regarding study or internships abroad and to find out about the differences between teacher candidates and other students, the authors are planning a survey study which will be presented and discussed in the round table session.

Session M 6

1 September 2017 12:00 - 13:30

Linna - K110

Poster Presentation

Assessment and Evaluation

PO: Assessment Methods and Tools

Keywords: Achievement, Assessment methods and tools, Attitudes and beliefs, Cognitive development, Cognitive skills, Comprehension of text and graphics, Higher education, Interdisciplinary, Learning analytics, Mathematics, Misconceptions, Mixed-method research, Motivation, Numeracy, Primary education, Problem solving, Secondary data analysis, Student learning

Interest group: SIG 01 - Assessment and Evaluation, SIG 17 - Methods in Learning Research

Chairperson: Marte Blikstad-Balas, University of Oslo, Norway

Assessing in partnership: involving students in formative assessment.

Keywords: Assessment methods and tools, Higher education, Mixed-method research, Student learning

Presenting Author:Elly Vermunt, Zuyd University of Applied Sciences, Netherlands; **Co-Author:**Dominique Sluijsmans, Zuyd University of Applied Sciences, Netherlands

Balancing the formative and summative function of assessment in higher education is a challenging task for teachers. The aim of this study is to increase students' learning by involving them actively in the cyclic assessment process by means of formative activities. For this purpose, we distinguished three research phases. In the first phase, we conducted a literature review. The aim of this review was to indicate which formative activities are effective with regard to the six steps in the assessment process. We found that generating assessment criteria together with students and self-assessment on a draft are effective activities. They provide valuable feedup to the students during the phases of defining learning outcomes and assessments. Peer-assessment is a valuable activity during the steps of test taking and analysis. Involving students in understanding the assessment results provides feed forward for future learning. In the second research phase, we investigated students' and teachers' perceived formative value within the steps of the assessment process. Results from interview data reveal that students find it difficult to understand the assessment criteria and the required standards. Based on this finding, we conducted an experimental study in the third research phase. This study examines the effect of student involvement in defining assessment criteria on students' performance and motivation. Preliminary results show that engaging students in setting the assessment criteria and the required standards and applying these to exemplars is beneficial for their learning and performance.

Comparing the consequences of various measurement error presentations in test score reports

Keywords: Assessment methods and tools, Comprehension of text and graphics, Mixed-method research, Primary education

Presenting Author:Dorien Hopster-den Otter, University of Twente, Netherlands; **Co-Author:**Saskia Wools, Cito, Netherlands; **Co-Author:**Theo Eggen, Cito/University of Twente, Netherlands; **Co-Author:**Bernard Veldkamp, University of Twente, Netherlands

This paper aims to determine (1) to what extent the presentation of measurement error information results into different educational decisions, and (2) users' preferences relating to the various presentations. The study compares four presentation formats: blur, color value, error bar and no measurement error. A mixed-method design was used, consisting of a survey experiment, think-aloud protocols and focus groups. In the survey experiment, the presentation formats were systematically varied. Each format represents the test score report of a hypothetical student. Participants were asked to assign each student to a group (I, II or III) or to indicate that they need additional information for this decision. Qualitative data from think-aloud protocols and focus groups were gathered to obtain deeper analysis and interpret the findings of the survey. Preliminary results of 77 preservice teachers show that the presentation of error seems to little influence decisions of participants. However, participants prefer the formats with error more than the format without error.

Symbolic number processing and mathematical achievement in adults

Keywords: Achievement, Cognitive skills, Mathematics, Numeracy

Presenting Author:Josetxu Orrantia, University of Salamanca, Spain; **Co-Author:**Laura Matilla, University of Salamanca, Spain; **Co-Author:**Rosario Sánchez, University of Salamanca, Spain; **Co-Author:**Sara San Romualdo, University of Salamanca, Spain; **Co-Author:**David Munez, National Institute of Education / Nanyang Technological University, Singapore; **Co-Author:**Lieven Verschaffel, KU Leuven, Belgium

The development of numerical abilities and math-related skills, both in children and adults, has become a heavily researched topic in the last years. Some of these studies have shown that the performance in symbolic number processing tasks relate to math achievement, although it is not still clear what mechanism is responsible of this relation. It could be either the automatic symbol processing, or the access to magnitude representation from the symbols. To answer this question, in the current study were used three different symbolic number processing tasks with adult participants: 1) number comparison, whose measure of “numerical distance effect” would reflect, indirectly, the access to magnitude representation 2) pure symbolic processing and 3) one task of direct access to magnitude (from symbols to magnitudes). As measures of arithmetic achievement two tests were used: arithmetic fluency and mental calculation. It was conducted a hierarchical regression analysis taking into account the intelligence, processing speed and verbal and spatial working memory. This analysis showed that the three measures of symbolic number processing contributed to the variance of arithmetic fluency even when the effects of non-mathematical abilities were controlled for. On the other hand, only the access to magnitude representation contributed to the variance on mental calculation. These results suggest that arithmetic achievement is built upon the abilities to automatically process symbols and to access to their magnitude, although this relationship is mediated by arithmetic achievement measures.

Procedural and Conceptual Knowledge: Problems in Definitions and Assessment

Keywords: Assessment methods and tools, Cognitive development, Mathematics, Problem solving

Presenting Author: Julia Erdmann, Ruhr University Bochum, Institute of Educational Research, Germany; **Presenting Author:** Christian Hartmann, Ruhr University Bochum, Germany; **Co-Author:** Nikol Rummel, Ruhr University Bochum, Institute of Educational Research, Germany

Domain-specific knowledge can be divided into different types of knowledge. In research on learning in mathematics, a commonly used typology is that of conceptual knowledge (CK) and procedural knowledge (PK). Research on CK and PK comprises a debate on the developmental interrelations between these two knowledge types. In the current work we claim that conclusions on these interrelations are not possible so far: different definitions lead to different operationalizations. This accounts for differences in measurement, which makes it impossible to generalize across studies. Furthermore, results of a large amount of studies use operationalizations that do not allow for a clear distinction between the two knowledge types. Supporting this finding, factor analyses were so far not able to extract two latent factors. Instead intercorrelations between measurements of CK and PK are high. This paper looks at commonalities across and differences in assessment and underlying definitions of CK and PK as well as different views of their interrelations. Problems emerging from these differences in definitions and assessment and from certain ways of assessment are discussed. We envisage a reconceptualization of CK and PK involving a systematic review of literature from research on learning an instruction as well cognitive psychology.

Translating between temporal representations for insight on human interaction

Keywords: Interdisciplinary, Learning analytics, Mixed-method research, Secondary data analysis

Presenting Author: Kristine Lund, University of Lyon, France; **Co-Author:** Matthieu Quignard, University of Lyon, France; **Co-Author:** David Shaffer, University of Wisconsin-Madison, United States

Traces of human interaction that come from recordings of audio and video data can be organized into temporal representations that have different affordances. In this contribution, we look at the affordances of two different representations, and at how translating between them can give added insight into the data being analyzed. To illustrate this, we use audio data of a discussion analyzed for its emotional characteristics. An initial grounded analysis divided the discussion into four phases. In what follows we examine this original analysis using two different tools: a *frieze representation* that shows the temporal distribution of indicators of engagement, and epistemic network analysis, an *aggregated representation* that shows how the pattern of associations among these indicators differ among the phases. We look at the interaction between these representations by show how it points to third translation of the data that re-anchors the interpretation of the data back into the temporally contextualized human interaction. Although this data is not from a pedagogical task, we argue that the analysis of emotion is a key component of knowledge construction. The ability to use multiple representations to characterize the emotional components of coded human interaction data is thus potentially an important tool in the study of learning.

When Strategic Graphical Interpretation Fails: The Influence of Prior Belief and Political Identity

Keywords: Attitudes and beliefs, Comprehension of text and graphics, Misconceptions, Motivation

Presenting Author: Ian Thacker, University of Southern California, United States; **Co-Author:** Robert Danielson, University of Southern California, United States; **Co-Author:** Gale Sinatra, University of Southern California, United States; **Co-Author:** Neil Jacobson, University of Southern California, United States

This study investigated whether understanding difficult science concepts such as climate change or vaccination risk is a function of learners' inability to parse complex scientific graphics, or a function of their prior beliefs and political identity. We asked 120 Americans drawn from an online environment to read the famous “hockey stick graph” depicting global temperature change over time (Mann et al., 2008). We randomly assigned participants to view one of three versions of the data in the “hockey stick graph” relating to global temperature change over time, housing prices over time, or the number of diagnosed cases of children with autism over time. Results revealed that in general participants in all conditions had a difficult time interpreting the graph, yet when the graph was labeled as portraying temperature change over time, their

political identity was predictive of how they interpreted changes in the data. In other words, in the absence of understanding, prior beliefs, and political identity predicted the kinds of causal inferences that they ascribed to rates of change in a graphical display but only when the graph depicted climate change. These results highlight the importance of research addressing the role of prior perspectives in the meaning making process of socially and politically charged topics.

Session M 7

1 September 2017 12:00 - 13:30

Main Building A - A07

Poster Presentation

Developmental Aspects of Instruction, Instructional Design, Learning and Instructional Technology, Learning and Social Interaction

PO: Metacognition and Writing

Keywords: Achievement, Cognitive development, Cognitive skills, Collaborative Learning, Computer-supported collaborative learning, Developmental processes, E-learning / Online learning, Educational Psychology, Instructional design, Language (L1/Standard Language), Learning analytics, Literacy, Metacognition, Misconceptions, Professions and applied sciences, Reading comprehension, Self-regulation, Teaching / instruction, Writing / Literacy

Interest group: SIG 12 - Writing, SIG 16 - Metacognition

Chairperson: Sanna Järvelä, University of Oulu, Finland

Uncertainty monitoring of open-ended and true-false questions in primary school children

Keywords: Cognitive development, Cognitive skills, Metacognition, Reading comprehension

Presenting Author: Martina Steiner, University of Bern, Switzerland; **Co-Author:** Natalie Guggisberg, University of Bern, Switzerland; **Co-Author:** Mariette van Loon, University of Bern, Switzerland; **Co-Author:** Claudia Roebers, University of Bern, Switzerland

This research examined primary school children's ability to give accurate confidence judgements (CJs) after answering two different types of text related questions. A special focus was laid on age differences in uncertainty monitoring. In the to be presented study children (younger group: 2nd/3rd graders; older group: 4th/5th graders) read six expository texts and answered two open-ended and three true-false (T-F) questions per text, followed by a CJ after each answer. While both age groups showed similar CJs in relation to correct answers for open-ended and T-F questions, an age-related progression in uncertainty monitoring was observed in open-ended questions, with older children giving lower CJs to incorrect answers than younger children. CJs for incorrect answers in T-F questions were similar across both age groups and markedly higher than CJs for incorrect answers in open-ended questions. Together these findings suggest a developmental progression in terms of uncertainty monitoring when answering open-ended questions. Moreover, the results showed a difference in uncertainty monitoring depending on the question type, with CJs following T-F questions were more positively biased across both age groups than CJs following open-ended questions.

Learners' Self-Regulatory Behaviour and its Relation to Designs of Blended Learning Environments.

Keywords: E-learning / Online learning, Instructional design, Learning analytics, Self-regulation

Presenting Author: Stijn Van Laer, KU Leuven, Belgium; **Co-Author:** Jan Elen, KU Leuven, Belgium

Instruction via blended learning environments, and the large variety of online and face-to-face interventions that came with it, has become increasingly popular in the last few decades. However, the conditions under which such environments are successful remains unclear. Studies suggest that blended learning challenges learners' self-regulation. Yet little is known about learners' self-regulatory behaviour in these environments and how this relates to their design. This limited understanding is problematic since the effectiveness of a learning environment is determined by it. The aim of this study was therefore to identify learners' self-regulatory behaviour profiles in blended learning environments and to relate them to the design of these environments. To do this, we first captured learners' self-regulatory behaviour in six blended learning courses (n=137). Trace data was analysed for frequency, diversity and sequences. Three user profiles were identified (internal regulator, external regulator and mis-regulator), confronted with the literature and related to performance. Subsequently the design of each of the learning environments was described, using a framework based on seven blended learning environment attributes that support self-regulation. Although this study focuses mainly on the online component of the learning environment, the results indicate that fewer learners with an undesirable profile (mis-regulators) are identified in courses which have thoughtfully integrated self-regulatory design attributes. This finding highlights the need to integrate attributes that support self-regulation in the design of blended learning environments. This contribution will facilitate further elaboration on the user profiles identified and addresses implications for the design of blended learning environments.

Integrating direct instruction and discovery learning based on Thinking-after-Instruction approach

Keywords: Achievement, Educational Psychology, Metacognition, Misconceptions

Presenting Author: Tatsushi Fukaya, Gunma University, Japan; **Co-Author:** Yuri Uesaka, The University of Tokyo, Japan;

Co-Author: Shin'ichi Ichikawa, University of Tokyo, Japan

This study tried to examine the effects of a Thinking-after-Instruction (TAI) approach, which integrate teachers' direct instruction and students' discovery learning (Ichikawa, 2004). Fifty-six Japanese 8th-grade students taking five-day science

classes were assigned to three groups: TAI group, semi-TAI group, and Thinking-before-Instruction (TBI) group. In the classes, TAI students received teachers' direct instruction on basic concepts, explained what teachers explained in pairs to check their own comprehension, tried to discover the solutions of deepening comprehension tasks, and described what they understood and did not understand. In the semi-TAI group, students engaged longer in the deepening comprehension task instead of checking comprehension. Before receiving teachers' direct instruction, TBI students tried to discover the solutions of basic concept tasks but did not work on comprehension checking and self-evaluation. Post-test results demonstrated that TAI students showed better performance on the basic concept test and deepening comprehension test than other groups.

Development and automatization of the writing process in Chilean school students

Keywords: Cognitive development, Developmental processes, Educational Psychology, Writing / Literacy

Presenting Author:Elvira Jéldrez, Universidad de Chile, Chile; **Co-Author:**Carmen Sotomayor, Universidad de Chile, Chile; **Co-Author:**David Maximiliano Gomez Rojas, Universidad de Chile, Chile

A good writer deploys cognitive skills such as planning, reviewing, and monitoring of his writing process in order to produce a coherent text meeting the communicative objectives of the task at hand. Achieving this requires the automatization of certain processes such as graphomotor execution and orthography, all of which make use of working memory capacity. Recent research has suggested that this automatization implies a release of cognitive resources, allowing students to develop the higher-level processes involved in written production. This presentation will show the results of an ongoing research project aimed at studying the automatization of the writing process in Chilean students. The final sample will include students from 3rd, 6th, and 9th grades. Written productions will be recorded and analyzed using a Tablet and Pen to measure writing speed and other relevant variables. A Thinking Aloud protocol will be also included, to observe and understand how the writing process unfolds. We will also assess students' working memory capacity and the development of ideas in the written productions. The main hypothesis is that increased automatization will be associated with higher-level processes in writing and more complex development of ideas in the written text.

A cognitive perspective of how authors and author-to-be describe their writing processes

Keywords: Language (L1/Standard Language), Literacy, Teaching / instruction, Writing / Literacy

Presenting Author:Victoria Johansson, Lund University, Sweden

In this qualitative examination of writing development, the attention is on how good adult writers develop into even better writers. Knowledge about advanced learning and development are important tools for understanding teaching and learning at all levels. This paper examines the writing development through an in-depth interview study of university students on a two-year creative writing program. We compare these authors-to-be views on writing, planning, revision, reading and the reader, at the beginning and the end of the program. In addition, these results are compared to established authors reasoning around the same theme. The answers are discussed in relation to Hayes & Flower's model of cognitive processes during writing, and Kellogg's notion of 'knowledge crafters', as being an advanced developmental stage of writing competence. Results suggest that the gap between the authors and the authors-to-be is closing during the education. Further, we can see how the authors-to-be develop from self-centred writers who are engage in expressing themselves through the text, to authors that are consciously using the text to evoke reactions in the readers. Further, many of the authors-to-be describe how they have come to appreciate the planning and revising processes of writing, which is in line with how the established authors describe their writing processes. This study gives a contribution to the field of life-long learning and development of writing. It will also add important knowledge for the development of teaching methods for adult writers.

Socially Shared Metacognition in a Project Based Learning Environment: A Comparison Study

Keywords: Collaborative Learning, Computer-supported collaborative learning, Metacognition, Professions and applied sciences

Presenting Author:Nikki Lobczowski, University of North Carolina at Chapel Hill, United States; **Co-Author:**Kayley Lyons, University of North Carolina at Chapel Hill, United States; **Co-Author:**Jacqui McLaughlin, University of North Carolina at Chapel Hill, United States; **Co-Author:**Jeff Greene, University of North Carolina, United States

Despite an increase in research on socially shared regulation of learning (SSRL), there remains a dearth of studies on socially shared metacognition (SSM). As a research community, we still lack understanding concerning how groups co-construct metacognitive knowledge, skills, and experiences. In this study, we analyzed video recordings from group meetings comprised of students enrolled in their second year of a health professions degree program. Six groups of students volunteered to participate in a pilot using a new mobile application (app) that teaches student groups individualized strategies to address identified areas of improvement. This analysis has informed the development of a coding scheme that characterizes the socially shared metacognitive processes of small groups in a project based learning environment. Using log data collected from the app, we distinguished which groups ranked highest and lowest overall for metacognitive experiences (ME), and then examined differences in the SSM processes between these groups. Finally, we studied how these processes changed over time. Initial findings show promising instances of SSM present in several groups. These will be explored in more depth throughout the course of the study and upon its completion.

Session M 8

1 September 2017 12:00 - 13:30

Pinni B - B0039

Poster Presentation

Assessment and Evaluation, Lifelong Learning, Teaching and Teacher Education

PO: Assessment and Evaluation

Keywords: Assessment methods and tools, Case studies, Competencies, Computer-assisted learning, Educational Psychology, Higher education, In-service teacher education, Learning approaches, Secondary education, Self-efficacy, Self-regulation, Student learning, Teacher Effectiveness, Teacher Professional Development, Teaching / instruction

Interest group: SIG 01 - Assessment and Evaluation

Chairperson: Mathias Mejez, University of Zurich, Switzerland

Developing Skills Development Monitoring System (SISDECOM): A Multiple-case Study

Keywords: Assessment methods and tools, Case studies, Competencies, Computer-assisted learning

Presenting Author: María Soledad Ibarra Saiz, EVALfor Research Group - University of Cadiz, Spain; **Co-**

Author: Gregorio Rodríguez Gómez, EVALfor Research Group - University of Cadiz, Spain

Within the context of assessment, when feedback and feedforward are concerned both the speed of their delivery and their comprehensibility are considered crucial. This paper, set within the framework of an evaluative approach to assessment as learning and empowerment, presents an earlier stage of a multiple-case study which seeks to evaluate a proposed Skills Development Monitoring System (SISDECOM). This system is based on the specification of assessment processes and the use of technological tools as means to facilitate and systematize the monitoring of skills development by university tutors and students. The study will be carried out in two Spanish universities for two academic years (2015-2017), involve 300 university students and focus on six different modules from four degree courses. Techniques such as Cross-Case Synthesis (CCS) and LogicModels will be employed to analyze the data to respond to the research questions posed. In short, using technological means such as the Gescompeval® and EvalCOMIX® web-based programmes integrated within a Moodle environment, the study aims to extend the implementation of the approach of assessment as learning and empowerment.

Teacher Training in Mexico: a model to evaluate learning transfer

Keywords: Assessment methods and tools, In-service teacher education, Teacher Professional Development, Teaching / instruction

Presenting Author: Miren Fernández, University of the Balearic Islands, Spain; **Co-Author:** Carla Quesada-Pallarès, Universitat de Manresa, Spain; **Co-Author:** Anna Ciraso, Universitat Autònoma de Barcelona, Italy; **Co-Author:** Edith Mariana Rebollar Sánchez, Instituto Superior de Ciencias de la Educación del Estado de México, Mexico

This paper aims to identify how teacher training transfer impacts on kindergarten, primary and secondary teachers' teaching in Mexico. In this case, training is provided by the State through institutions responsible of training and education of teachers: the Division of Teacher's Training and Update or SuCAD. To evaluate the effectiveness of the training provided by the SuCAD, we applied the Transfer Questionnaire three months after training to a sample of 3,677; 345 teachers responded (response rate of 9.38%). The questionnaire is composed of three dimensions: (a) teachers' learning transfer level to their workplace; (b) impact of their transfer to their teaching responsibilities; and (c) transfer organization at school level. After testing its validity and reliability, we present the results regarding the learning transfer level of the Mexican teachers as well as its impact. Findings suggest that teachers perceive a high learning transfer level; however, they also indicate that transfer organization at school acts as a barrier of teachers' learning transfer. In addition, results suggest a low training impact on teacher teaching practice which could be related to contents and topics developed during training and its relation with teachers' training needs.

A proposal for assessment of skills using complex tasks in virtual learning environments

Keywords: Assessment methods and tools, Competencies, Computer-assisted learning, Higher education

Presenting Author: Jaione Cubero Ibáñez, EVALfor Research Group - University of Cadiz, Spain; **Presenting**

Author: María Soledad Ibarra Saiz, EVALfor Research Group - University of Cadiz, Spain; **Presenting Author:** Gregorio Rodríguez Gómez, EVALfor Research Group - University of Cadiz, Spain

Zlatkin-Troitschanskaia, Shavelson and Kuhn (2015), manifest the need to research and design new assessment methods to assess skills directly, reliably and accurately, due to the current lack of methods based on objective outputs, as existing methods predominantly use the students' perceptions collected through questionnaires, interviews or self-reports. They also claim that there is a lack of innovative and adaptive measurement method since most assessment tools depend on paper-based questionnaires or multiple choice tests. In this regard, Redecker and Johannessen (2013) highlight the potential of information and communications technology (ICT) to deliver new and more holistic assessment tasks and formats to apply to transversal skills that are hard to assess properly using traditional methods. This paper presents a methodology to assess the skill level of university students in five skills: analytical and critical thought, problem solving, sense of Ethics, decision making and teamwork. The proposal focuses on: skills assessment through complex tasks and a digital context with e-rubrics. It is contextualized in the DevalSimWeb Project, more specifically for the skills' assessment of APREVAL-DevalSimWeb Training Course. The methodological design of the evaluation proposal refers to the Expert

Design Method. The results reflect the methodological proposal made on the basis of complex tasks and applying e-rubrics before and after the completion of the training course to assess the skill level of first year university students.

Engaging students in feedback processes: Challenges and opportunities

Keywords: Assessment methods and tools, Higher education, Learning approaches, Student learning

Presenting Author: Jessica To, The University of Hong Kong, China

Student engagement with feedback is crucial for productive learning. However, there has been little research investigating the difficulties of engaging students with feedback in the post-secondary context. To fill the gap, this small-scale case study explores the challenges and opportunities of increasing post-secondary students' engagement with feedback. The participants of this study involved 20 first-year students taking an Academic English module at a self-financed post-secondary institution in Hong Kong. The investigation focused on the students' responses to feedback on different assessment tasks (essay outlines, oral presentations and end-of-module assignments). Data collection methods encompassed documentation of written feedback on marked assignments, recordings of verbal feedback sessions and focus group interviews. For data analysis, the modified version of Hyland's (1997) feedback classification system was employed to identify feedback characteristics. Themes were identified from interview transcripts to see students' views on feedback. The significance of this paper lies in revealing the complexity of engaging post-secondary students with feedback. The students were found to be in the objectivity-empathy dilemma (Crossman, 2007): a need for specific comments for improvement and protection from critical feedback. Their communication trust in teachers was weakened when the use of praise for rapport building put frank discussion of performance at stake. Feedback sincerity was in doubt when feedback was inconsistent with assessment results. This paper highlights the importance of fostering students' 'feedback resilience' to manage emotions from negative feedback. Suggestions for developing 'feedback resilience' are also discussed.

Student perceptions of achievement, self-efficacy, self-regulation and feedback in Mathematics

Keywords: Secondary education, Self-efficacy, Self-regulation, Student learning

Presenting Author: Siv M. Gamlem, Volda University College, Norway; **Co-Author:** Lars Kvinge, Stord/Haugesund University College, Norway; **Co-Author:** Kari Smith, Norwegian University of Science and Technology, Norway; **Co-Author:** Knut Steinar Engelsen, Stord/Haugesund University College, Norway

Abstract. The aim of this paper is to share the framework of a quasi-experimental research project in lower secondary school in Norway and some findings from the validation of a survey included in the data sample. The main goal of the project is to examine the relationship between responsive pedagogy, defined as feedback practice, and students' learning in Mathematics, defined as achievements, self-regulation skills and self-efficacy. The pilot was conducted in May 2016, involving 10 classes ($n=198$ pupils). In our pilot we find that the way the teacher gives feedback to the learner has an emotional aspect by influencing degree of "fear of mathematics" (anxiety) to students ($r=-.47$, p

New Mathematical Model for Analyzing Accuracy of Teachers' Predictions About Student Competencies

Keywords: Assessment methods and tools, Educational Psychology, Teacher Effectiveness, Teacher Professional Development

Presenting Author: Yuri Uesaka, University of Tokyo, Japan; **Co-Author:** Masanori Nakagawa, Otsuma Women's University, Japan; **Co-Author:** Kazuhiro Yamaguchi, The University of Tokyo, Japan; **Co-Author:** Hidekazu Kaminishi, Dokkyo Medical University, Japan; **Co-Author:** Kae Nakaya, University of Tokyo, Japan; **Co-Author:** Tatsushi Fukaya, Gunma University, Japan

The accuracy of teachers' judgments about students' academic performance is an important topic in educational psychology. Although most previous studies had been based on correlational examinations, one important aspect that had not been investigated in previous research is teachers' predictions of distribution of students' performance. Such distribution predictions are potentially crucial in designing appropriate materials and conduct of a class. Knowing the degree of accuracy with which teachers can predict their students' performance could also be helpful to teachers in seeking and/or engaging in appropriate professional development activities. Thus this study proposed a new mathematical model to analyze the teachers' predictions of distribution of students' performance. The model also includes statistical tests to examine the validity of the model and to test whether teachers' prediction fit perfectly or not. The new model was applied in analyzing actual data of COMPASS, which is an assessment used in Japan for evaluating school students' basic mathematical competencies. Five teachers predicted their students' performance in 5 tasks. The results showed that in 24 out of 25 cases, the model fits well in analyzing the data. Also, the model is able to detect variations in teachers' accuracies in predicting distributions of student performance. In addition, the model can detect overall variations in teachers' prediction accuracy across tasks. These results suggest that the model works well in analyzing teachers' predictions of distributions of students' performance.

Session M 9

1 September 2017 12:00 - 13:30

Pinni B - B4116

Roundtable

Lifelong Learning

RT: Professional Development and Neuroscience

Keywords: Assessment methods and tools, Educational Psychology, Informal learning, Lifelong learning, Neuroscience, Philosophy, Professions and applied sciences, Psychometrics, Workplace learning

Interest group: SIG 14 - Learning and Professional Development, SIG 22 - Neuroscience and Education

Chairperson: Chiel vander Veen, VU University Amsterdam, Netherlands

From neurons to nations and back: Translating across levels of explanation in educational research

Keywords: Educational Psychology, Neuroscience, Philosophy, Psychometrics

Presenting Author:Lennart Schalk, ETH Zurich, Switzerland; **Co-Author:**Joshua McGrane, University of Oxford, United Kingdom; **Co-Author:**Peter Edelsbrunner, ETH Zurich, Switzerland; **Co-Author:**Roland H. Grabner, University of Graz, Austria; **Co-Author:**Samuel Greiff, University of Luxembourg, Luxembourg; **Co-Author:**Manu Kapur, ETH Zurich, Switzerland; **Co-Author:**Tommi Kokkonen, University of Helsinki, Finland; **Co-Author:**Alexander Renkl, University of Freiburg, Institute of Psychology, Germany; **Co-Author:**Elsbeth Stern, ETH Zurich, Switzerland

This roundtable brings together experts who address questions of learning and instruction in educational research at different levels of explanation: from educational neuroscience investigating networks of neurons to large-scale assessments comparing nations. The idea is to start a constructive debate on how these levels interrelate. Following short presentations from the organizers and the presenters, we will engage in an open discussion with the attending participants about the following set of interconnected questions: Is it possible to translate across levels of explanation and how should this be done? Is it appropriate to mention educational implications in articles that cross-cut levels of explanation? Could we formulate a unified theoretical framework to underpin cross-level educational research and what would it look like? There will not be simple solutions, but given the quickly rising number of publications, it is necessary to start asking these questions and engage in constructive exchange.

Learning to do the right thing: Learning social and ethical accountability

Keywords: Informal learning, Professions and applied sciences, Workplace learning, Lifelong learning

Presenting Author:Leonie Beatrice Jacob, University of Regensburg, Germany; **Co-Author:**Vasudha Chaudhari, Open University, United Kingdom; **Co-Author:**Allison Littlejohn, Open University, United Kingdom; **Co-Author:**Regina Mulder, University of Regensburg, Germany

Everyday professionals have to make decisions that have consequences that are not easily predicted. This roundtable session examines a range of methods used to explore how professionals learn to make ethical decisions. These decisions are made in ways that take into consideration factors including responsibility towards others, integrity in relationships, respect for the dignity of other people and responsibility towards society. Ethical behaviours are demonstrated through work practice, often by mimicking more expert colleagues. Strengths, weaknesses and assumptions underpinning qualitative and quantitative methods used in empirical studies of how professionals learn to act in an ethical way will be examined.

Evaluating the Impact of Learning from Incidents

Keywords: Assessment methods and tools, Informal learning, Professions and applied sciences, Workplace learning

Presenting Author:Victoria Murphy, Open University, United Kingdom; **Co-Author:**Allison Littlejohn, Open University, United Kingdom; **Co-Author:**Bart Rienties, Open University, United Kingdom

Learning from incidents (LFI) is a sub-section of workplace learning, where being able to evaluate the effectiveness of educational processes is crucial. LFI involves learning after an accident to ensure that similar events do not occur. Many companies invest substantial resources into LFI processes to ensure the lives of their employees are safe, hence it is vital to understand which of their interventions are most impactful. Assessment is a challenging topic in workplace learning, as studies have shown that employees' learning is often generated during everyday activities, without employees knowing what they have learnt. While assessment of learning is vital to allowing companies to invest their resources wisely, there remains areas of the LFI process where no methods for evaluation exist. A systematic review of literature identified 75 articles related to LFI as a learning process. Attempts in the articles to evaluate the LFI process were noted along with important aspects that have not yet been evaluated. Assessments of the LFI process have taken several forms, such as modelling accident rates to understand if an incident prompts learning. Our review indicated that limited attention has been paid to understanding or evaluating learning on the job. At EARLI we will report the findings of our meta-review, highlighting methods that have been used to understand the impact of LFI interventions, with the goal of using the roundtable format to discuss ways of gaining insight into the effectiveness of LFI processes, particularly aspects where assessment has yet to be fully developed.

Session M 10

1 September 2017 12:00 - 13:30

Linna - K109

Poster Presentation

Higher Education, Instructional Design, Learning and Instructional Technology, Lifelong Learning

PO: Instructional Design and Inquiry Learning

Keywords: Cognitive skills, Computer-supported collaborative learning, Conversation / Discourse analysis, E-learning /

Online learning, Educational Technology, Game-based learning, Higher education, Inquiry learning, Instructional design, Learning Technologies, Metacognition, Motivation, Primary education, Reading comprehension, Science education, Self-regulation, Social interaction

Interest group: SIG 06 - Instructional Design, SIG 20 - Inquiry Learning

Chairperson: Tim Kühl, University of Mannheim, Germany

"I am a scientist in a virtual lab": A computer supported inquiry learning environment

Keywords: Inquiry learning, Learning Technologies, Primary education, Science education

Presenting Author: Iolite Nicolaidou, Cyprus University of Technology, Cyprus; **Co-Author:** Christy Spyrou, Cyprus University of Technology, Cyprus; **Co-Author:** Christiana Nicolaou, Center for Educational Research and Evaluation, Cyprus

In response to calls for research for developing proper guidance for inquiry-based enactments when computer-supported inquiry learning (CoSIL) environments with virtual labs are involved, a CoSIL environment named "Albert's science lab" was designed specifically for supporting primary students' inquiry skills, by integrating CoSIL tools, such as a) virtual labs, b) a digital notepad, c) help pages offering procedural, metacognitive and strategic scaffolding and d) a dictionary of difficult terms offering conceptual scaffolding. This study evaluates an enactment based on a CoSIL environment for supporting the development of 6th graders' inquiry skills, using a case-study design. The research questions are: 1) To what extent does an enactment based on the designed CoSIL environment support the development of 6th graders' inquiry skills in science education? 2) Does the frequency of use of CoSIL tools (virtual labs, digital notepad, help pages, dictionary) relate to students' progress in inquiry skills? Two 6th grade classes of a primary school (37 students) participated in an enactment of four 80-minute lessons using the CoSIL environment. A pretest-posttest research design was used to measure students' inquiry skills, before and after the enactment. Process data were used to examine students' frequency of use of CoSIL tools. Findings showed a statistically significant increase in students' inquiry skills ($t = -6.99$, $df = 36$, $p = 0.00$), through their interaction with the "virtual labs", the "digital notepad" and the "help pages" in the environment. The findings of the study have instructional implications for the design and development of future CoSIL environments.

Designing games: The association(s) between game mechanics, players' roles and collaboration

Keywords: Computer-supported collaborative learning, Educational Technology, Game-based learning, Instructional design

Presenting Author: Raija Hamalainen, University of Jyväskylä, Finland; **Co-Author:** Timo Lainema, University of Turku, Finland; **Co-Author:** Mikko Niilo-Rämä, University of Jyväskylä, Finland

Designing collaborative three-dimensional (3D) learning games for vocational learning can be seen as one way to enhance the quality of learning and respond to the needs of working life. The overarching aim of this study is to determine how game mechanics implemented within computer-supported collaborative learning roles (scripted vs. emergent) are associated with the emergence of collaborative knowledge construction. The target group consisted of 15 vocational school students (16–18 year olds). The data were gathered by recording the groups' discussions and saving the game logs (actions) for each group. A total of 8128 transcribed utterances were eligible for content analysis to shed light on the characteristics and differences in knowledge construction processes under scripted and non-scripted role situations. We found a difference between the players' utterances in tasks with scripted and non-scripted roles. In the level with scripted roles providing knowledge was the most dominant type of utterance. Further, students with similar roles performed actions and applied similar discussion activities. In the level grounded on the emerging collaboration processes shared problem solving was the most actively used speech activity. In this presentation, we illustrate that diverse game mechanisms used in the game design highlight that different collaboration activities should be taken into account in the educational game design.

Effect of cognitive and metacognitive scaffolds on reading in digital learning environments

Keywords: Cognitive skills, Metacognition, Reading comprehension, Self-regulation

Presenting Author: Leonie Brummer, University of Groningen, Netherlands; **Co-Author:** Marlies ter Beek, University of Groningen, Netherlands; **Co-Author:** Anouk Donker, GION - University of Groningen, Netherlands; **Co-Author:** Marie-Christine Opdenakker, University of Groningen, Netherlands

In secondary education, self-regulated learning and learning from texts (i.e., comprehensive reading) play essential roles in academic achievement. However, many students lack the necessary skills in this regard. To improve students' reading comprehension and learning in general (e.g., for history and geography), scaffolds can be used that focus on cognitive and metacognitive strategies. Scaffolds can be provided by digital systems. These systems offer a platform for students to control and regulate their learning, for example, by letting students decide when to consult scaffolds. For the current study, an experimental design was used to study the effectiveness of scaffolds by comparing a condition with scaffolds (i.e., cognitive and metacognitive) and with no scaffolds. The pretest and posttest are indicative for short-term effects and contain no scaffolds in both conditions. The follow-up performance is administered approximately eight weeks later and indicates long-term effects. This format is similar to the pretest and posttest. Reading performance is measured with multiple-choice questions. Data gathering starts at the moment of submission and will continue in the upcoming months. Analysis of the data will be, for example, analysis of covariance.

Understanding the student-student interaction processes in technology-enhanced physics learning

Keywords: Computer-supported collaborative learning, Conversation / Discourse analysis, Science education, Social

interaction

Presenting Author:Joni Lämsä, University of Jyväskylä, Finland; **Co-Author:**Raija Hamalainen, University of Jyväskylä, Finland; **Co-Author:**Jouni Viiri, University of Jyväskylä, Finland

Many researches have shown that in higher education lecture-based instruction and teaching should be developed towards active learning methods (Freeman et al. 2014). Primetime-learning model (Author 2016) was piloted in an introductory course of thermodynamics and optics at University of X in the autumn 2016. The model is based on interactive and collaborative studying methods supported by a technology-enhanced learning (TEL) environment and a weekly primetime between a teacher and a small group. Students formed small groups (five people in a group), and twice a week they worked collaboratively in TEL-settings without a teacher. Problems the groups solved with their computers included e.g. simulations, numerical scripts, and multiple-choice questions regarding typical misconceptions. Data was collected by screen capturing and recording the group workings sessions of four different groups. In this study the student-student interaction processes are analyzed grounded on conversation analysis adjusted to sociocultural discourse analysis (Mercer 2004). The aim is to figure out how interaction processes evolved during the seven-week course, and how different kind of problems foster students to high-level and productive collaborative learning. Preliminary results show the amount of exploratory talk (Mercer 2004) depends on the type of the problem. There are also differences between the groups how the quality of the collaborative problem solving evolved during the course. The results can be used to develop new research-based instructional methods supporting student-centered learning and teaching in higher education giving attention to the implementation of these methods (Wieman, Deslauriers & Gilley 2013).

A model of Media supported Inquiry-based Learning

Keywords: E-learning / Online learning, Higher education, Inquiry learning, Learning Technologies

Presenting Author:Julian Dehne, University of Potsdam, Germany; **Co-Author:**Thi Nguyen, University of Potsdam, Germany; **Co-Author:**Ulrike Lucke, University of Potsdam, Germany

Inquiry-based learning in higher education can be complemented by media ICT tools. However, little knowledge exists on how inquiry-based learning can benefit from systematic application of ICT. We propose a model of media supported inquiry learning based on a previous qualitative study. The model was then connected to the findings of an interview study with academic teachers concerning the use of ICT in inquiry-based courses. As a result, we present a model that explicate media supported in inquiry-based learning environments. The model is integrated with a cycle of academic learning and linked to current research in inquiry based learning models.

The development of students' situational interest across various science domains

Keywords: Inquiry learning, Instructional design, Motivation, Science education

Presenting Author:Erkka Laine, University of Turku, Finland; **Co-Author:**Tomi Jaakkola, University of Turku, Finland

This pilot study investigates the development of elementary-school students' situational interest within and across different science learning topics in inquiry learning context. Inquiry learning has been found to have a positive impact on learning outcomes but studies focusing on its connection with interest are scarce and limited. In order to understand the stability and development of situational interest, it is important to measure interest at different time points during the learning task, as well as across multiple topics and settings. Using a longitudinal approach, this study aims to analyze how students' situational interest develops during an inquiry learning topic, and how stable are the developmental trajectories across different topics. The study followed 147 5th and 6th grade students, aged 11-13 as they participated in two science inquiry learning topics. Students' were asked to indicate their situational interest multiple times during each topic by answering a short self-assessment questionnaire. Results of this study are expected to clarify the developmental process(es) between triggered and maintained situational interest and also reveal some of the more general developmental trajectories that take place during an inquiry learning activity in science. The findings will also bring new information regarding the stability of the developmental trajectories of situational interest across different science topics. Large scale results of the main study that include data from several European countries can inform whether inquiry learning can redeem the expectations of restoring students' interest in science

Session M 11

1 September 2017 12:00 - 13:30

Main Building C - C7

Poster Presentation

Learning and Instructional Technology, Learning and Social Interaction

PO: Social Interaction in Learning and Instruction

Keywords: Assessment methods and tools, Case studies, Cognitive development, Collaborative Learning, Computer-supported collaborative learning, Content analysis, Design based research, Language (Foreign and second), Language (L1/Standard Language), Learning Technologies, Mathematics, Out-of-school learning, Peer interaction, Pre-service teacher education, Qualitative methods, Reasoning, Second language acquisition, Social aspects of learning and teaching, Social interaction, Student learning

Interest group: SIG 10 - Social Interaction in Learning and Instruction

Chairperson: Kyriaki Doumas, Linnaeus University, Sweden

Personal English Learning Ecologies and Meaningful Input with Digital and Non-Digital Artefacts

Keywords: Language (Foreign and second), Out-of-school learning, Qualitative methods, Second language acquisition

Presenting Author: Michel Cabot, Western Norway University of Applied Sciences, Norway

This paper analyses students' self-perceived personal English Learning ecologies (PELE) in relation to written EFL input. Ecological perspectives are integrated with language development theories. Data from in-depth and member checking interviews of twelve students at an upper secondary school in Norway is presented. The findings indicate a generally low exposure to written input outside school and scarce extensive reading in the past at lower secondary school. Most cases of screen reading are found to involve intensive reading. The representations of the students' PELE are similar to an X-ray photo, which gives a straightforward summary of the interviewees' ecological transitions and agentic triggers on one learning trajectory viewed in a temporal and locational perspective. It is particularly interesting to show a link between different ecological pushed input transitions, more meaningful agentic triggers, when artefacts are used repeatedly, and intensive and extensive reading. Schools serve an important complementary function in the case of intensive versus extensive reading.

Teachers' decision-making and reasoning: how consistent are their planned and interactive decisions?

Keywords: Case studies, Content analysis, Reasoning, Social interaction

Presenting Author: Bas Agricola, Utrecht University, Netherlands; **Co-Author:** Frans Prins, Utrecht University,

Netherlands; **Co-Author:** Marieke van der Schaaf, Utrecht University, Netherlands; **Co-Author:** Jan van Tartwijk, Utrecht University, Netherlands

Supervision meetings between teachers and students are key to support students' process of writing an undergraduate dissertation and offer opportunities for supervisor-student interaction. Supervisors' judgments about students' research skills are the basis for the decisions they make. This study aimed to investigate the decisions supervisors make before and during supervision meetings of the undergraduate dissertation and which reasons supervisors have for their decisions. An explanatory multiple case study with seven supervisors was conducted. A pre-active interview to determine planning decisions was held with each supervisor. Each supervision meeting was videotaped with a head mounted camera. After the meeting, a video stimulated recall interview was held to determine interactive decisions and reasons. Content and comparative analyses were conducted on the transcribed video data. Analyses showed that the supervisors made three main decisions: giving feedback, explaining, and eliciting input. The main reason for giving feedback and explaining was increasing student understanding. The main reasons for eliciting input were increasing student involvement and motivation, checking student understanding, and increasing student understanding. Analysis showed an acceptable consistency of the content between planned decisions and the interactive decisions during the supervision meeting. Supervisors, who elicited input from their students, applied a student centred approach, and created opportunities to check and diagnose student's research understanding. However, these eliciting supervisors struggled with students' unexpected questions and found it hard to give adapted support to increase students' understanding.

Enhancing connected learning through OpenForest: First-year teacher education students' design ideas

Keywords: Learning Technologies, Out-of-school learning, Pre-service teacher education, Social aspects of learning and teaching

Presenting Author: Henriikka Vartiainen, University of Eastern Finland, Finland; **Co-Author:** Petteri Vanninen, University of Eastern Finland, Finland; **Co-Author:** Saara Nissinen, University of Eastern Finland, Finland; **Co-Author:** Sinikka Pöllänen, University of Eastern Finland, Finland

The 21st century challenges to develop adaptive learning environments and social practices that connect people from various backgrounds to work together, and collectively construct, organise and develop information around multifaceted phenomena. To meet these challenges, an open wiki-based learning environment, OpenForest (www.openforest.fi), has been built on three educational pillars: 1) participatory learning in extended and generative communities as a vital concept for learning, 2) use of diverse technological resources and infrastructure as social and personal tools, 3) and co-development of information resources that offer multiple perspectives on forest related phenomena. For further development of the portal and related social practices, this study aims to examine what kinds of learning systems were mediated when first-year teacher education students (N = 160) were given an open-ended task to design a field trip to forest and/or forest museum with the support of OpenForest portal. The data was collected at the beginning of their studies in the autumn 2016 by means of an online questionnaire. A preliminary content analysis of the students' design ideas indicated that OpenForest was used in adaptive manner, when designing learning and teaching activities situated in extended learning environments. Yet, the pedagogical design ideas for connecting the extending network of subjects, objects and resources seemed to reflect the traditional re-production model in which school field trips have been typically organized as spring outings. The findings provide grounds for designing participatory practices and extended learning networks in teacher education, and for developing OpenForest portal further to meet these challenges.

From experimental research to educational and psychological practices: "IDIOME" a computerized tool

Keywords: Assessment methods and tools, Cognitive development, Language (L1/Standard Language), Social aspects of learning and teaching

Presenting Author: Jamila Hattouti, CNRS - University of Poitiers, France; **Co-Author:** Sandrine Gil, University of Poitiers, France; **Co-Author:** Virginie Laval, University of Poitiers, France

Drawing on experimental research, we have created an original tool that allows education and psychology professionals to better understand children's and adolescents' language skills. Our tool is designed to investigate pragmatic abilities, which play a crucial role in social communication and interaction (Gibbs, 1991; Levorato & Cacciari, 1999). Pragmatic abilities determine what we say, why we say it, and how we say it, and whether it is appropriate in a given situation. However, although the ability to make sense of different cues in a communication situation is a fundamental mechanism for navigating the social world, professionals have so far been without a satisfactory tool for assessing this ability. Nonliteral language seems to be widely used to investigate pragmatic abilities in psychology research. It is defined by a gap between what is said and what is meant, according to the context. Bridging the gap between these two meanings requires the contribution of pragmatic skills. We have created and tested in a large population of children and adolescents (9-13 years) a computerized system for assessing nonliteral comprehension that satisfies the previously unmet need for a tool to measure the pragmatic abilities underlying communication.

Case-based portraits of micro-interaction patterns during online collaborative problem solving

Keywords: Case studies, Computer-supported collaborative learning, Peer interaction, Social aspects of learning and teaching

Presenting Author:Johanna Pöysä-Tarhonen, University of Jyväskylä, Finland; **Co-Author:**Esther Care, The Brookings Institution, United States; **Co-Author:**Nafisa Awwal, University of Melbourne, Australia; **Co-Author:**Päivi Häkkinen, University of Jyväskylä, Finland

This study recognizes the role and the quality of social competencies in collaborative problem solving (CPS) processes and outcomes. The aim of this study, relying on multiple data and phases of analysis, is to explore and visualise, through contrasting case-based portraits, how micro-interaction processes at pair level evolve during CPS assessments in an online environment. The assessment is designed for a student pair in STEM domain. The results show that in spite of students' comparable CPS performance measures, variations in micro-interaction patterns occurred across pairs. It is expected that studying these patterns at pair level may provide new insights into CPS processes and so advance teaching these skills.

Effects of Task Design during Collaborative Problem Solving using the Knowledge Constructive Jigsaw

Keywords: Collaborative Learning, Design based research, Mathematics, Student learning

Presenting Author:Miho Kawasaki, Shizuoka University, Japan; **Co-Author:**Hiroyuki Masukawa, Shizuoka University, Japan; **Co-Author:**Ikko Endo, Tajima Junior High School, Japan

This study examines the effects of task design on learning during collaborative problem solving. Effective learning through collaborative problem solving depends on the varied ideas presented, and how those ideas are compared and related. Task design was deemed an important factor that affected the variety of ideas proposed, compared, and related. Thus, we conducted four mathematical lessons as a design research using the Knowledge Constructive Jigsaw method to examine effective task design for collaborative problem solving. Altogether 94 sixth-graders from a public school in Japan participated in this study. We designed the four mathematical lessons using the Knowledge Constructive Jigsaw (KCJ) method. KCJ is a framework of collaborative learning, based on research findings on how people's conceptions change. KCJ consists of three phases of learning activities (Miyake, 2013): expert, jigsaw, and crosstalk. In this study, we primarily changed the tasks assigned to the children during the expert group activity that was conducted between the four lessons, and observed if they influenced the outcome of the lessons. The results suggests that the effectiveness of KCJ depends on how the tasks are divided. It appears that dividing the tasks complementarily not correspondingly might be a design principle that can evoke varied ideas to compare and integrate.

Session M 12

1 September 2017 12:00 - 13:30

Linna - K108

Poster Presentation

Teaching and Teacher Education

PO: Teacher Education and Motivation

Keywords: Attitudes and beliefs, Communities of practice, Comparative studies, Content analysis, Instructional design, Motivation, Pre-service teacher education, Primary education, Problem-based learning, Quantitative methods, Reflection, Secondary education, Teacher Professional Development, Teaching / instruction, Video analysis, Vocational education

Interest group: SIG 11 - Teaching and Teacher Education

Chairperson: Brook Sawyer, Lehigh University, United States

Comparison of teaching motivations and perceptions of male and female Estonian preservice teachers

Keywords: Attitudes and beliefs, Comparative studies, Motivation, Pre-service teacher education

Presenting Author:Merle Taimalu, University of Tartu, Estonia; **Co-Author:**Piret Luik, University of Tartu, Estonia

In Estonia as well as in several other countries there is problem of teachers unbalanced gender distribution in educational system. We have only about 12 % male teachers working in our educational institutions. Motivations why individuals choose teaching career and how they perceive teacher work have been investigated in different countries, but there are

only some studies found about factors influencing female and male preservice teachers' career choice. Our study was carried out with the sample of Estonian preservice teachers (N = 480). The Factors Influencing Teaching Choice (FIT-Choice) scale was used to collect data, and 10 factors for motivations and 6 factors for perceptions were found. Several differences between male and female preservice teachers were found. In motivations five factors from 10 were evaluated higher by female than male respondents, and in perceptions about teaching career three factors from six evaluated also higher by female respondents.

Propitious conditions for case-based learning with classroom videos: the participants' perspective

Keywords: Content analysis, Instructional design, Pre-service teacher education, Video analysis

Presenting Author:Manuela Frommelt, University of Teacher Education of Lucerne, Switzerland; **Co-Author:**Isabelle Hugener, University of Teacher Education Lucerne (PH Luzern), Switzerland; **Co-Author:**Kathrin Krammer, University of Teacher Education Lucerne, Switzerland

Analysing classroom videos facilitates the application of theoretical knowledge to actual teaching practice. This fosters the development of a professional vision – i.e. knowledge-based noticing and interpretation of classroom situations –, which is deemed to be a crucial prerequisite for effective teaching. Accordingly, the use of classroom videos in teacher education has been on the increase over the past years. In parallel, also the question pertaining to the design of propitious settings for video learning in initial teacher education has gained in importance. The project VideA ("Video Analysis in Teacher Education") explores effects and conditions of case-based learning with pre-service teachers' own and other teachers' videos in the first year of their preparation programme. Over the course of one semester, one intervention group worked with videos of their own teaching, while a second intervention group attended to videos of teachers unknown to them. The control group dealt with cases that were documented in written materials. The findings to be presented refer to interviews that were conducted with twelve students and eight facilitators at the end of the semester and questioned them about conditions of the intervention that had been conducive to their learning. Our analyses show that both the students and the facilitators considered the examples of teaching practice to be useful and the procedure to be helpful. Furthermore, they emphasised the importance of the facilitators' guidance in the analysis process. The findings also provide some indications of conditions of success as well as challenges specific to each intervention group.

Novice teachers in the Czech Republic: Why do they leave and change schools?

Keywords: Primary education, Quantitative methods, Secondary education, Teacher Professional Development

Presenting Author:Eva Minarikova, Masaryk University, Czech Republic; **Co-Author:**Svetlana Hanusova, Faculty of Education, Masaryk University, Brno, Czech Republic; **Co-Author:**Klara Ulicna, Faculty of Education, Masaryk University, Brno, Czech Republic; **Co-Author:**Miroslav Janik, Faculty of Education, Masaryk University, Brno, Czech Republic; **Co-Author:**Tomas Janik, Faculty of Education, Masaryk University, Czech Republic; **Co-Author:**Jan Mares, Faculty of Education, Masaryk University, Brno, Czech Republic; **Co-Author:**Tomas Kohoutek, Faculty of Education, Masaryk University, Brno, Czech Republic

Novice teachers are at a vulnerable stage of their career and are at an increased risk of quitting teaching. Therefore it is necessary to study the drop-out of novice teachers together with the reasons behind it. Our study focuses on Czech primary and secondary beginning teachers (up to three years of experience) and aim to explore how they perceive the interactive and institutional aspects of their job as well as the broader context, how valued and supported they feel, and how this connects to their intention to stay in their school (stayers), change schools (movers) or quit teaching (leavers). Also, we focused on how their views change over time. 126 teachers completed a questionnaire consisting of 70 Likert scale items and additional context questions twice in a school year (with slight adaptations; 6 months between the stages). The distribution of stayers (73 % / 74 %), movers (17 % / 18 %) and leavers (10 % / 10%) was similar in both stages. Statistically significant differences between stayers and movers/leavers were especially in the perception of the institutional level (school, colleagues, school leadership). It is noteworthy that it was the movers who were more negative. This gap widened further with time – in the second stage, movers were even more negative towards their school context, especially towards school leadership. Stayers felt statistically significantly more valued and supported. The findings are important for educational policy as well as provide impulses for the development of teacher education and induction programmes.

A video portfolio for the summative assessment of pre-service teachers' teaching competences

Keywords: Pre-service teacher education, Teaching / instruction, Video analysis, Vocational education

Presenting Author:Kerstin Baeuerlein, University of Applied Sciences Northwestern Switzerland, Switzerland; **Co-Author:**Urban Fraefel, University of Applied Sciences Northwestern Switzerland, Switzerland

The increasing focus on the development of competences in European educational systems goes hand in hand with an increasing need for instruments to assess these competences reliably. In this context, at the School of Teacher Education Northwestern Switzerland a video portfolio has been developed for the summative assessment of pre-service teachers' teaching competences at the end of their studies. Pre-service teachers submit a set of lesson plans, videotaped lessons, and analysis of and reflection on their classroom-related competences. Each video portfolio undergoes a high inference rating by two trained experts according to a mandatory evaluation rubric. It is expected that the extensive documentation of a complete real work process and well documented ratings by two trained experts will bring about high quality assessments which meet the general scientific test quality criteria (objectivity, reliability, validity amongst others). To test this hypothesis

the evaluation forms of more than 150 video portfolios of secondary school pre-service teachers are analyzed for the dimensionality of the assessed construct (factor analysis) and reliability (inter-rater reliability). To gather more information about the validity of the instrument we use a pre-service teacher and rater questionnaire after the next video portfolio examinations ($N \sim 75$ resp. $N \sim 45$). Moreover, the video portfolio grades are compared with pre-service teachers' final examination grades before the introduction of the video portfolio. At the conference we will present the concept of the video portfolio, preliminary results of our evaluation, measures for revisions of the instrument based on these results, and further evaluation plans.

School-university partnerships in Initial Teacher Education. The model "School Adoption"

Keywords: Communities of practice, Pre-service teacher education, Reflection, Teacher Professional Development

Presenting Author: Andreas Bach, University of Salzburg, Austria

Although the development of partnership models is considered a key concept in the current teacher training programs of many countries, the collaboration between schools and universities in Germany has not been professionalized yet, and is characterized more by traditional roles. The European University of Flensburg was the first university in Germany to implement the concept of "School Adoption" in the teacher education program. The model is part of a long-term internship ("practical semester") and takes place in the Master's program. During the so-called "adoption week," student teachers teach all lessons at a school, while the teachers engage in further education. Faculty staff members from the university work intensively together with student teachers and teachers. The overall goal is to develop a form of cooperation in practical teacher training that can support the professionalization of the student teachers as well as the development of the participating school. The first results of an accompanying evaluation show a high level of satisfaction with the new practice model among all participants. This paper reports on the concept of the Flensburg model and on the results based on the transactional stress model, which show that student teachers tend to see the complexity of teaching more as a positive challenge after participating in the partnership model.

Evidence-based optimization of a learning setting to support professional vision

Keywords: Content analysis, Pre-service teacher education, Video analysis, Problem-based learning

Presenting Author: Victoria L. Barth, Freie Universität Berlin, Germany; **Co-Author:** Valentina Piwowar, Freie Universität Berlin, Germany; **Co-Author:** Diemut Ophardt, Technische Universität Berlin, Germany; **Co-Author:** Katharina Krysmanski, Freie Universität Berlin, Germany; **Co-Author:** Irina Rosa Kumschick, Freie Universität Berlin, Germany; **Co-Author:** Felicitas Thiel, Freie Universität Berlin, Germany

While previous studies demonstrated that competencies of professional vision can be supported through case-based learning (Goeze, Zottmann, Vogel, Fischer, & Schrader, 2014; Piwowar, Thiel, & Ophardt, 2013), there are almost no empirical findings which examine the efficacy of the learning setting for case-based learning. Using two quasi-experimental studies, we explored (1) if there are differences between the professional vision of preservice teachers when a problem-based learning setting entails elements of direct instruction vs. if it does not. And (2), if this learning setting can increase the competencies of professional vision for classroom disruptions as well as the knowledge of classroom management by preservice teachers over time. To assess professional vision of classroom disruptions, we used a video-based case analysis with an open response format (Barth, accepted). Data analysis of the written case analyses used a category system, which was deductively developed in line with the approach of the qualitative content analysis (Mayring, 2010). To assess knowledge of classroom management, we used an objective multiple-choice test (Krysmanski & Piwowar, in prep.). In a first study we defined two groups: One regular problem-based learning setting and one setting completed with a direct instruction. The results suggested that the learning setting, which was completed with a direct instruction, supported the reasoning-competence of professional vision more than the other learning setting. In a second study we showed in a pre-post-design that the learning setting with an instruction improves the reasoning-competence of professional vision as well as the knowledge of classroom management over time.

Session M 13

1 September 2017 12:00 - 13:30

Pinni B - B3109

Roundtable

Assessment and Evaluation, Teaching and Teacher Education

RT: Teaching Approaches

Keywords: Assessment methods and tools, In-service teacher education, Language (Foreign and second), Language (L1/Standard Language), Literacy, Pre-service teacher education, Quasi-experimental research, Student learning, Teaching approaches

Interest group: SIG 06 - Instructional Design, SIG 11 - Teaching and Teacher Education

Chairperson: Sandra Lammerding, University of Cologne, Germany

The role of language in content-area learning – conceptual frameworks and their underpinnings

Keywords: Language (Foreign and second), Literacy, Student learning, Teaching approaches

Presenting Author: Sari Sulkunen, University of Jyväskylä, Finland; **Co-Author:** Johanna Saario, University of Jyväskylä,

Finland; **Co-Author:**Tarja Nikula, University of Jyväskylä, Finland; **Co-Author:**Mirja Tarnanen, University of Jyväskylä, Finland; **Co-Author:**Merja Kauppinen, University of Jyväskylä, Finland; **Co-Author:**Eija Aalto, University of Jyväskylä, Finland

In the context of school education there are several challenges for learning which intertwine the issues related to language, literacy and content-area. In recent years, researchers have paid increasing attention to the role of language and social interaction in learning across curriculum, e.g. in math (Mercer & Sam, 2006) and history (Barton & Levstik, 2009). This approach has shown to provide the necessary scaffolding for all students, especially for those struggling with reading and writing complex and abstract texts (Hynd-Shanahan, 2013), for those with insufficient language proficiency for abstract thinking and knowledge construction (Saario, 2012; Vääntinen, 2009) and for students who aren't advanced in information processing skills with multimodal texts (Ho et al., 2011). This pedagogical approach derives from theoretical paradigms which stress the social and context-bound nature of language and literacy (Swain, Kinnear & Steinman, 2015). In other words, language is considered to be embedded in the culturally-defined practices of the particular community. Also knowledge domains and the corresponding school-subjects are such a communities. In this round table session, multiple conceptual frameworks for language, literacy and content-area learning are discussed, compared and contrasted. The aim is to reach a mutual understanding of the underpinnings of each framework and to explore their compatibility and divergence.

(How) can we measure elementary school teachers' language-support skills?

Keywords: Assessment methods and tools, In-service teacher education, Language (Foreign and second), Language (L1/Standard Language)

Presenting Author:Birgit Heppt, Humboldt-Universität zu Berlin, Germany; **Co-Author:**Katrin Gabler, Humboldt-Universität zu Berlin, Germany; **Co-Author:**Sofie Henschel, Humboldt Universität zu Berlin, Germany

Even though the relevance of language support across the curriculum is widely accepted (e.g., Gottlieb & Ernst-Slavit, 2014), very little is known about teachers' competencies to foster their students' language skills during content classes. What is more, the development of instruments to assess teachers' language-support skills has been largely neglected by previous research (cf. Ofner, Roth & Thoma, 2016). The current study thus aims at the development and validation of test items to assess teachers' knowledge and competencies regarding the conception of linguistically enriched content classes. Within the scope of a larger project, in which elementary school teachers are extensively trained in their language support skills, we developed 14 test items with a particular focus on the content of the training series. Based on data from the pre-test, in which 22 elementary school teachers from Berlin, Germany took part, we determined relationships with the pilot version of another test instrument that aims at the assessment of elementary teachers' language-support skills. While we found a slightly positive, albeit not significant, correlation between the newly developed items and teachers' knowledge about language and language acquisition, as measured by the criterion variable ($r = .33, p = .27$), there was no relationship whatsoever with the ability scale ($r = .01, p = .98$). By the time of the conference, data from the post-test will be available, which will shed light on this finding and allow for further conclusions regarding the reliability and validity of the test items.

Integrating Grammatical Knowledge in Foreign Language Teaching in Higher Education

Keywords: Language (Foreign and second), Pre-service teacher education, Quasi-experimental research, Teaching approaches

Presenting Author:Eva Nelz, University of Education Freiburg, Germany

According to the German education report conducted in 2014, the proportion of pupils with migratory backgrounds during the second phase of secondary school is nearly equal to those without. This results in a growing variety of L1 (native/first languages) and L2s (second/foreign languages) in the classroom – an environment for which future foreign language teachers, the experts for language acquisition, need to be prepared. This paper explores an integrated, plurilingual approach to Spanish grammar teaching during pre-service teacher education. The reference is students' grammatical knowledge in French. We thereby investigate the effectiveness of this (quasi-experimental) approach for promoting the students' grammatical knowledge about Mood Distinction in Spanish as well as its probable impact on their future teaching skills. Mastering Mood Use in Spanish is challenging, even for advanced students (Montrul, 2004). We expect the activation of grammatical knowledge from a previous learned and similar language to allow a deeper processing of the chosen linguistic phenomenon. In a teachback study at secondary school we then observe if experiencing their own plurilingualism during a language course at university will influence the teaching practices of those students. A study by Burns and Knox (2005) showed that in-service teachers, after participating in a grammar class based on systemic-functional linguistics, still relied on traditional approaches. We expect the pre-service experience to result in the adaption of our approach, as "teachers' prior learning experiences [...] play a powerful role in shaping their [...] teaching practices" (Crandall, 2000: 35).

Session M 14

1 September 2017 12:00 - 13:30

Main Building A - A08

Roundtable

Higher Education, Learning and Social Interaction, Learning and Special Education

RT: Educational Effectiveness and Phenomenography

Keywords: Assessment methods and tools, Content analysis, Engineering, Higher education, Learning disabilities, Mathematics, Numeracy, Phenomenography, Primary education, Science education, Synergies between learning - teaching and research, Video analysis

Interest group: SIG 09 - Phenomenography and Variation Theory, SIG 18 - Educational Effectiveness

Chairperson: Susan Beltman, Curtin University, Australia

The existence of Science and Engineering Practices in Making Activities

Keywords: Engineering, Primary education, Science education, Video analysis

Presenting Author:Adam Maltese, Indiana University, United States; **Co-Author:**Amber Simpson, Indiana University, United States

In this study we used GoPro video cameras to record youth participating in making activities in underserved schools as part of an after school maker program offered by a local science center. Our goal was to identify whether the students were actively participating in science and engineering practices as outlined in the Next Generation Science Standards. We found youth participating in a variety of the practices, but participation was often shallow and definitely did not follow the sequential order implied by the standards. We will discuss both the approach and the results of this work in relation to how making experiences can be evaluated for STEM learning.

Nursing students' preconceptions of their Bachelor's Thesis process

Keywords: Content analysis, Higher education, Phenomenography, Synergies between learning - teaching and research

Presenting Author:Ani Henttonen, Sophiahemmet University College, Sweden; **Co-Author:**Marianne Teräs, Stockholms universitet, institutionen för pedagogik och didaktik, Sweden; **Co-Author:**Margareta Westerbotn, Sophiahemmet Högskola, Sweden; **Co-Author:**Max Scheja, Stockholm University, Sweden; **Co-Author:**Björn Fossum, Sophiahemmet Högskola, Sweden

This study aimed at examining variation in nursing students' preconceptions of their Bachelor's Thesis process. A total of 93 nursing students answered a single open question by writing. Qualitative Content Analysis was used as an analytic method. Framework of Variation Theory guided the interpretation for the results giving three main categories describing three levels of conceptions: 1) Preconceptions were expressed as mixed emotions ranging from despair to positive excitement in relation to the individual resources demanded in the pursuit. 2) The concept of supportive learning was related to library services, good relations to study mates, tutors and examiners. 3) The students expressed expectations that their BT process will facilitate knowledge to future professional work as a qualified nurse and/or researcher. Thus, Bachelor Thesis is highly appreciated by nursing students. This study proposes that the three levels of preconceptions function as motivational frames of reference in learning; furthermore they contain pedagogical potential for teaching in higher education for professionals.

How to assess numerical competences differentially in secondary education?

Keywords: Assessment methods and tools, Learning disabilities, Mathematics, Numeracy

Presenting Author:Katharina Lambert, University of Tübingen, Germany; **Co-Author:**Tanja Dackermann, Knowledge Media Research Center, Germany; **Co-Author:**Korbinian Moeller, Leibniz-Institut für Wissensmedien, Germany

Numeracy is a key competence for personal and vocational prospects. Accordingly, respective deficits pose a major disadvantage to affected individual. Therefore, early identification of numerical deficits is crucial for remedial interventions. However, there are currently hardly any assessment tools for children beyond primary school and the few existing ones do not differentiate well within the group of low-achieving adolescents. As a result, our knowledge about the exact profile of deficits of mathematical low-achieving adolescents is still rather patchy. In the present study, we evaluated numerical competences in this population (grades 5 to 10 or first year of vocational training) with the aim of constructing a new test for this age group. Analyses of over 1400 adolescents in a pilot study revealed that students from the lowest track of German secondary schools showed severe deficits in basic numerical competencies such as magnitude understanding, clock reading, and arithmetic but also fractions, decimals, percentages, as well as graph interpretation. Even though difficulty level was very low corresponding to the Levels I to III of PISA assessment, many students could just solve the most basic problems. In the round table session, we would therefore like to discuss the question of how to assess numeracy differentially in secondary education in terms of selection of appropriate basic numerical tasks, difficulty level and minimum standards that should also apply for this group.

Session M 15

1 September 2017 12:00 - 13:30

Pinni B - B3117

Poster Presentation

Educational Policy and Systems, Higher Education

PO: Higher Education and Mixed-Method Research

Keywords: Comparative studies, Educational policy, Educational Technology, Higher education, Learning analytics, Learning approaches, Lifelong learning, Mathematics, Mixed-method research, Physical Sciences, Researcher education,

Science education, Secondary education, Self-regulation, Student learning, Synergies between learning - teaching and research

Interest group: SIG 04 - Higher Education

Chairperson: Minna M Hannula-Sormunen, University of Turku, Finland

Developing self-regulated learning skills: A longitudinal study with higher education students

Keywords: Higher education, Self-regulation, Student learning, Lifelong learning

Presenting Author: Elisabeth Müller, University of Applied Sciences and Arts Northwestern Switzerland, Switzerland

This poster focuses on self-regulated learning as a key competence in innovative societies and therefore as a current issue in higher education. If society is based on individuals able and willing to permanently acquire new knowledge and improve their skills, then higher education needs not only to promote professional knowledge and skills but also knowledge and skills for self-regulated learning. The poster presents a conceptual framework for the various aspects of self-regulated learning drawn from the literature. It also presents the design of an ongoing longitudinal study at a University of Applied Sciences involving 300 social work students and the results of a preliminary study (pre-test).

A questionnaire for assessing the learning approaches of university chemistry students: ChemApproach

Keywords: Higher education, Learning approaches, Physical Sciences, Science education

Presenting Author: Mika Lastusaari, University of Turku, Finland; **Co-Author:** Eero Laakkonen, University of Turku, Finland; **Co-Author:** Mari Murtonen, University of Turku, Finland

The theory of learning approaches has proven to be one of the most powerful theories explaining university students' learning. However, learning approaches are sensitive to the situation and the content of learning. Chemistry has its own specific features that should be considered when exploring chemistry students' learning habits; specifically the role of practicals (i.e. hands-on laboratory work) as they are crucial in chemistry education. Therefore, the aims of this study were to find and validate a questionnaire for measuring chemistry students' learning approaches. A 17-item questionnaire was tested with 561 Finnish chemistry students from four different universities. Students ranging from first year bachelor level to fifth year master level participated in the study. The statistical analyses showed that a four factor model fitted the data best and these factors were named as submissive surface, technical surface, active deep, and practical deep. In order to establish validity, the model was further tested with analysis in the subgroups of the major subject and gender. The analyses show that the questionnaire is statistically valid and can be used in studying chemistry students' learning approaches.

Explaining the Silence on Ethics in Doctoral Examination

Keywords: Higher education, Mixed-method research, Researcher education, Synergies between learning - teaching and research

Presenting Author: Allyson Holbrook, SORTI, The University of Newcastle, Australia; **Co-Author:** Kerry Dally, SORTI, The University of Newcastle, Australia; **Co-Author:** Carol Avery, SORTI, The University of Newcastle, Australia; **Co-Author:** Terence Lovat, The University of Newcastle, Australia; **Co-Author:** Hedy Fairbairn, SORTI, The University of Newcastle, Australia

There is an expectation that all researchers will act ethically and responsibly in the conduct of research involving humans and animals. While research ethics is mentioned in quality indicators and codes of responsible researcher conduct, it appears to have little profile in doctoral assessment. Institutional climate and supervisory scaffolding appear to be key in developing positive attitudes towards research ethics in candidates, however, it is not clear if candidates are being adequately prepared to apply ethical principles in the design, conduct and reporting of their research. There seems to be an implicit assumption that ethical competence has been achieved by the end of doctoral candidacy and that there is no need for candidates to report on the ethical dimensions of their study nor for examiners to assess this integral aspect of researcher development. In the context of ensuring that institutions are fulfilling their responsibility of producing ethically sensitive and competent researchers, it is salient to determine the extent to which the doctoral thesis and examination process reflect a candidate's ethical development. This paper reports on two phases of a study being undertaken to explore the phenomenon of ethics in doctoral theses and the examination process. Phase 1 focuses on the ways in which ethics features in examiner reports and Phase 2 will analyse the text of Australian theses to determine the nature and extent of candidates reporting on the ethical dimensions of their research. Implications of this analysis will be discussed with reference to doctoral standards and doctoral training programs.

Learning Analytics Features Self-regulated Learners Prefer for Learning

Keywords: Educational Technology, Higher education, Learning analytics, Self-regulation

Presenting Author: Clara Schumacher, University of Mannheim, Germany; **Co-Author:** Dirk Ifenthaler, University of Mannheim, Germany

More and more learning in higher education is supported by educational technology, which allows to analyze the data generated by the learners while using these technologies aiming to understand and support individual learning processes better. Thus, learning analytics allows to provide highly personalized learning environments meeting the different needs of learners by analyzing various information. Such systems enable students to directly interact with the user interface which

provide several features, visualizations, or tools (e.g., information about performance, status of assignments, learning recommendations). The purpose of this quantitative study ($N = 216$) was to investigate the relation of specific learning analytics features rated in terms of learning and components of learners' self-regulation. Findings showed that evaluating learning analytics features for learning are related to self-reported self-regulation capabilities of students.

Understanding student engagement in the universities across the Greater China

Keywords: Comparative studies, Higher education, Mixed-method research, Student learning

Presenting Author:Lily Min Zeng, The University of Hong Kong, Hong Kong; **Co-Author:**Luke K. Fryer Fryer, The University of Hong Kong, Hong Kong; **Co-Author:**Maggie Yue Zhao, The University of Hong Kong, Hong Kong; **Co-Author:**Yan Luo, Tsinghua University, China; **Co-Author:**Christine A. Armatas, The Hong Kong Polytechnic University, Hong Kong; **Co-Author:**Wai Yin Ng, The Chinese University of Hong Kong, Hong Kong; **Co-Author:**Gordon Y. N. Tang, Hong Kong Baptist University, Hong Kong

The student experience has generally been measured as satisfaction with instruction and course learning environments in Hong Kong universities. Alternatively, student engagement, namely, students' participation in a broader range of activities which enhance learning outcomes, became central to the understanding of student experience in other parts of the world. Started from American universities, the use of the student engagement framework has steadily expanded globally for the past four decades. More recently, the Chinese College Student Survey based on the same theory was developed and implemented in many universities in Mainland China during the past decade. This paper is a bridge to the Mainland Chinese work and extends our understanding of the student experience in Hong Kong. The project includes the development of a Hong Kong Survey of Student Engagement followed by an inter-institutional validation and triangulation which combining data analytics and lecture observation techniques. Preliminary qualitative and quantitative work developing a Hong Kong Survey of Student Engagement will be presented. These quantitative findings will be presented along with established longstanding results from institutional data on students' programme experiences. Through the conjoint results of these two streams of research, theoretical work towards the development of a framework integrating the best of Student Learning Theory (used across Hong Kong institutions for more than eight years) and Student Engagement Theory will be presented. Implications for integration and theory development as well as the practical opportunities for inter-institutional support across Hong Kong and Greater China will be discussed.

Upper secondary school subject choices: Critical bottlenecks of the Finnish education system

Keywords: Educational policy, Higher education, Mathematics, Secondary education

Presenting Author:Satu Kaleva, University of Oulu, Finland; **Co-Author:**Jouni Pursiainen, University of Oulu, Finland; **Co-Author:**Hanni Muukkonen, University of Oulu, Finland

A study based on large register data examines student's subject choices at upper secondary school and how these students have been recruited to higher education in a ten year span. Numerous international studies have examined the reasons why females continue to be underrepresented in math-intensive fields. The present study provides a perspective based on a national sample of upper secondary school subject choices, subjects completed in the matriculation examination, and students receiving a study place at Finnish universities. Further, this investigation inquires about students' reason for subject choices and their future plans for a profession. The initial results suggest that students opting for extended mathematics have better chances at recruitment to research university. Further, students who have chosen extended mathematics, tend to have also a grade in physics, chemistry, and biology. This, consequently, appears to feed towards segregation of disciplines, as early as these choices made in the first year of the upper secondary education.

Session M 16

1 September 2017 12:00 - 13:30

Main Building D - D14

Roundtable

Learning and Instructional Technology, Learning and Social Interaction

RT: Social Interaction in Learning and Instruction

Keywords: Conversation / Discourse analysis, Early childhood education, Experimental studies, Learning Technologies, Metacognition, Out-of-school learning, Science education, Social aspects of learning and teaching, Student learning, Teaching / instruction, Video analysis

Interest group: SIG 10 - Social Interaction in Learning and Instruction

Chairperson: Lorna Bourke, Liverpool Hope University, United Kingdom

Socially-shared metacognition processes of 7th graders throughout science museum context in Turkey

Keywords: Learning Technologies, Metacognition, Out-of-school learning, Science education

Presenting Author:Gamze Türkmen, Middle East Technical University, Turkey; **Co-Author:**Zahide YILDIRIM, Middle East Technical University, Turkey

This study aims at investigating socially-shared metacognition processes of 7th graders based on science lessons within a science museum context. Research questions are collected under three main themes which are (1) detecting current practices of science museum context in reference to students', science teachers' and museum educators' perceptions, (2)

investigating metacognition processes of 7th graders having museum experience, and (3) observing and detecting the indicators of socially-shared metacognition processes of 7th graders via a virtual science museum. While first research question has been conducting for need analysis purposes, 10 science museums from five metropolis in Turkey was selected to conduct interview with science museum educators and to reach active teachers who contributed to field-trips. For the second and third research questions, a cognitive ethnographical research method will be conducted based on purposive sampling method. Two groups who are whether having museum experience (tutors) or not (tutees) will consist of totally 24 students. Students, equally distributed in gender, will be selected based on their achievement levels in science lessons including low, moderated and high achievement levels. The main study will endure throughout eight weeks. Students having science museum experience for four-weeks will be recorded via first-person view and third-person view. Tutor students will conduct activities by concurrently thinking aloud. After the activities conducted, students will be shown their video recordings for retrospective thinking. Following the science museum experience, for four-week duration, tutor students will be a part of a video production process and share their videos with other students having no opportunity to visit science museums.

Impact of learning goals and protagonists' behavior on interactions in and effectiveness of tutoring

Keywords: Conversation / Discourse analysis, Experimental studies, Student learning, Teaching / instruction

Presenting Author:Stephanie Herppich, University of Freiburg, Germany; **Co-Author:**Joerg Wittwer, University of Freiburg, Germany

Tutoring is an effective form of instruction. The key to its effectiveness is seen in the intensive one-on-one interaction between a tutor and a tutee. Less reliable knowledge exists about factors that influence this process and consequently its effectiveness. Our planned project aims at testing the influence of two assumedly central factors – the learning goal of the tutoring and the protagonists' behavior – with two related experiments. Participants in each experiment are $n = 50$ physics teacher students as tutors and $n = 50$ high school students as tutees. The topic covered in tutoring is energy. In the first experiment, half the tutor-tutee-dyads solve physics problems to attain a skill acquisition learning goal. The second half discuss physics problems to attain the goal of deepened understanding of concepts and principles. In the second experiment, tutoring with tutors who receive training for enhanced instructional strategies is compared with tutoring with tutees who receive training for enhanced learning strategies. Here, the learning goal is deepened understanding of concepts and principles because tutoring for this goal has not been well-studied yet, despite the importance of teaching for understanding. We expect results that inform us about the differences in quality and effectiveness of the tutoring process as a function of the two examined factors, about ways to improve the tutoring process, and about who to target with support for improvement, the tutor or the tutee or both. We would like to discuss details of the design at the round table to create optimally productive research.

Teachable moments in early childhood classrooms: Operationalizing key features and boundaries

Keywords: Early childhood education, Social aspects of learning and teaching, Teaching / instruction, Video analysis

Presenting Author:Mayra Mascareño, University of Groningen, Netherlands; **Co-Author:**Marjolein Deunk, University of Groningen, Netherlands; **Co-Author:**Cathernine Snow, Harvard Graduate School of Education, United States

The effects of teacher-child interactions on child outcomes has predominantly been explored by means of general assessments of classroom quality and by micro-analysis of interactions at the utterance level. Neither of these levels, however, is able to directly capture key transactions at the micro-time in which learning occurs. A unit of analysis that captures the sequential aspect of interactions is *teachable moments*, interactional sequences characterized by an appropriate match between the learning opportunity and the child's readiness to grasp this opportunity. In a previous study we concluded that recurrent Initiation-Response-Follow-up patterns of interaction with complexity shifts were associated with child vocabulary and symbolic understanding, suggesting that dynamic adjustments of the complexity of interaction might favor child learning. Building on those findings, we aim at refining the coding scheme to allow for the identification of teachable moments. Definitions and boundaries to examine these sequences are necessary, and they represent the focus of this round-table presentation.

Session M 17

1 September 2017 12:00 - 13:30

Main Building C - C5

Roundtable

Learning and Social Interaction, Teaching and Teacher Education

RT: Teacher Effectiveness

Keywords: Action research, Arts, Attitudes and beliefs, Educational policy, Mixed-method research, Primary education, Teacher Effectiveness, Teacher Professional Development, Teaching / instruction, Teaching approaches

Interest group: SIG 11 - Teaching and Teacher Education

Chairperson: Tracy Zou, The University of Hong Kong, Hong Kong

Exploring Constructivist Beliefs and Practices in an Alternative Route to Licensure Program

Keywords: Attitudes and beliefs, Mixed-method research, Teacher Effectiveness, Teaching approaches

Presenting Author:Jori Beck, Old Dominion University, United States; **Co-Author:**Steve Hayden, University of Nevada, Las Vegas, United States; **Co-Author:**Tara Plachowski, University of Nevada, Las Vegas, United States; **Co-Author:**Christina Santoyo, University of Nevada, Las Vegas, United States; **Co-Author:**Chyllis Scott, University of Nevada, Las Vegas, United States

Abstract Approximately one-third of first year teachers hired since 2005 have entered through Alternative Route to Licensure programs. Because of the growing popularity of these programs, this proposal explores the experiences of two teacher candidates of color in a 5-week summer ARL program. This mixed methods study explored the teacher candidates' beliefs and practices during the program. Based on the analysis of data from the beginning and end of the experience, we convey how the teacher candidates entered the program with student-centered beliefs while demonstrating teacher-centered practices and how these beliefs and practices changed over time. Implications for theoretical and practical significance are discussed.

Supporting learning and social cohesion through arts education. Interventions in Finnish schools

Keywords: Action research, Arts, Primary education, Teaching / instruction

Presenting Author:Marja-Leena Juntunen, University of the Arts Helsinki, Finland; **Presenting Author:**Minna Törmänen, University of Helsinki, Finland; **Co-Author:**Heidi Partti, University of the Arts Helsinki, Finland; **Co-Author:**Liisa Jaakonaho, Theatre Academy of the University of the Arts, Finland; **Co-Author:**Eeva Anttila, University of the Arts Helsinki, Finland; **Co-Author:**Mari Tervaniemi, University of Helsinki, Finland; **Co-Author:**Kaisa Tiippana, University of Helsinki, Finland; **Co-Author:**Tanja Linnavalli, University of Helsinki, Finland; **Co-Author:**Isto Turpeinen, University of the Arts Helsinki, Finland; **Co-Author:**Anniina Suominen, Aalto University, Finland; **Co-Author:**Riku Saastamoinen, University of the Arts Helsinki, Finland

In this round table session we examine the possibilities of arts education to enhance learning, participation and social cohesion among pupils in Finnish primary and lower secondary education through four ongoing intervention studies. Furthermore, we invite participants to engage in the discussion about extrinsic dimensions, values and possibilities of the arts and art education, especially in promoting pupils' learning, growth and well-being, in compulsory education. We will present and discuss the aims, methodologies, key concepts, preliminary findings, and possible impacts of the following interventions: (1) The *Music, movement and learning* intervention examines the possible impacts of added music, movement and music-and-movement activities on a variety of skills and capacities of pupils in primary education (3rd grade). (2) The *Embodying difference through/in dance* intervention examines how contemporary dance pedagogy can support 1st and 2nd grade pupils' identity development and relationships in diverse, i.e. multicultural, mixed-gender and mixed-ability groups. (3) The *Norm, error and difference* intervention aims at creating understanding of normative forces among different age groups in primary education (grades 2-6) and how art-based approaches can create group awareness of equality and acceptance of difference.

Governing teacher education – The effectiveness of cooperative structures and coherent curricula

Keywords: Educational policy, Mixed-method research, Teacher Effectiveness, Teacher Professional Development

Presenting Author:Katharina Hellmann, University of Education Freiburg, Germany; **Co-Author:**Hans-Georg Kotthoff, Pädagogische Hochschule Freiburg, Germany

The topic of teacher education and teaching competency is of continuing interest both in scientific research and policy. In this contribution, a state funded research program is outlined that focuses on determining the effectiveness of both structural and curricular reorganization at two German universities that started to cooperate in teacher education. The overall goal of the universities' cooperation is to develop site specific innovative concepts and thus enhance a professional oriented teacher education. The effectiveness of the cooperation onsite both on a structural and a curricular level will yet have to be examined. The associated research program hence is two-staged. It will start with focus group discussions in which the newly developed cooperative structures will be discussed and analysed from a multilevel governance perspective. The possible persistence of the newly developed cooperative structures, stakeholders' expectations of educational effectiveness, and feasible criteria for determining effects of the cooperation will be at the centre of this first research phase. Results of the focus group discussions will then be used to align the design of a following long-term mixed-methods research program. The importance of such a program that accompanies university restructuring and the benefit of scientific research for political decision-makers as well as further funding will be outlined.

Session M 18

1 September 2017 12:00 - 13:30

Pinni A - A3098

Roundtable

Educational Policy and Systems, Higher Education

RT: Higher Education and Writing

Keywords: Argumentation, Assessment methods and tools, Attitudes and beliefs, Case studies, Computer-supported collaborative learning, Educational policy, Higher education, Interdisciplinary, Peer interaction, Writing / Literacy

Interest group: SIG 04 - Higher Education, SIG 12 - Writing

Chairperson: Catherine Simon, Bath Spa University, United Kingdom

When universities take over states: an introduction to "academic capture"

Keywords: Case studies, Educational policy, Higher education, Interdisciplinary

Presenting Author:Mihaylo Milovanovitch, Center for Applied Policy, Austria; **Co-Author:**Arevik Anapiosyan, Yerevan State University and Center for Applied Policy, Armenia; **Co-Author:**Elena Denisova-Schmidt, University of St. Gallen, Switzerland

This research seeks to introduce and conceptualise the notion of "academic capture" - a conflict of interest situation that arises when holders of public office with responsibility for regulating education have a for-profit affiliation with one or more higher education institutions in their respective country. "Profit" is defined in broad terms and might range from regular payments (i.e. salary or expert fees) that members of government might be receiving from a higher education institution, to a prospect of being employed by it upon completion of their political mandate, to any other kind of material benefit, including ownership of private tertiary education institutions.

Mining Student Peer Reviews: Cross-Cultural Perspectives

Keywords: Assessment methods and tools, Computer-supported collaborative learning, Peer interaction, Writing / Literacy

Presenting Author:Djuddah Leijen, University of Tartu, Estonia; **Co-Author:**Christopher Anson, North Carolina State University, United States; **Co-Author:**Joseph Moxley, USF, United States; **Co-Author:**Anna Wärensby, Malmö University, Sweden; **Co-Author:**Asko Kauppinen, Malmö University, Sweden; **Co-Author:**Roger Yallop, University of Tartu, Estonia

Numerous studies report on best-practices for conducting peer review from a pedagogical perspective. However, in the discipline of writing studies, there is, surprisingly, little quantitative, replicable, aggregated, data-driven (RAD) research conducted on peer reviews. In this round table session, data gathered from a web-based peer review system, MyReviewers (myreviewers.org), is mined and investigated to provide a better understanding what aspects of peer review may influence the writing process of students. The studies presented during the round-table are data-driven and replicable. In addition, as the data gathered in MyReviewers is heterogeneous and comes from different countries, educational levels, text types and languages, the discussion of these results should provide added impetus for further investigations of how these quantitative studies may advance our understanding of writing in Higher Education.

Research, Representation and Obstructionism: National-Others in the Japanese University

Keywords: Argumentation, Attitudes and beliefs, Educational policy, Interdisciplinary

Presenting Author:Damian Rivers, Future University Hakodate, Japan

This discussion addresses the institutional existence of national-other teachers, academics and scholars (cultural guests) working within the Japanese universities (cultural hosts). It draws upon the sociological theory of differentiation (Luhmann, 1977: 31) and the political idea of obstructionism to illustrate how within differentiated systems (drawn on the basis of nationality) "we will find two kinds of environment: the outer environment common to all subsystems and the special internal environment for each subsystem". Evidence is shown depicting the nefarious ways in which the internal institutional involvement of national-other teachers, academics and scholars is systematically regulated. These regulations include exclusion from the internal decision-making processes, positioning outside the regular academic structure and being prohibited from attending faculty meetings. These acts merge with the burden of irregular employment titles, higher workloads and oddly configured contractual arrangements. Despite these inequalities occurring in plain sight, voices of dissent have been rare, due in part to the fact that such micro-aggressions and ways of "dividing people up into groups" (Scollon et al. 2012: 3) are presented as being culturally appropriate and therefore acceptable in context. However, no matter how hospitable the host appears when dealing with the guest, the "very structural position of being the guest... allows an act of inclusion to maintain the form of exclusion" (Ahmed, 2012: 43). The presenters suggest that all such practices are obstructionist, anti-democratic and detrimental to the research development and spread of ideas, representations of knowledge and ways of living originating from non-Japanese nationality teachers, academics and scholars.

Session M 19

1 September 2017 12:00 - 13:30

Pinni A - A2088

Roundtable

Cognitive Science

RT: Metacognition, Graphics and Reasoning

Keywords: Case studies, Cognitive skills, Comparative studies, Comprehension of text and graphics, Experimental studies, Metacognition, Physical Sciences, Professions and applied sciences, Reasoning, Science education, Secondary education, Student learning

Interest group: SIG 02 - Comprehension of Text and Graphics, SIG 16 - Metacognition, SIG 26 - Argumentation, Dialogue and Reasoning

Chairperson: Maria A. Flores, University of Minho, Portugal

Metacognitive knowledge and creative process: a comparative qualitative study in three art fields

Keywords: Case studies, Cognitive skills, Comparative studies, Metacognition

Presenting Author: Violeta Vainer, FLACSO, Argentina

Metacognitive thoughts about creativity by artists, scientists and designers can give us some inputs to better understand creative process. This is a work in progress. It is a qualitative study with semi open questions. We will present the first stage, interviews to artists in three fields, music composition, dance composition or choreography and filmmaking. We will compare their experiences and metacognitive thoughts about creative process. Also we participate in the domain specific-domain general debate, or if creative abilities are domain general or domain specific. We analyze as well what level of consciousness artists have about the creative process and how it influences their work.

Using a graphic organizer to improve comprehension and recall of a medical guidance text

Keywords: Comprehension of text and graphics, Experimental studies, Professions and applied sciences, Student learning

Presenting Author: Ely Kozminsky, Ben-Gurion University of the Negev, Israel; **Co-Author:** Shani Amar, Ben-Gurion University, Israel

Texts are dominant when providing medical information, but often they are beyond the reading level of most patients. Alternative formats, such as graphic organizers, can improve understanding and recall of the guiding information. The study examines the effect of adapting a graphic organizer format on understanding and recalling behavioral guidelines to reduce the consequences of neutropenia, and is given to post-chemotherapy cancer patients, compared with the original guidelines. Since cancer is perceived as a threatening situation, it often provokes anxiety. Therefore, we've also examined the effect of induced anxiety on comprehension and recall. 80 students were randomly assigned to: (a) receiving a document in a text format, a graphical format, or in both formats, by (b) inducing anxiety or not. Understanding and recall were superior with the graphical format condition compared with the other two conditions. While we induced state anxiety, it did not affect understanding and recall.

Characterizing and Promoting Secondary Students' Reasoning about Evidence in Science

Keywords: Physical Sciences, Reasoning, Science education, Secondary education

Presenting Author: Guanzhong Ma, The University of Hong Kong, China; **Co-Author:** Jan van Aalst, The University of Hong Kong, Hong Kong; **Co-Author:** Carol Chan, The University of Hong Kong, Hong Kong

An overlooked practice of claim evaluation with evidence in scientific reasoning literature is evaluating the evidence itself, especially in face of prior beliefs in science. The paper reports on secondary students' evaluation of evidence in face of misconceptions in science, and the results of an intervention with them designed to promote this evaluation. This intervention embodied three conjectured contributing factors, including epistemological understanding, scientific explanation, and knowledge about experimental error. Seventh graders ($N = 36$) were asked to evaluate evidence that contradicted their prior misconceptions about Newtonian mechanics. They were engaged to evaluate three naïve responses to this question against materials that conveyed the ideas about the aforementioned factors. Results showed that prior to the intervention students had difficulties de-contextualizing their misconceptions from the reasoning, which may lead them to ignore the data, discount the method of obtaining the data and make it difficult to interpret the data variability. We found an overall positive effect of the intervention in facilitating students to attend to the evidence, accept the method, and interpret the data variability. However, individual differences in the effect existed. The study extends current research on claim evaluation by identifying students' difficulties in reasoning about evidence that contradicted their misconceptions, and showing the aforementioned factors and the engagement in evaluating naïve responses facilitate this reasoning. Future research involves describing the processes by which the change in this reasoning occurs, and explaining how these processes lead to the change.

Session M 20

1 September 2017 12:00 - 13:30

Main Building E - E301

Poster Presentation

Motivational, Social and Affective Processes, Teaching and Teacher Education

PO: Teaching and Teacher Effectiveness

Keywords: Achievement, Assessment methods and tools, Attitudes and beliefs, Cognitive skills, Conceptual change, Content analysis, Emotion and affect, Language (Foreign and second), Numeracy, Parental involvement in learning, Peer interaction, Pre-service teacher education, Reading comprehension, Self-efficacy, Teacher Effectiveness, Teacher Professional Development, Teaching / instruction, Teaching approaches, Video analysis

Interest group: SIG 11 - Teaching and Teacher Education

Chairperson: Alberto Cattaneo, Swiss Federal Institute for Vocational Education and Training, Switzerland

Design thinking: Teachers' approaches to creating learning experiences for their students

Keywords: Teacher Effectiveness, Teacher Professional Development, Teaching / instruction, Teaching approaches

Presenting Author: Lori Lockyer, University of Technology Sydney, Australia; **Co-Author:** Sue Bennett, University of Wollongong, Australia; **Co-Author:** Shirley Agostinho, University of Wollongong, Australia

This paper reports on the research design and findings the first phases of a current Australian study that aims to

understand how teachers engage in the design of learning experiences. The research project re-conceptualises what comprises teaching by drawing attention to the teachers' design work. Specifically, the study focuses on teacher design thinking as a cognitive process that occurs in a social context. The study takes a qualitative, multi-phase multiple case study approach to investigate how expert and novice teachers think about and approach the design of learning experiences and how evidence-based models might stimulate novice teachers' design thinking. The outcomes of this project will inform the development of improved strategies and resources for initial teacher preparation and ongoing teacher professional learning.

All on Board! Successful School-Family Partnerships in Schools with Personalized Learning Concepts

Keywords: Conceptual change, Content analysis, Parental involvement in learning, Teaching / instruction

Presenting Author:Rita Stebler, University of Zurich, Switzerland; **Co-Author:**Katriina Vasarik Staub, University of Zurich, Switzerland

What makes communication and cooperation between schools and families effective, when schools have changed their "grammar of schooling" (Tyack & Tobin, 1994, p. 454) towards personalized learning (Murphy et al., 2016)? We present results part of a longitudinal research project on schools with personalized learning concepts in Switzerland. For qualitative content analysis of interviews and strategic documents of schools (n=12) an analytic instrument was developed semi-deductively based on research on school-family partnerships (e.g. Jeynes, 2012), with six main communication and cooperation structures such as channels of information exchange and six content areas such as the pedagogic concepts. The key findings show that strategic linking of which communication and cooperation structures accommodate which contents are beneficial for school-family partnerships, rather than rigid parent involvement procedures. Three typologies emerged: Schools with informal structures/contents; with little formal/conflict management oriented structures and variable contents; with formal structures and pedagogical contents. Reciprocal relations become crucial when re-conceptualizing school environments, and aligned with personalized learning where students' different needs are addressed, this work enables a more tactic approach to school-family partnerships. Jeynes, W. (2012). A Meta-Analysis of the Efficacy of Different Types of Parental Involvement Programs for Urban Students. *Urban Education*, 47(4), 706–742. Murphy, M., Redding, S., Twyman, J.S. (Eds.) (2016). Handbook on personalized learning for states, districts, and schools. Center on Innovations in Learning, Temple University, Philadelphia, PA. Tyack, T. B., & Tobin, W. (1994). The „grammar“ of schooling. Why has it been so hard to change? *American Educational Research Journal*, 31(3), 453–479.

Parent's attitudes and expectations and home practices in the development of early numeracy skills

Keywords: Achievement, Cognitive skills, Numeracy, Teaching / instruction

Presenting Author:Javier Rosales, University of Salamanca, Spain; **Co-Author:**Blanca Hernández, University of Salamanca, Spain; **Co-Author:**Marta Ramos, Salamanca University, Spain

The present longitudinal study investigated the influence of formal and informal home numeracy practices, parent's attitudes and expectations on early numeracy skills. Seventy-three children were assessed, and their parents completed a questionnaire based on Skwarchuk, Sowinski & LeFevre (2014). Children whose parents completed the questionnaire were recruited for numeracy testing one year later. Correlational analyses were done and the results showed two main relationships. First, between parent's attitudes and expectations and second, between formal home numeracy practices correlated -only in T2- with intelligence variables. The present research supports claims about the importance and nature of home experiences in early numeracy skills. Interaction effects are explored and discussed.

An exploratory study of pre-service teachers' relational beliefs and relational self-efficacy

Keywords: Attitudes and beliefs, Emotion and affect, Pre-service teacher education, Self-efficacy

Presenting Author:Anne Milatz, University of Jena, Germany

Effective student-teacher relationships are as important for students' learning as for teachers' health, so the need to incorporate relational aspects into teacher education is pressing^{1,3,4,7,9,10,12}. Since so little is known as yet about relational beliefs and relational self-efficacy of (pre-service) teachers and how those aspects affect initial practical experiences, the present study aims to explore this field. Research question 1 aims to establish the extent of, and relationship between, relational beliefs (growth/destiny beliefs⁵), the relational self-efficacy³ and self-perceived competences to establish an emotionally-supportive classroom⁸ of pre-service teachers while undertaking their first field and teaching experiences in school. Research question 2 explores whether relational preconditions of pre-service teachers impacts their self-efficacy to master difficult situations in the field experience against the background of motivational research and theory^{2,6}.

An online questionnaire is currently administered with pre-service teachers (max. N = 134) at the beginning of their practical experience in their 5th or 6th semester (as part of the project "Getting it right from the beginning: Jena model of teacher education" founded by the German Federal Ministry of Education and Research). Consequently, first results will be reported at the conference. Whilst descriptive statistics as well as a correlation plot will explore the relational preconditions of pre-service teachers, multi-level analysis will be used to explore the impact of the relational preconditions on the motivation toward the practical field experience. Implications of the results will be discussed in the light of teacher education as well as relating to supervision of practical field experience.

Do preservice teachers benefit from peer feedback when analyzing videobased classroom situations?

Keywords: Peer interaction, Pre-service teacher education, Teacher Professional Development, Video analysis

Presenting Author: Nicola Meschede, Goethe-Universität Frankfurt, Germany; **Co-Author:** Katja Adl-Amini, Goethe-Universität Frankfurt, Germany; **Co-Author:** Ilonca Hardy, Goethe-Universität Frankfurt, Germany

Studies on video-based learning environments in teacher education show that preservice teachers may learn to notice relevant aspects of instruction and to reason about them based on their prior knowledge – an ability that has been termed “professional vision”. However, the specific elements fostering this development within video-based learning environments are still unclear. The study investigates to what extent peer feedback can contribute to preservice teachers’ professional vision and whether heterogeneous grouping, with feedback provided from a different theoretical perspective, is especially beneficial. The study was conducted in two university-level classes with different theoretical foci (inclusive practices; teacher-student-interactions). In a feedback cycle, students first wrote individual analyses of a videotaped instructional situation. Students of both classes were then randomly assigned to a group receiving feedback from peers of their own class only or a group which also received feedback from a student of the other class, thus providing a different perspective on the same video. Students then revised their analyses based on the feedback received. Results indicate a significant increase after the feedback cycle in both groups with regard to the number of events noticed, using a coding scheme on the two processes of professional vision. Moreover, students within each class provided analyses aligned to the theoretical focus of the class. Especially students with a focus on inclusive education benefitted from peer feedback given by students with an additional focus on the same video segment. The quality of written peer feedback is currently analyzed to provide insight into the underlying mechanisms.

Fostering Subject-Specific Diagnostic Skills? Insights from English as a Foreign Language

Keywords: Assessment methods and tools, Language (Foreign and second), Reading comprehension, Teacher Professional Development

Presenting Author: Judith Sebastiani, University of Koblenz - Landau, Germany

Evidence-based teaching approaches allow teachers to provide optimal support for the development of language skills. Nevertheless, language learning still seems to be rather input-driven and reports from large-scale assessments are rarely used to inform teaching. Research suggests that this is due to insufficient diagnostic skills of foreign language teachers. To investigate this issue, we would like to examine the judgment accuracy of secondary school teachers of English as a foreign language and we would also like to identify task features that influence their judgments. In an experimental study, we would like to find out, whether diagnostic skills of English teachers can be fostered. Moreover, we would like to investigate whether teachers who have received a one-day training on the diagnosis of reading skills can improve their estimates of task difficulty and can create better tasks. The present study contributes to the implementation of evidence-based teaching in the foreign language classroom.

Session M 21

1 September 2017 12:00 - 13:30

Pinni A - A3103

Roundtable

Teaching and Teacher Education

RT: Teaching and Teacher Education

Keywords: Competencies, Educational policy, Educational Psychology, Emotion and affect, Language (L1/Standard Language), Mathematics, Pre-service teacher education, Primary education, Qualitative methods, Secondary data analysis, Social interaction, Teacher Professional Development

Interest group: SIG 11 - Teaching and Teacher Education

Chairperson: Mieke Koeslag-Kreunen, Netherlands

Do extraverts get better grades? Student personality factors and teacher-assigned grades

Keywords: Educational Psychology, Language (L1/Standard Language), Mathematics, Secondary data analysis

Presenting Author: Andrea Westphal, University of Potsdam, Germany; **Co-Author:** Miriam Vock, Universität Potsdam, Germany

Teacher-assigned grades may have relevant implications for students’ further-educational trajectories. The extent to which teachers take student characteristics other than achievement into consideration when assigning grades has therefore been a matter of debate and controversy. This study aims to clarify whether differences in teacher-assigned grades are systematically associated with students’ personality factors, while controlling for a range of student indicators, as well as the classroom’s average achievement. We also examined whether the relationship between student personality factors and teacher-assigned grades may be moderated by student achievement as measured in standardized tests. As part of the National Educational Panel Study (NEPS), teacher-assigned grades and standardized achievement in mathematics and German were assessed, along with the “big five” personality factors, verbal and mathematical self-concept, and socioeconomic background, in a sample of 5,163 ninth-grade academic-track students from all 16 German federal states.

Multilevel regression analyses suggested that students who score highly in conscientiousness and neuroticism received better grades in both mathematics and German. In addition, teachers of German awarded better grades to highly extraverted students than to more introverted students. We also found statistically significant interaction effects between students' personalities and their standardized achievement scores in German, indicating that teachers take students' conscientiousness and neuroticism into account to a higher degree when assigning grades to higher-achieving students. In contrast, when teachers assigned grades to lower-achieving students, conscientiousness and neuroticism seemed to be less important. Implications for teacher training are discussed.

Teacher students' social and emotional competences: Development of a research-based training program

Keywords: Competencies, Emotion and affect, Pre-service teacher education, Social interaction

Presenting Author:Bastian Carstensen, Leibniz Institute for Science and Mathematics Education (IPN), Germany; **Co-Author:**Uta Klusmann, Leibniz Institute for Science and Mathematics Education (IPN), Germany; **Co-Author:**Michaela Köller, Institute for Psychology of Learning and Instruction, Kiel University, Germany

The aim of the project is to develop a theory-based training program for social-emotional competences which is intended to prepare teacher students for their work at schools. To link the mostly theoretical curriculum at university to the practical demands of the teaching profession, the training shall both improve the quality of interactions between teachers and students and teachers' subjective well-being. The training concept encompasses the following contents with regard to student teachers' professional development: knowledge of emotions and social interactions, regulation of one's emotions and those of others, understanding of and acting competent in social situations. Apart from imparting knowledge the training includes practical exercises. To test the effectiveness of the program, it will be evaluated in a pre-post control group design. Upon successful evaluation, the training program is to be incorporated into teacher training at Kiel University. First results indicate positive training-effects and provide information for further implementations.

The added value of research-based teacher education on teachers' roles in primary schools

Keywords: Educational policy, Primary education, Qualitative methods, Teacher Professional Development

Presenting Author:Luce Claessens, Utrecht University, Netherlands; **Co-Author:**Frans Prins, Utrecht University, Netherlands; **Co-Author:**Chris Phielix, Utrecht University, Netherlands

In the past decade, research-based teacher training programs for primary school teachers have been established in the Netherlands. This study examines the added value of these programs on teachers' roles in primary schools and compares beginning teachers from research-based training programs to beginning teachers from vocational training programs. Given that beginning teachers are influenced by the school culture of the school in which they work, we took a person-environment fit approach. We have interviewed 10 teachers and their principals on educational reform, school development, the merits of research-based teacher training, the teacher's professional development, and the teacher's person-environment fit. Preliminary analyses show a preoccupation of both types of teachers with classroom processes and what types of roles they fulfil in school reform. Some teachers from research-based programs affirmed a bad person-environment fit concerning their specific abilities. All principals observed differences between the two types of teachers, both as teachers in a classroom and as members of a school team. We think our findings can inform theory and practice on the merits of research-based teacher training programs for primary school teachers and how to scaffold beginning teachers from these programs so they can reach their full potential.

Session M 22

1 September 2017 12:00 - 13:30

Pinni B - B3108

Poster Presentation

Assessment and Evaluation, Educational Policy and Systems, Teaching and Teacher Education

PO: Learning in Early Childhood

Keywords: Assessment methods and tools, At-risk students, Cognitive development, Early childhood education, Educational policy, Educational Psychology, Lifelong learning, Literacy, Mixed-method research, Multimedia learning, Out-of-school learning, Peer interaction, Primary education, Quantitative methods, Secondary data analysis, Self-regulation

Interest group: SIG 05 - Learning and Development in Early Childhood

Chairperson: Bert Slof, Utrecht University, Netherlands

Relations between pre-schoolers' family background and kindergarten quality

Keywords: At-risk students, Early childhood education, Educational policy, Secondary data analysis

Presenting Author:Jennifer Lambrecht, University of Potsdam, Germany; **Co-Author:**Helvi Koch, Universität Potsdam, Germany; **Co-Author:**Guido Nottbusch, University of Potsdam, Germany; **Co-Author:**Nadine Spörer, University of Potsdam, Germany

Visiting a high-quality kindergarten is linked with the expectation that it enhances the development of a child and that it has a compensatory effect for children from deprived families. Empirical findings affirm the positive influence of a high-quality kindergarten on the development of a child. The question arises, if all children have the same chance to access high-quality kindergartens regardless of their families' social status. As there is little and ambiguous empirical evidence available on

that question for the German early education and care system, we analyzed if children from families with a low socioeconomic status, low education or a migration background access kindergarten groups with lower quality than children from families with a medium or high socioeconomic status, education or no migration background respectively. Analyses were based on a sample of $N = 2122$ pre-schoolers from starting Cohort two of the German National Educational Panel Study. Data on family background and kindergarten quality (structural and process quality) was collected via standardized interviews with the parents and educators. Exploratory factor analyses suggested two scales on structural and two scales on process quality (Cronbach's α between .71 and .78). Analyses of variance revealed differences in kindergarten quality according to socioeconomic status, education, and migration background.

A Review of Multiliteracies Pedagogy in Primary Classrooms

Keywords: Early childhood education, Literacy, Primary education, Multimedia learning

Presenting Author: Pirjo Kulju, University of Tampere, Finland; **Co-Author:** Reijo Kupiainen, University of Tampere, Finland; **Co-Author:** Anne Jyrkiäinen, University of Tampere, Finland; **Co-Author:** Kirsii-Liisa Koskinen-Sinisalo, University of Tampere, Finland; **Co-Author:** Marita Mäkinen, University of Tampere, Finland; **Co-Author:** Angela Wiseman, NC State University, United States

In recent years our views of literacy have changed profoundly as our classrooms have become more diverse and our learning is affected by advances in technology. These changes and current literacy environment requires rethinking and development of literacy practices in school pedagogy. This is often addressed by the concept of multiliteracies (New London Group 1996). However, there seems to be a lack of systematic analyses of how the concept has been applied in school pedagogy, especially at the primary level. Based on a systematic review of 68 research articles with primary classroom data, this study aims to review how the concept of multiliteracies is understood and what kind of guidelines these studies offer for multiliteracies practices in schools. Based on qualitative content analyses of the reviewed articles, the main results indicate that the articles followed the guidelines of the New London Group's manifesto on multiliteracies, and they often took into account both the multimodality of meaning-making and the diversity of learners. The studies were often framed with sociocultural approaches. Findings on pedagogy indicate that there is a growing importance of linking ICT, literacy and communication together within the contexts of different school systems. Creative and collaborative meaning making is emphasized in order to strengthen young people's active and participatory citizenship in real and digital worlds.

Monitoring quality of playgroups in Portugal: A mixed-method approach

Keywords: Assessment methods and tools, Early childhood education, Educational policy, Mixed-method research

Presenting Author: Vanessa Russo, University Institute of Lisbon (ISCTE - IUL), Portugal; **Co-Author:** Joana Alexandre, University Institute of Lisbon (ISCTE-IUL), Portugal; **Co-Author:** Maria Clara Barata Almeida, Faculdade de Psicologia e de Ciências da Educação da Universidade de Coimbra, Portugal; **Co-Author:** Catarina Leitão, Faculdade de Psicologia e de Ciências da Educação da Universidade de Coimbra, Portugal; **Co-Author:** Bruno de Sousa, Faculdade de Psicologia e de Ciências da Educação da Universidade de Coimbra, Portugal

Playgroups are community-based groups that bring together young children and their caregivers for the purpose of play and social activities. International studies have reported outcomes for children who participate in playgroups (e.g. child language). Little is known about what happens during playgroups to facilitate change; however evidence shows higher levels of quality associated with children's development. In Portugal, playgroups were implemented in 5 districts, twice a week for two hours with two facilitators and one supervisor per district. In this paper, we will examine the following research questions: How does quality vary thorough the implementation of playgroups? Which quality characteristics caregivers, facilitators and supervisors value the most? This study used a mixed-method approach (quantitative and qualitative methods). From the 25 playgroups operating, 13 were randomly selected. Data collection was gathered twice (T1 and T2). Individual interviews with caregivers and supervisors were conducted, and the facilitators completed a survey. An observation tool was created to evaluate the quality of playgroups and the 13 playgroups were videotaped. Results show that, on average, the 13 playgroups evaluated are above level 3 (minimum) in all subscales and in the global scale. There was a statistically significant improvement in quality from T1 to T2 in the global scale and in two subscales: space and materials; activities and routines. Likewise, stakeholders perceived a positive climate in playgroups, and pointed out diverse activities and materials. The strength of the design enables triangulation, and can produce more powerful and robust findings about the quality of playgroups.

The friendship network stability of preschool children during one pedagogical season

Keywords: Early childhood education, Educational Psychology, Peer interaction, Quantitative methods

Presenting Author: Yili Wang, University of Turku, Finland; **Co-Author:** Jarmo Kinos, University of Turku, Finland; **Co-Author:** Tuire Palonen, University of Turku, Finland; **Co-Author:** Tarja-Riitta Hurme, University of Turku, Finland

This longitudinal study aims to examine how five- and six-year-old children's peer relationships are formed and fostered during one preschool year in a southwestern Finnish preschool. All 16 kindergarteners participated in the study (at dyad level $N=240$; i.e., 16×15 relationships among the children). The children were divided into four daily groups. During the intervention one iPad was given to each group in order to stimulate interaction among peers and, thus, enable the children to form new peer relationships. In the data gathering, sociometric nomination techniques were used to investigate the nature of the peer relationships. The data was collected five times during the year to see what kind of peer relationship changes occurred at the dyad level and the group level, i.e., in establishing and losing friendship ties among the children.

Social network analyses were used to analyze the data. The results indicate that the children's preference for gender segregation was strong compared to age preference and intervention. In all, the number of reciprocal friendship ties and the mutual absence of friendship ties increased towards the end of the year, whereas the number of unilateral friendship ties decreased. This indicates that children's nominations narrow down; thus, the group structure becomes more crystalized. Instead of extending their friendship networks, children seek stable and mutual relationships with their peers in their middle childhood years. The intervention only had a slightly negative influence on children's peer relationships.

Effects of an early childhood intervention: Evidence from the German program Chancenreich

Keywords: Cognitive development, Early childhood education, Quantitative methods, Lifelong learning

Presenting Author:Juliane Schünke, Freie Universität Berlin, Germany; **Co-Author:**Yvonne Anders, Freie Universität Berlin, Germany; **Co-Author:**Franziska Cohen, Freie Universität Berlin, Germany; **Co-Author:**Hannah Ulferts, Freie Universität Berlin, Germany

Already at the beginning of primary do school children vary significantly in their cognitive skills (Magnuson et al., 2004) depending on their social and cultural background (OECD, 2004). There is strong evidence of positive long-term effects of early childhood intervention program for families with low socioeconomic status. However, there is still a clear need for systematic evaluations of such programs in Germany (Taubner, Munder, Unger & Wolter, 2013). The study AQuaFam evaluates the early childhood intervention program 'Chancenreich' with a two-wave panel design. The program seeks to improve parenting skills and child outcomes by offering a great variety of support to the parents. Data comes from the study AQuaFam that has a treatment and a control group in both waves. The treatment group includes 184 families with children aged between two and four years in the first and 122 families with children aged between two and five years in the second wave. The control group includes 58 families with same aged children in the first wave and 42 families in the second wave. These families did not participate in the program. Findings suggest that families benefit from participating in the 'Chancenreich' program on a long-term basis. Chancenreich participants reported more social support in the first and in the second wave. Furthermore the parenting training courses made a difference for the parents. Implications of our findings will be discussed in the light of the theoretical background as well as the conceptual framework of the program.

Observations of physical activity and classroom structure in nature and traditional kindergartens

Keywords: Early childhood education, Educational Psychology, Out-of-school learning, Self-regulation

Presenting Author:Joshua Meyer, University of Victoria, Canada

Nature schools are designed to provide children with large amounts of time in nature-based outdoor settings to learn, play, explore, and experience natural systems and natural materials. This approach has gained considerable interest, yet despite its growing appeal little is known about the operational variables distinguishing nature-based from traditional classrooms. The purpose of this research is to examine the intensity and complexity of physical activity and classroom structure between nature and traditional kindergarten classrooms to develop a better understanding about the similarities and differences between these learning environments. The findings from this observational study show a higher frequency in vigorous and diverse types of physical activity as well as less rigid classroom structure in nature kindergartens than in traditional kindergartens. These findings support previous research examining physical activity in nature classrooms. Additionally these findings provide information about the relationship between classroom structure and physical activity in these learning environments.

Session M 23

1 September 2017 12:00 - 13:30

Main Building A - A35

ICT Demonstration

Learning and Social Interaction

Introducing a social network analysis toolkit for socially responsive classrooms

Keywords: At-risk students, Educational Technology, Peer interaction, Social interaction

Interest group: SIG 10 - Social Interaction in Learning and Instruction

Chairperson: Paula De Barba, The University of Melbourne, Australia

The aim of this demonstration is to introduce a social network analysis toolkit that can be used by researchers and educators alike to examine and understand student-student social interaction in learning and instruction processes. The toolkit offers a wide range of functions and measures drawn from a social network perspective. We will display, explain and familiarize participants with the toolkit's functions, ranging from collecting, managing, analysing, interpreting and presenting social network data. The feasibility and methodological rigour of such a research tool will be discussed as a way of building a bridge between research and practice. Driven by a theory of social capital, we will highlight the potential value of examining social interdependencies and interconnectedness among students in a classroom network rather than simply looking at one-to-one interactions. In doing so, we will provide an example from our empirical research of using the toolkit in two Year 4 classrooms. This will consist of a step-by-step introduction to designing and implementing social network analysis as well as discussing a number of social network measures we implemented that participants may also consider using in their own settings.

Introducing a social network analysis toolkit for socially responsive classrooms

Presenting Author:Christoforos Mamas, University of California, San Diego, United States; **Co-Author:**Alan Daly, University of California, San Diego, United States; **Co-Author:**Giovanna Schaelli, University of Zurich, Switzerland

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Session M 24

1 September 2017 12:00 - 13:30

Pinni B - B4117

ICT Demonstration

Learning and Instructional Technology

A Second Life environment to train Mathematical Acting in the Context of Nursing.

Keywords: Higher education, Instructional design, Mathematics, Workplace learning

Interest group: SIG 07 - Learning and Instruction with Computers

Chairperson: Sebastian Kuntze, Ludwigsburg University of Education, Germany

A Virtual Learning Environment (VLE) can be regarded as a potentially useful teaching tool to integrate domain-specific knowledge with the personal transferable and generic academic skills in instructional practices (Tynjälä, 2013). Students have to transform abstract theories and formal knowledge to construct principles and conceptual models (Weeks et al., 2013). They have to learn to distill and use relevant information from complex situations, especially complex calculation problems. This ICT demonstration is about a VLE that is designed for bachelor nursing students to support them in recognizing various problem states to which the math theorem applies and enhance nursing students' competences through a solid base of mathematical facts and procedures. The design includes features such as interactive stories and is equipped with (complex) care situations and clear objectives for solving problems that insure that players have that immersion experience in the virtual world (Shute et al., 2009). It should therefore motivate nursing students for learning mathematics by integration of 'real life' (complex) care situations and bridge nursing students' transfer problems by using a virtual workplace environment with (complex) care situations.

A Second Life environment to train Mathematical Acting in the Context of Nursing.

Presenting Author:Diana P. Zwart, Windesheim University of Applied Sciences, Netherlands; **Co-Author:**Sui Lin Goei, Windesheim University of Applied Sciences, Netherlands; **Co-Author:**Omid Noroozi, Tarbiat Modares University, Iran; **Co-Author:**Johannes Van Luit, Utrecht University, Netherlands

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Session M 25

1 September 2017 12:00 - 13:30

Main Building C - C2

ICT Demonstration

Learning and Instructional Technology

Cohvis. Automated concept map feedback for writing cohesive texts

Keywords: Computer-assisted learning, E-learning / Online learning, Educational Technology, Writing / Literacy

Interest group: SIG 07 - Learning and Instruction with Computers

Chairperson: Jasperina Brouwer, University of Groningen, Netherlands

Novice writers are often challenged by the demand of writing cohesive and comprehensible texts. In this ICT Demonstration, we propose the web-based feedback tool, Cohvis, to support students in writing cohesive explanations. Cohvis visualizes cohesion deficits in students' explanations in a concept map. In several experimental studies, Cohvis proved to be effective, as students with the concept map feedback conducted revisions which resulted in more cohesive and also more comprehensible texts than the texts of students who revised without concept map feedback. These findings could also be replicated in more naturalistic classroom settings. Together, the findings provide evidence that Cohvis can be a useful scaffold to support students writing cohesive texts, an ability that is paramount in today's information age.

Cohvis. Automated concept map feedback for writing cohesive texts

Presenting Author: Christian Burkhart, University of Freiburg, Germany; **Co-Author:** Andreas Lachner, University of Tübingen, Germany; **Co-Author:** Matthias Nückles, University of Freiburg, Germany

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KEYNOTES - PART 3 1

1 September 2017 13:45 - 15:15

Tampere Hall - Big Auditorium

EARLI Keynote Session

Higher Education

A Critical Analysis of Student Approaches to Learning in the Light of Recent Empirical Evidence

Keywords: Emotion and affect, Learning approaches, Motivation, Self-efficacy

Interest group: SIG 04 - Higher Education

Chairperson: Eero Ropo, University of Tampere, Finland

There is a rich body of research on students' approaches to learning from the last 50 years. My aim is to explore the nature of the approaches to learning in the context of today's university and in the light of recent multidisciplinary empirical evidence. In addition, I will argue that the approaches to learning still is an important research area. The concepts surface and deep are problematic, because they can be misinterpreted to characterise a superficial student or someone more thoughtful or philosophical. This is not, of course, what the theory suggests, but this is an important aspect from the students' point of view when they analyse their own learning or receive feedback on their learning. In addition, surface and deep do not anymore capture the essence of these approaches. Furthermore, providing clear definitions of the deep and surface approaches is challenging because in different disciplines, these take different meanings and forms and this variation needs to be taken into account when interpreting empirical evidence. According to the original definition, students who apply the surface approach concentrate on memorising facts. In the light of recent evidence, the surface approach is more about problems in constructing knowledge resulting in a fragmented knowledge base. There is also a clear shift in the deep approach. Aiming at understanding cannot anymore be a criterion for the deep approach. There is a clear ceiling effect in items measuring students' aim at understanding, because almost all university students consider this as an important personal aim in studying. The core of the deep approach is the process of critically evaluating the study material, and integrating knowledge in order to create a personal worldview of topic under study. A systematic use of the deep approach to learning is one dimension of the disposition to understand for oneself, which is pivotal in the development of academic expertise.

A Critical Analysis of Student Approaches to Learning in the Light of Recent Empirical Evidence

Presenting Author: Sari Lindblom, University of Helsinki, Finland

There is a rich body of research on students' approaches to learning from the last 50 years. My aim is to explore the nature of the approaches to learning in the context of today's university and in the light of recent multidisciplinary empirical evidence. In addition, I will argue that the approaches to learning still is an important research area. The concepts surface and deep are problematic, because they can be misinterpreted to characterise a superficial student or someone more thoughtful or philosophical. This is not, of course, what the theory suggests, but this is an important aspect from the students' point of view when they analyse their own learning or receive feedback on their learning. In addition, surface and deep do not anymore capture the essence of these approaches. Furthermore, providing clear definitions of the deep and surface approaches is challenging because in different disciplines, these take different meanings and forms and this variation needs to be taken into account when interpreting empirical evidence. According to the original definition, students who apply the surface approach concentrate on memorising facts. In the light of recent evidence, the surface approach is

more about problems in constructing knowledge resulting in a fragmented knowledge base. There is also a clear shift in the deep approach. Aiming at understanding cannot anymore be a criterion for the deep approach. There is a clear ceiling effect in items measuring students' aim at understanding, because almost all university students consider this as an important personal aim in studying. The core of the deep approach is the process of critically evaluating the study material, and integrating knowledge in order to create a personal worldview of topic under study. A systematic use of the deep approach to learning is one dimension of the disposition to understand for oneself, which is pivotal in the development of academic expertise.

KEYNOTES - PART 3 2

1 September 2017 13:45 - 15:15

Main Building A - Main Auditorium

EARLI Keynote Session

Motivational, Social and Affective Processes

A Unified Model of Task-Specific Motivation

Keywords: Attitudes and beliefs, Emotion and affect, Motivation and emotion, Reflection

Interest group: SIG 08 - Motivation and Emotion

Chairperson: Marold Wosnitza, RWTH Aachen University, Germany

In almost all theories of motivation a distinction is made between affective and cognitive aspects. Theories disagree about the relation between these aspects. Some theories see them as opposed, whereas others consider them to be additive. The Unified Model of Task-specific Motivation (UMTM) adopts a third possibility by declaring them as independent. Affective and cognitive valences are produced by two interacting but distinct systems of behavior regulation. Affective valences are feelings about doing an activity; cognitive valences are thoughts about the value of the consequences of an activity. This distinction is combined with the distinction between positive and negative valences. Roughly speaking, positive valences give rise to approach motivation, negative valences to avoidance motivation. As these types of motivation are also relatively independent, we thus have four distinct components of motivation. The UMTM identifies four factors that constitute conditions for these valences: the autonomy in choosing and executing an activity, the feasibility of an activity, the relatedness with other people in the action context, and the inclination to abide with normative views about an activity of other people in the action context: subjective norm. Autonomy and feasibility are distinguished in a personal and a contextual facet. After the explanation of the UMTM and the argumentation that supports it, we present empirical evidence that was recently collected in several activity contexts. This evidence showed that the specific activity determines to what extent different components come into play. It supports the idea that each activity brings about a different configuration of valences. Each specific activity determines also the importance of conditional factors. Social aspects are, for instance, less important in an individual activity. Furthermore, as all factors in the model appear to influence each other mutually, we discuss the conceptual status of the influence paths in the UMTM.

A Unified Model of Task-Specific Motivation

Presenting Author: Cornelis de Brabander, Leiden University, Netherlands; **Co-Author:** Rob Martens, Open University of the Netherlands, Netherlands

In almost all theories of motivation a distinction is made between affective and cognitive aspects. Theories disagree about the relation between these aspects. Some theories see them as opposed, whereas others consider them to be additive. The Unified Model of Task-specific Motivation (UMTM) adopts a third possibility by declaring them as independent. Affective and cognitive valences are produced by two interacting but distinct systems of behavior regulation. Affective valences are feelings about doing an activity; cognitive valences are thoughts about the value of the consequences of an activity. This distinction is combined with the distinction between positive and negative valences. Roughly speaking, positive valences give rise to approach motivation, negative valences to avoidance motivation. As these types of motivation are also relatively independent, we thus have four distinct components of motivation. The UMTM identifies four factors that constitute conditions for these valences: the autonomy in choosing and executing an activity, the feasibility of an activity, the relatedness with other people in the action context, and the inclination to abide with normative views about an activity of other people in the action context: subjective norm. Autonomy and feasibility are distinguished in a personal and a contextual facet. After the explanation of the UMTM and the argumentation that supports it, we present empirical evidence that was recently collected in several activity contexts. This evidence showed that the specific activity determines to what extent different components come into play. It supports the idea that each activity brings about a different configuration of valences. Each specific activity determines also the importance of conditional factors. Social aspects are, for instance, less important in an individual activity. Furthermore, as all factors in the model appear to influence each other mutually, we discuss the conceptual status of the influence paths in the UMTM.

KEYNOTES - PART 3 3

1 September 2017 13:45 - 15:15

Tampere Hall - Small Auditorium

EARLI Keynote Session

Preparing Lifelong Learners. Student Learning in Higher Education and Beyond

Keywords: Learning approaches, Lifelong learning, Student learning, Workplace learning

Interest group: SIG 14 - Learning and Professional Development

Chairperson: Anneli Eteläpelto, University of Jyväskylä, Finland

Education is facing challenges today in educating students to become life-long learners and versatile experts. Successful learning in this perspective assumes students to be involved for instance in 'deep learning'. Over the past decades, a large amount of research has been conducted on how students approach their learning in (higher) education and in the transition to the workplace.

Although students are expected to develop more 'deep learning' during their studies, research concerning the development is not always pointing into that direction. In my lecture, I will discuss the longitudinal research in this field and will argue that both conceptual and methodological factors might be important explanations for some of the contradictory findings.

I will conclude with research from our own research group in which we try to take into account these factors by looking to learning at different levels (task level, course level and general level) and by combining self-report measures (such as questionnaires and interviews) with online process measures (such as eye-tracking).

Preparing Lifelong Learners. Student Learning in Higher Education and Beyond

Presenting Author: David Gijbels, University of Antwerp, Belgium

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I will conclude with research from our own research group in which we try to take into account these factors by looking to learning at different levels (task level, course level and general level) and by combining self-report measures (such as questionnaires and interviews) with online process measures (such as eye-tracking).

Session N 1

1 September 2017 15:45 - 17:15

Pinni A - A3103

Single Paper

Higher Education

Researcher Education and Careers - B

Keywords: Attitudes and beliefs, Collaborative Learning, Communities of practice, Content analysis, Culture, Doctoral education, Emotion and affect, Higher education, Mixed-method research, Social aspects of learning and teaching, Social sciences, Survey Research

Interest group: SIG 24 - Researcher Education and Careers

Chairperson: Olga Kasatkina, Université Grenoble Alpes, France

Comparative study of researcher community and support among Finnish and Danish PhD-students

Keywords: Doctoral education, Mixed-method research, Social aspects of learning and teaching, Survey Research

Presenting Author: Søren Bengtsen, Aarhus University, Denmark; **Presenting Author:** Solveig Cornér, University of Helsinki, Finland; **Co-Author:** Jouni Peltonen, University of Oulu, Finland; **Co-Author:** Kirsi Pyhältö, University of Oulu / University of Helsinki, Finland

Prior research has identified social support as a key determinant of the doctoral journey, and supervisory support has shown to have a positive influence on students' persistence and robustness. However, we still know little about cross-cultural variation in the support experienced among PhD-students. This study explores the experienced support of 356 PhD-students within the humanities and social sciences from two research-intensive universities in Denmark (n=145) and Finland (n=211). The data were collected through the *Doctoral Experience*-survey and included Likert-type statements and open-ended questions. The study shows that in the Danish context more PhD-students report being well integrated in the home institution, while in Finland more PhD-students report being encouraged to co-author journal papers and to build up an international profile early on. The findings imply that seemingly similar regional contexts hold important differences in educational strategies at the PhD-level. The study also revealed that PhD-students experience enhanced self-efficacy and researcher autonomy when being away from their home institution on conferences and research stays. This calls for more research into how PhD-students are being supported and develop as researchers when they are away from their home educational environments.

What are the most positive and negative significant events in the doctoral journey?

Keywords: Attitudes and beliefs, Communities of practice, Doctoral education, Higher education

Presenting Author: Eva Liesa, Ramon Llull University, Spain; **Co-Author:** Gabriela González Ocampo, Ramon Llull University, Spain; **Co-Author:** Mariona Corcelles, Universitat Ramon Llull, Spain; **Co-Author:** Maribel Cano, Universitat Ramon Llull, Spain; **Co-Author:** Montserrat Castelló, Ramon Llull University, Spain

Doctoral journey is an emotionally and intellectually intensive process during which doctoral students experience a wide range of positive and negative experiences. Research has extensively explored Ph.D. students' experiences, mainly negatives, but did not focus on identifying what events had a higher impact—either positive or negative—in the doctoral journey. The aim of this study was to explore what were the most significant positive and negative events that doctoral students confront during their doctoral trajectory. We used a cross-sectional interpretative design combining mixed method data analysis. A survey was administered to 1173 doctoral students of different disciplines from 56 Spanish Universities. Results showed that events related with scientific communication, especially receiving expert feedback, were valued as the most positive events having a higher impact on the student's doctoral trajectory. On the contrary, dealing with some affordances and limitations, mainly related to funding, were the most negative. Results also revealed that the relationship with the global research community (research stays, conferences) had a positive impact in their trajectory while relationships with their supervisor were mainly considered as a negative experience. Some events (such as the management of the research) might be considered both as positive and negative depending on support received and discipline. These findings contribute to a better understanding of the doctoral trajectory and provide crucial information to improve the quality of the doctoral programs.

Trust Me! Mapping vulnerability and trust building in doctoral student-supervisor relationships.

Keywords: Collaborative Learning, Culture, Doctoral education, Social aspects of learning and teaching

Presenting Author: Kay Guccione, University of Sheffield, United Kingdom

The value and purpose of the doctoral degree in preparing researchers for careers within and, increasingly, beyond the academy, is coming under scrutiny. Competent leadership, as well as technical and intellectual mentorship is required of supervisors who wish to positively impact on doctoral learning. This study provides insight into perceptions of relationship quality, using a framework of trust. It uses a qualitative approach to examine how doctoral students and supervisors (across disciplines) in UK universities experienced supervisory relationship building and maintenance. All participants noted a role for trust in supervisory relationships, and began with an implicit trust in each other. This implicit trust could be converted over time into a shared professional trust, or it could be eroded, or broken, in response to specific behaviours. Trust development was most likely to be related to defining parameters and finding safe learning environments within a context of uncertainty and unpredictability. Trust was broken largely in response to conflict around seeking third-party opinions, and matters of research integrity. Trust in the supervisory relationship impacts on students' development towards independence and this study maps doctoral vulnerabilities for students and for supervisors and evidences a role for trust-building in creating good quality supervision relationships. It demonstrates that building trust is a fluid process of renegotiation, highlighting critical relational aspects of doctoral development that impact on doctoral learning, development and progression.

The doctoral supervisor journey: experiences and feelings

Keywords: Content analysis, Doctoral education, Emotion and affect, Social sciences

Presenting Author: Gabriela González Ocampo, Ramon Llull University, Spain; **Co-Author:** Montserrat Castelló, Ramon Llull University, Spain

Research has shown that supervisors face tensions and challenges in learning how to supervise. However, little is known about how supervisors perceive their own doctoral journey in terms of the feelings associated to such experience. This study focuses on analysing supervisors' experiences as doctoral students and doctoral supervisors, their relationship, and feelings related to both experiences. Specifically, we looked for the relationships between their experiences as doctoral students and as supervisors. Participants were 61 supervisors of Social Sciences and Humanities (36 women and 25 men). Data were collected using an on-line open-ended survey aimed to explore supervisors' perspectives concerning three issues: 1) their experience as doctoral students, 2) their experience as supervisors, and 3) the feelings associated to both experiences. Aspects related to background information were also requested (age, discipline and years of experience as supervisor). Results indicated that supervisors' experiences throughout their doctoral journey were related to the following aspects: 1) supervisory relationship, 2) learning and agency, and 3) resources and working environment. Furthermore, results showed that supervisors' experiences were associated to feelings of satisfaction, support, and frustration due to high demands.

Session N 2

1 September 2017 15:45 - 17:15

Main Building C - C6

Single Paper

Motivational, Social and Affective Processes

Motivation and Emotion - I

Keywords: At-risk students, Attitudes and beliefs, Educational Psychology, Emotion and affect, Experimental studies,

Higher education, Learning analytics, Mathematics, Motivation and emotion, Parental involvement in learning, Secondary education

Interest group: SIG 08 - Motivation and Emotion

Chairperson: Tim van der Zee, Leiden University, Netherlands

Who are these bored students? Profiles of learning emotions

Keywords: Educational Psychology, Emotion and affect, Higher education, Learning analytics

Presenting Author: Dirk Tempelaar, Maastricht University, Netherlands; **Co-Author:** Alexandra Niculescu, European Respiratory Society, Switzerland

Learning boredom is both a 'silent emotion' (Goetz et al., 2014), as well as one of the most frequently experienced learning emotions (Pekrun et al., 2010). A setting where boredom and other negative learning emotions play a crucial role in learning, is the first year at university, especially in challenging, competitive courses (Niculescu et al., 2015). Yet: not much is known about what learning contexts given rise to boredom, and what students are in particular in danger of getting bored. In this empirical research into the learning experiences of about 6000 first year university students in a business and economics program, taking a challenging course that introduces mathematics and statistics, we investigate profiles of learning emotions, based on the framework of Control-Value Theory of Achievement Emotions (CVTAE; Pekrun, 2006). Latent-class analysis results in six classes that are consistently positioned in the space of learning emotions, with each higher positive emotions and lower negative emotions, with one exception: a single latent class with high levels of boredom and low levels of enjoyment, relative to the other levels of learning emotions. In a subsequent analysis, making use of student learning disposition data generated by an application of dispositional learning analytics (Buckingham Shum & Deakin Crick, 2012), we investigate differences in learning dispositions between the latent classes, and find differences in students' epistemological views, their effort beliefs, expectancy-based learning attitudes, metacognitive regulation, goal setting behavior and learning motivation and engagement. Implications for education are discussed.

Gendered math career expectations: do perceptions of teacher support and expectations matter?

Keywords: Attitudes and beliefs, Mathematics, Secondary education, Motivation and emotion

Presenting Author: Doriane Jaegers, University of Liège, Belgium; **Co-Author:** Dominique Lafontaine, Université de Liège, Belgium

Drawing on the expectancy-value theory (Eccles, 2011) and the three basic dimensions of instructional quality (Klieme et al., 2006), this study tries to understand gendered math career expectations by questioning, on the one hand, some motivational variables (self-concept, self-efficacy, interest, utility, anxiety and effort cost), and on the other hand, students' perceptions of teacher (academic or social) support and teacher expectations in mathematics. The sample consists of 1091 adolescents from 11th grade in French speaking community of Belgium. Results indicated that math self-concept is a critical predictor of math career expectations for girls. Despite the fact that girls perceive more the academic or social support, only their perceptions of teacher expectations could improve their self-concept, area in which there were no gender differences.

Can a dot-probe task reliably detect attentional bias in students with test anxiety?

Keywords: At-risk students, Educational Psychology, Emotion and affect, Experimental studies

Presenting Author: Wendy Symes, University of Birmingham, United Kingdom; **Co-Author:** Dave Putwain, Liverpool John Moores University, United Kingdom

Individuals with a range of anxiety disorders typically display an attentional bias (AB) towards threat-relevant stimuli. Whilst a handful of dot-probe studies have found evidence of AB in students with test anxiety (TA), attempts to replicate these findings have proved difficult. This study examined whether this difficulty is the result of AB being conceptualised as a bias towards, as opposed to away from, threat in dot-probe tasks. Furthermore, it examined how TA itself might interfere with participants' ability to complete the dot-probe task. 191 students participated in this experimental study which compared response times of high and low trait test anxious students in high and low threat conditions. When an absolute measure of AB was used, participants with high TA were more likely to show an attentional bias in a high-threat condition. Furthermore, in the high-threat condition, there was a tendency for those in the high TA group to respond to both threat and neutral stimuli more slowly than in the low threat condition. The findings from this study have important implications for the use of dot-probe tasks to investigate AB in students with TA.

Time perspective development related to importance attached to school by parents and friends

Keywords: Attitudes and beliefs, Parental involvement in learning, Secondary education, Motivation and emotion

Presenting Author: Thea Peetsma, University of Amsterdam, Netherlands; **Co-Author:** Jaap Schuitema, University of Amsterdam, Netherlands; **Co-Author:** Ineke van der veen, Kohnstamm Institute, University of Amsterdam, Netherlands

Students' time perspectives, short and long term, on a school and professional career are well-known as motivator for school, especially for students' motivated learning behavior. As a person's time perspectives develops from early adolescence on, the development of the time perspective will probably be influenced during adolescence by the importance parents and friends attach to school and vice versa. 701 students in the first two years of all academic levels of secondary education in the Netherlands participated in this study: they filled in questionnaires on future time perspectives on a school and professional career five times and two times on perceived importance attached to school by their parents and friends.

The relationships between the developments of time perspectives and the importance attached to school was assessed using multivariate cross-lagged models with Mplus. Multi-group models were estimated to assess differences between students from lowest and highest academic levels of secondary education. The results showed that both parents and friends are important for the development of students' future time perspectives on a school and professional career. There were reciprocal effects in both ways between the long term time perspective and perceived importance attached to school by parents and friends. We found also reciprocal effects between the perceived importance attached to school by friends and students' short term time perspective on a school and professional career. However, the perceived importance attached to school by parents did not predict students' short term time perspective on school and professional career.

Session N 3

1 September 2017 15:45 - 17:15

Pinni B - B1097

Single Paper

Lifelong Learning, Motivational, Social and Affective Processes, Teaching and Teacher Education

Professional Development and Vocational Education

Keywords: Assessment methods and tools, Cognitive skills, Competencies, Educational Psychology, Intelligence, Language (Foreign and second), Lifelong learning, Mathematics, Primary education, Secondary education, Social aspects of learning and teaching, Teacher Professional Development, Vocational education, Workplace learning

Interest group: SIG 14 - Learning and Professional Development

Chairperson: Markus P. Neuenschwander, University of Applied Sciences and Arts Northwestern Switzerland, Switzerland

Professional situation of gifted adults. Career biography, job position and job satisfaction

Keywords: Cognitive skills, Intelligence, Social aspects of learning and teaching, Vocational education

Presenting Author:Kristina Kögler, University of Hohenheim, Germany; **Presenting Author:**Maren Schlegler, Goethe-Universität Frankfurt, Germany; **Co-Author:**Eveline Wuttke, Goethe-Universität Frankfurt, Germany

In recent years, there has been an increasing public and scientific interest in giftedness with a special focus on educational issues. However, research mainly concentrates on gifted children and adolescents. Empirical findings about gifted adults in professional work life are lacking, even though it is a field of particular interest for vocational education, human resource management and organizational psychology. In some studies, authors point to non-linear career biographies of gifted and the risk of social conflicts at the workplace as well as their preference for independent and creative working tasks. The aim of this contribution is to shed light upon the professional situation and career development of gifted adults. A questionnaire on socio-demographics, education, job position, career development and job satisfaction was administered online. The sample consisted of n=227 members of Mensa in Deutschland e.V., the main German association for gifted people and a member of Mensa International, whose members have a tested IQ equal to or larger than 130 points. Descriptive results indicate a very well educated sample of participants who predominantly work in the fields of law and economics, natural sciences, and engineering. One third of the sample is self-employed, only 26.8% have superior positions with responsibility for up to 650 employees. Gifted adults in the sample like their occupations, but often lack the feeling of being challenged adequately. The findings offer a first insight into the professional situation of gifted adults and will be further substantiated by means of interviews.

One-to-one assessment interviews:Building teachers' expertise in understanding mathematical thinking

Keywords: Assessment methods and tools, Mathematics, Primary education, Teacher Professional Development

Presenting Author:Doug Clarke, Australian Catholic University, Australia; **Presenting Author:**Barbara Clarke, Monash University, Australia

In this paper, we outline the benefits to teachers' expertise of the use of research-based, one-to-one assessment interviews in mathematics. Drawing upon our research and professional development work with teachers and students in primary and middle years in Australia and the research of others, we share data which indicate that the use of such interviews builds teacher expertise through enhancing teachers' knowledge of individual and group understanding of mathematics, including misconceptions and preferred strategies, and also provides an understanding of typical learning paths in various mathematical domains. The use of such interviews also provides a model for teachers' interactions and discussions with students, building both teachers' pedagogical content knowledge and their subject matter knowledge. We report briefly on a separate study which indicated that similar benefits were evident to preservice teachers who used the assessment interview with students, and on another study in which teachers used an interview to inform their work with students with Down syndrome.

Vocationally educated graduates moving on from education to the labour market: A systematic review

Keywords: Secondary education, Vocational education, Workplace learning, Lifelong learning

Presenting Author:Eva Vermeire, KU Leuven, Belgium; **Co-Author:**Nele De Cuyper, KU LEUVEN, Belgium; **Co-Author:**Eva Kyndt, KU LEUVEN, Belgium

Entering the labour market is seen as a crucial phase in life, which influences vocational outcomes, career development, and future career success (Koen et al., 2012). Recent graduates should be prepared for this school-to-work transition

because “preparation is a key ingredient to success in transitioning to the world of work” (Akkermans et al., 2015, p. 67). This importance of preparation is also argued by Nicholson (1990) in his transition model as preparation is one of the four transitional phases. Former research indicated the importance of initial education for preparing final year students (Akkermans et al., 2015). Among these students, lower educated graduates experience more difficulties than higher educated graduates when entering the labour market (Akkermans et al., 2015). The difficulties experienced by these lower educated graduates are probably related to different conditions when entering the labour market, such as differences in support in finding a job, required skills according to the employer, and job outcomes (Arum & Shavit, 1995; Kerckhoff, 2002). To gain insight in how education can smoothen the transition of lower educated graduates, the literature is systematically reviewed. More specifically, we analysed the structural factors within education and personal resources of students, investigated in literature, contributing to vocational outcomes within this school-to-work transition. Within this systematic literature overview, we analyse how lower educated graduates are prepared for the school-to-work transition through initial education. More specifically, we analyse the structural factors within education and personal resources of students contributing to vocational outcomes during this transition.

Development of English competency at vocational schools depending on number of lessons and job field

Keywords: Competencies, Educational Psychology, Language (Foreign and second), Vocational education

Presenting Author: Carolin Raetzer, University of Hagen, Germany; **Co-Author:** Kathrin Jonkmann, FernUniversitaet in Hagen, Institut fuer Psychologie, Germany

In-depth knowledge of English is deemed to be one of the basic skills coping job-related and social standards (Tenorth, 2001). Due to the marginal role of English as a subject of instruction at vocational schools in Germany, the commission of enquiry recommended to introduce English as compulsory teaching for one hour. The aim of the study is to investigate the effect of English lessons on the development of English competency attending to the teaching time and the job field. 1236 students of 65 vocational schools completed several tasks at three different measuring times (December 2014, July 2015 and July 2016). Text reconstruction tests (e.g. C-Tests) were used for measuring their current level of English skills. Multilevel regression analyses were conducted because of the hierarchical structure of data with students nested within schools. After controlling for variables on the first level, the analyses revealed evidence for both predictors on school-level to affect differences in students' average performance. Mean English competencies between students with one English lesson a week differed due to vocational field. These differences increase by comparing the second condition with one English lesson a week and the third condition with two English lessons a week. These first findings suggest the importance of implementing English lessons as compulsory instruction at vocational schools to prepare students adequately for their professional career.

Session N 4

1 September 2017 15:45 - 17:15

Main Building A - A32

Single Paper

Learning and Social Interaction, Motivational, Social and Affective Processes

Motivation and Emotion - K

Keywords: At-risk students, Educational Psychology, Emotion and affect, Goal orientation, Higher education, Mathematics, Mixed-method research, Motivation, Motivation and emotion, Self-regulation, Values education, Vocational education

Interest group: SIG 08 - Motivation and Emotion

Chairperson: James Kwan, Lancaster University, Singapore

Motivation, well-being and transactional patterns in the prevention of unqualified academic drop-out

Keywords: At-risk students, Mathematics, Vocational education, Motivation and emotion

Presenting Author: Elke Baten, University of Ghent, Belgium; **Co-Author:** MarieClaire Vandevelde, Ghent University, Belgium; **Co-Author:** Edwin Hantson, Ghent University, Belgium; **Co-Author:** Brigitte Decraene, Ghent University, Belgium; **Co-Author:** Annemie Desoete, Ghent University & Artevelde University College, Belgium

The aim of this study is to investigate the characteristics of students at risk for academic drop-out in vocational education. Therefore, 54 pupils of 9th and 10th grade and 40 of their teachers participated in a large assessment program of the City of Ghent. Measurements of preferential transactional patterns, autonomous vs. controlled mathematical motivation, well-being and fact retrieval mathematics were conducted in the pupils. Intelligence was taken into account as a control factor. For the teachers, preferential transactional patterns were assessed. Results revealed that 58.14% of pupils were motivated by playful contact, whereas only 5% of teachers spontaneously focused on such a playful contact, demonstrating a mismatch. Further, only 10.91% of the pupils had the best qualitative motivation (high autonomous and low controlled motivation), according to the Self-Determination Theory. In addition, for pupils with focus on facts, better mathematical proficiency was found. Finally, the self-esteem among the pupils was low. All these findings might be related to the large rate of early academic drop-out in this particular school. Limitations and educational implications will be discussed.

What types of life purposes do Finnish Bachelor of social service students identify with?

Keywords: Higher education, Mixed-method research, Motivation, Values education

Presenting Author:Niina Manninen, University of Helsinki, Finland; **Co-Author:**Elina Kuusisto, University of Helsinki, Finland; **Co-Author:**Kirsi Tirri, University of Helsinki, Finland

This study identifies the life purposes of Finnish Bachelor of social service students (N = 151) during their studies at Helsinki Metropolia University of Applied Sciences. In their future profession the altruistic aims are considered important in the light of earlier research (Toros & Medar 2015; Liedgren & Elvhage 2015). This is in accord with Damon et al.'s study (2003) in which contribution beyond-the-self is regarded as part of the definition of purpose. The design of the study is a mixed method with both quantitative and qualitative data. The data was gathered with an online questionnaire including Roberts and Robins (2000) life goals instrument and with essays where students wrote about their life purposes. Results are discussed with other earlier purpose and social service studies. The implications of this study can be used to develop education of social service students with an emphasis on purpose in their professional development.

Exploring factors in student engagement that predict low versus high academic performance

Keywords: At-risk students, Educational Psychology, Higher education, Self-regulation

Presenting Author:Sarah Davis, University of Victoria, Canada; **Co-Author:**Rebecca Edwards, University of Victoria, Canada; **Co-Author:**Allyson Hadwin, University of Victoria, Canada; **Co-Author:**Todd Milford, University of Victoria, Canada

Student engagement has been identified as an important factor in academic performance, but research usually does not address the multidimensional aspects of engagement. The purpose of this mixed method case study is to explore specific engagement characteristics distinguishing students who entered the course with low prior academic achievement and remain in the low achievement band versus those who enter with low achievement levels and move into the higher achievement bands. For this study, engagement data comprised two primary sources: (a) learning analytics collected in activity and access logs gathered in a course management system, and (b) quality of "non-graded" SRL engagement in course learning activities. Data sources were organized into five potential indicators of: (a) behavioral engagement, (b) cognitive engagement, (c) emotions experienced during learning, (d) agency or proactive approaches to studying, and (e) overall engagement. Findings indicated that (a) students who moved achievement bands showed higher levels of behavioral engagement, cognitive engagement, agency or proactive approaches to studying and overall engagement and (b) students who remained in the same achievement band showed higher levels of positive deactivating emotions.

Do students' beliefs about errors vary as a function of their achievement goal orientation profiles?

Keywords: Emotion and affect, Goal orientation, Motivation, Motivation and emotion

Presenting Author:Antti Pulkka, National Defence University, Finland; **Co-Author:**Heta Tuominen, University of Helsinki, Finland; **Co-Author:**Maria Tulis, University of Augsburg, Austria; **Co-Author:**Anna Tapola, University of Helsinki, Finland; **Co-Author:**Markku Niemivirta, University of Oslo, Norway

This study focused on how university students' achievement goal orientations are associated with their error-related beliefs and responses. The participants were 145 first year students from the Finnish National Defence University (NDU). Students' goal orientations (mastery-intrinsic, mastery-extrinsic, performance-approach, performance-avoidance, and work-avoidance) and their error-related beliefs and responses (beliefs about learning from errors, affective-motivational adaptivity and action adaptivity of error reactions, error anticipation, and error strain) were assessed at the beginning of their first year in the NDU. Latent class clustering analysis was used to form groups of students based on their motivational profiles, and analysis of variance was used to examine differences between these groups in error beliefs and responses. Four groups of students were identified: mastery-oriented (focus on learning and improvement, 31%), success-oriented (focus on absolute and relative success, 11%), indifferent (no clear goal emphasis, 36%) and avoidance-oriented (focus on avoiding failure and effort, 22%). The goal orientation groups differed from each other on their beliefs about learning from errors as well as on affective-motivational adaptivity and action adaptivity of error reactions. The success-oriented and mastery-oriented students scored highest, especially regarding adaptive learning behavior and metacognitive activities after errors, when compared to avoidance-oriented and indifferent students. There were no significant differences in error anticipation and strain. Our results increase understanding on how students with different motivational profiles interpret and respond to errors.

Keywords: achievement goal orientation, error beliefs, adaptivity of error reactions, person-centred approach

Session N 5

1 September 2017 15:45 - 17:15

Main Building A - A2A

Single Paper

Instructional Design

Instructional Design - F

Keywords: Comprehension of text and graphics, Cooperative / collaborative learning, Educational Psychology, Experimental studies, Instructional design, Learning analytics, Learning approaches, Meta-analysis, Motivation and emotion, Psychometrics, Quantitative methods, Teaching / instruction, Teaching approaches

Interest group: SIG 06 - Instructional Design
Chairperson: Kiran Vanbinst, KU LEUVEN, Belgium

Impact of scientific experiments on students' knowledge – A performance test on geometrical optics

Keywords: Educational Psychology, Instructional design, Learning approaches, Psychometrics

Presenting Author: Sonja Franziska Christina Wenzel, Goethe-Universität Frankfurt, Germany; **Co-Author:** Mark Ullrich, Goethe University Frankfurt, Germany; **Co-Author:** Holger Horz, Goethe-University Frankfurt, Institute of Psychology, Germany; **Co-Author:** Jeremias Weber, Goethe-University Frankfurt, Institute of Physics, Germany; **Co-Author:** Jan Winkelmann, Goethe-University Frankfurt, Institute of Physics, Germany; **Co-Author:** Roger Erb, Goethe-University Frankfurt, Institute of Physics, Germany

In science education, classroom experiments are a broadly known and used teaching method for transferring scientific knowledge to students. To study the impact of experimental situations on physics teaching in detail, a longitudinal research design with various interventions was implemented. Therefore, it is planned to analyze the effects of three different approaches (treatments) on how to implement scientific experiments in physics classes. The talk will describe the planned study in detail, give a short overview concerning the development of a performance test on geometrical optics using models of item response theory and present first findings regarding the impact of different approaches of scientific classroom experiments on students' knowledge of geometrical optics.

Innovative Learning Environments and their impact on learning and instruction

Keywords: Cooperative / collaborative learning, Instructional design, Teaching / instruction, Teaching approaches

Presenting Author: Marian Mahat, The University of Melbourne, Australia; **Co-Author:** Wesley Imms, The University of Melbourne, Australia; **Co-Author:** Clare Newton, The University of Melbourne, Australia; **Co-Author:** Terry Byers, The University of Melbourne, Australia

In recent years, billions of dollars have been invested in Australia and New Zealand for the construction of new and refurbished learning environments in schools. In Australia alone, the Building the Education Revolution (BER) committed \$16.2 billion investment for educational facilities in schools as part of the Australian Government's \$42 billion Nation Building - Economic Stimulus Plan. However, there is scant research to show that innovative learning environments improve student learning and provide value-add to educational outcomes. This paper begins by defining innovative learning environments. The heart of the paper reports on the results of a survey conducted in over 6000 schools in Australia and New Zealand. It provides findings on the type of learning spaces currently available in schools, as well as the teaching approaches and student learning that occur in these spaces. The paper concludes by projecting opportunities and challenges in the use of innovative learning environments to improve learning and instruction in schools. In doing so, it provides the link between research and the advancement of educational outcomes. While pertinent to the Australian and New Zealand contexts, the results have broader relevance to other educational systems and schools.

The Interaction of Learners' Emotional State and Learning with Self-Generated Drawings

Keywords: Comprehension of text and graphics, Educational Psychology, Instructional design, Motivation and emotion

Presenting Author: Sabrina Navratil, University of Mannheim, Germany; **Co-Author:** Tim Kühl, University of Mannheim, Germany

Self-generated learning (SGL-) activities are one way to support learners' comprehension of new learning material. SGL-activities, such as self-generated drawings, foster learners to work more actively on learning materials, which in turn may result in deeper comprehension. One aspect that might affect the effectiveness of SGL-activities is the emotional state. It is assumed that positive emotional states enhance intrinsic motivation, support the use of productive problem-solving and creative learning strategies. This in turn is supposed to be especially beneficial for self-generating tasks. Contrary, negative emotional states seem to lead to rigid, analytical and detail-oriented learning strategies that might be beneficial for already given information, such as text. This study aims to explore an interplay of learning with SGL-activities and learners' emotional state. Students (N = 123) were randomly assigned to one of four conditions, which resulted from a two-factorial design with learning material (drawing vs. no-drawing) and emotional state (positive vs. negative) as independent variables. Emotional state was induced by watching a positive or a negative film segment. Learning outcomes were measured by retention, transfer and a pictorial test. Regarding retention as well as the pictorial test, no significant results were observed. With respect to transfer, learning with self-generated drawings compared to no drawings led to significantly better learning outcomes, and were also perceived as significantly more difficult than no-drawings. The latter results may go along with the notion of so-called Desirable Difficulties, suggesting that learning material that includes challenges leads to a deeper processing and enhances comprehension.

Fostering Diagnostic Competences: A Meta-analysis on two Instructional Approaches

Keywords: Experimental studies, Learning analytics, Meta-analysis, Quantitative methods

Presenting Author: Venance Timothy, Ludwig-Maximilians-Universität (LMU), Germany; **Co-Author:** Frank Fischer, Ludwig-Maximilians-Universität (LMU), Germany; **Co-Author:** Raimund Girwidz, Ludwig-Maximilians-Universität (LMU), Germany; **Co-Author:** Matthias Schwaighofer, Ludwig-Maximilians-Universität (LMU), Germany; **Co-Author:** Nicole Heitzmann, University Munich & Clinics of University Munich, Germany

Diagnostic competences are important in various disciplines. Numerous studies report instructional interventions with the

goal of fostering diagnostic competences. However, it is still unclear with what kind of instructional approach diagnostic competences can be fostered best. A meta-analysis was undertaken to review empirical studies which used interventions to foster diagnostic competences among undergraduate students. Main research questions were whether diagnostic competences can be fostered through interventions and which kind of instructional approach (worked examples vs. problem-solving) would be more effective. A total of 26 studies is included in the sample. The study characteristics were double coded by a second trained person. A random effects model was applied. Results show a medium mean effect size (0.47) that was significant (p

Session N 6

1 September 2017 15:45 - 17:15

Pinni B - B3116

Symposium

Higher Education, Instructional Design, Motivational, Social and Affective Processes

Learning in Higher Education: Instruction and student-related factors

Keywords: Achievement, Emotion and affect, Higher education, Instructional design, Learning approaches, Meta-analysis, Quantitative methods, Quasi-experimental research, Reasoning, Science education, Self-efficacy, Student learning, Teaching / instruction

Interest group: SIG 04 - Higher Education, SIG 06 - Instructional Design

Chairperson: Maja Flaig, University of Trier, Germany

Discussant: David Gijbels, University of Antwerp, Belgium

There is a large body of research that has investigated instruction-related and student-related factors of learning and achievement in higher education students. The symposium demonstrates the width of the research field by reviewing cumulative evidence of instructional methods, as well as presenting exemplary evidence from studies of cognitive and affective characteristics of higher education students that relate to their learning and achievement. The first contribution reviewed meta-analyses and summarized over 3,000 effect sizes of instruction-related and student-related variables for student achievement in higher education. The second contribution reviews the evidence of the flipped learning method in higher education and discusses the findings in the light of other recent advances in the field of science learning and instruction. The third contribution is an empirical study that explores the relations between critical thinking, approaches to learning and self-efficacy beliefs among university freshmen. The final contribution is a longitudinal study that tracks the development of stress levels over the course of one academic year in university students and investigates the relations between stress, coping and protective factors. Overall, the four contributions cover a variety of factors that impact on learning and achievement in higher education students and include learners from a wide range of higher education programs and countries.

Achievement in higher education: A review of meta-analyses

Presenting Author: Michael Schneider, University of Trier, Germany; **Co-Author:** Franzis Preckel, University of Trier, Germany

The number of empirical studies on achievement in higher education has increased sharply over the last 20 years. These findings can provide some orientation with respect to the design of effective courses in colleges and universities. However, most teachers in higher education are not aware of this wealth of empirical findings. We conducted a systematic literature review of 38 meta-analyses reporting 105 correlates of achievement in higher education. These findings are based on 3330 effect sizes obtained with almost 2 million students. We provide a list of the 105 variables, ordered by their effect size, and summary statistics for central research topics. Teachers with high-achieving students stimulate social interaction in the classroom, invest time and effort into planning and organizing their courses, provide clear learning goals and class objectives, give task-focused improvement-oriented feedback, and treat students with friendliness and respect. Instructional technology had comparably modest effect sizes, which did not increase over the past decades. Students in higher education with above-average achievement have high self-efficacy, intelligence, and prior achievement, miss few classes, engage in effort regulation, and use learning strategies in a goal-directed way. Most meta-analyses averaged over experimental and correlational studies, leaving it open whether causal relations are underlying the reported correlations. However, overall, achievement in higher education is well researched and understood. Teachers in higher education can improve the effectivity of their classes by adhering to evidence-based instructional design principles.

Examining the Evidentiary Basis of Flipped Learning

Presenting Author: Manu Kapur, ETH Zurich, Switzerland

In this paper, I argue that the current levels of (over)enthusiasm for and adoption of flipped learning are not commensurate with and far exceed scientific evidence in its favor. I start by examining experimental evidence for flipped learning, only to find that studies that have compared flipped learning with traditional instruction tend to either be largely based on perceptions or fraught with critical confounding factors that severely limit the inferences one can derive from them. I then introduce recent research from the learning sciences to question the very assumption underlying flipped learning and traditional instruction—that is, when teaching novices a new concept, instruction must come first. By leveraging evidence from a number of controlled experimental studies, I argue that the above assumption is indeed flawed. And that, novices

learn more when they are first engaged in generating solutions to novel problems *before* receiving instruction compared to those who receive instruction first.

Critical thinking, approaches to learning and self-efficacy among beginning university students

Presenting Author: Liisa Postareff, University of Helsinki, Finland; **Co-Author:** Heidi Hyytinen, University of Helsinki, Finland; **Co-Author:** Auli Toom, University of Helsinki, Finland

During university studies, students are expected to learn generic academic capabilities necessary for their future work. Critical thinking is one of the crucial capabilities for academic experts in order to be able to work effectively in changing contexts and find solutions for the professional challenges. Even more importantly, critical thinking is a key capability for deep learning and for enhancing one's expertise during the university studies. Self-efficacy beliefs and approaches to learning play an important role as well, although their relationships with critical thinking are not clear. This study explores the relations between critical thinking, approaches to learning and self-efficacy beliefs among beginning educational science students ($n=76$) in a Finnish university. Students have been selected through demanding entrance exams. The self-report data measuring approaches to learning and self-efficacy beliefs and performance-based assessment data of critical thinking skills were analysed with quantitative and qualitative procedures. The results showed that most students applied the deep approach to learning and had high self-efficacy beliefs related to their learning. However, they had great differences in their critical thinking skills as measured by the performance-based CLA task. Three different student groups were identified in the analysis, which showed remarkable differences in the dimensions of critical thinking, but the groups did not differ in terms of the approaches to learning or self-efficacy beliefs. The results indicate that the highly competitive entrance exam does not necessarily guarantee the advanced critical thinking skills. Learning and development of these skills need to be facilitated significantly during university studies.

Protective Factors for Students' Situation-Specific and Situation-General Stress in Higher Education

Presenting Author: Maja Flaig, University of Trier, Germany; **Co-Author:** Michael Schneider, University of Trier, Germany

Stress levels of students in higher education are high, and many potentially stress-inducing demands have been identified. Protective factors, in particular, personal resources, coping strategies, and desirable personality traits, might help students to perceive these demands as resource-activating challenges rather than as threatening stressors. However, previous research on stress in higher education mainly focused on stress levels and stressors so that little is known about students' protective factors. We conducted a correlational study ($N = 240$) and a longitudinal study with two measurement points at the beginning and the end of the academic year ($N = 225$) on how potential protective factors (five types of personal resources, problem- and emotion-focused coping, and the Big-Five personality traits) were associated with stress. High competence, high social support from the family, low emotion-focused coping, and low neuroticism together explained 48% of student stress in higher education modeled as a latent variable. A latent state-trait model had an excellent fit to the longitudinal data and showed that there was a situation-specific and situation-general component of stress. Situation-specific stress was related to situational personal resources and coping, but not to stable trait neuroticism. Situation-general stress was related to trait neuroticism, but not to personal resources and coping. Stress-reduction interventions should monitor and treat situation-general and situation-specific stress separately, for example, by strengthening students' subjective competence and social resources and by reducing emotion-focused coping and, if possible, neuroticism.

Session N 7

1 September 2017 15:45 - 17:15

Pinni B - B3107

Symposium

Motivational, Social and Affective Processes, Teaching and Teacher Education

Alternative Pathways into Teaching & Beginning Teachers Identity Formation

Keywords: Competencies, Engineering, Higher education, In-service teacher education, Motivation, Motivation and emotion, Pre-service teacher education, Qualitative methods, Teacher Professional Development, Workplace learning

Interest group: SIG 08 - Motivation and Emotion, SIG 11 - Teaching and Teacher Education

Chairperson: Hermann J. Abs, University of Duisburg-Essen, Germany

Discussant: Axel Gehrmann, TU Dresden, Germany

Alternative pathways into the teaching profession receive attention in the light of teacher shortages in different European countries due to the ageing of the teacher staff and the difficulty of attracting new personnel to teaching study programs. This symposium's intention is to give insight in four different training programs for second-career teachers in three different countries and to present empirical research about these programs. Two papers analyze the professional identities and motivations of Teach First programs' participants. The Norwegian contribution uses motivational profiles, narratives and interviews with six Teach First participants to explore the construction of their professional identities, coming to the conclusion that this program might face difficulties to recruit trainees who will remain for a longer period of time at schools. Trainees of the same program in Austria were also analyzed by another of the symposium's contribution. Their answers in an online survey were compared with the ones of beginning teachers who followed the traditional path into the teaching profession. The results show that there is a significant difference between the two groups regarding the motivations "job security" and "social responsibility". One submission from Israel examines the professional motives of second career

teaching students and their beliefs about the teaching profession with the help of self-reported surveys, whereas another Israeli paper focusses on a special program which trains engineers as second-career teachers. Using mixed-methods, the researchers analyzed the expectations of engineers who completed this program regarding the contribution of their previous career to their teaching performance.

Teacher “on hold” - Professional identity constructions of Teach First candidates

Presenting Author:Katrine Nesje, University of Oslo, Norway; **Co-Author:**Esther Tamara Canrinus, University of Oslo, Norway; **Co-Author:**Jon Strype, University of Bergen/The Norwegian Police University College, Norway

The primary aim of this study was to explore the construction of professional identities among candidates in the Teach First (TF) programme. We draw upon motivational profiles, narratives and interview data of six Teach First Norway candidates collected during their two-year stay in the TF programme. Findings from this study suggest that TF might be perceived as a place for identity play in which candidates explore possible professional identities. By analyzing TF candidates' conceptions of teaching, experiences of relationships with student and colleagues, and their perceptions of the structural aspects of the school context, this study reveals how the interplay between personal and contextual factors shape the construction of professional identities in a non-binding, time limited educational programme. Our study might have implications beyond TF. Our findings regarding professional identity play, and the factors involved, may apply to candidates in similar teacher recruitment programs, as well as to recruitment programs in other professions in search of subject expertise.

Second career student teachers' intentions, motivations, and perceptions regarding teaching

Presenting Author:Orna Muller, ORT Braude College of Engineering, Israel; **Co-Author:**Ruth Zuzovsky, Kibbutzim College of Education, Israel; **Co-Author:**Smadar Donitsa-Schmidt, Kibbutzim College of Education, Israel

In light of predicted teacher shortages, many countries including Israel have initiated Master of Teaching programs targeting second career candidates. Their unique profile aroused our interest in examining their motives for turning to teaching and their beliefs about the teaching profession. Findings of a longitudinal study with 77 participants of this Master program show the dominance of an altruistic motive followed by an intrinsic and an extrinsic one. Candidates adhere to a middle position between viewing teaching as a technical-rational activity and a reflective practice and view "good" teachers as having a mixture of adequate personality traits, positive human relations and professional performance with an emphasis on personality traits.

Engineers as second-career teachers: Pedagogical perceptions in relation to previous career

Presenting Author:Orna Muller, ORT Braude College of Engineering, Israel; **Co-Author:**Yael Furman Shaharabani, ORT Braude College, Israel; **Co-Author:**Miri Shacham, Ort Braude Academic College of Engineering, Israel

Due to a shortage in high-school teachers in Science, Technology, Engineering and Mathematics, the Ministry of Education in Israel has initiated special programs dedicated to training engineers as second-career teachers. This longitudinal study aims to explore the possible contribution of education and previous career in engineering to teaching as a second-career. The study probes engineers' perceptions and professional development during their first years of teaching in high-school. It follows the transition to teaching of 30 engineers who have completed an intensive pre-service teacher training program. The research tools include questionnaires at the end of the training program and semi-structured interviews with a subgroup of the engineers during their first two years of teaching at the schools. The research shows that engineers bring knowledge and competencies developed throughout their engineering career to their class. Most of the difficulties they experience are common among first-career young teachers, and some refer to teaching of frequently changing topics such as engineering. However, the manners in which they cope with these difficulties strongly relate to their background and do not characterize first-career teachers, including the implementation of non-traditional approaches and autonomous behavior. A deeper understanding of the unique skills and qualities engineers bring with them to school may help in utilizing these skills in promoting engineering education. Moreover, findings also contribute to the adaptation of traditional pre-service teaching preparation programs for engineers in their transition to teaching.

Initial teachers' motivations to become a teacher – Comparing traditional and alternative trainings

Presenting Author:Eva Anderson-Park, University of Duisburg-Essen, Germany; **Co-Author:**Stefanie Morgenroth, University of Duisburg-Essen, Germany; **Co-Author:**Beatriz Antonia Cardoso Matafora, University of Duisburg-Essen, Germany; **Co-Author:**Hermann J. Abs, University of Duisburg-Essen, Germany

The authors examine whether beginning teachers from traditional teacher training programs (control group) and beginning teachers from alternative pathways (intervention group) differ in their motives to become teachers. In the scope of this paper, the authors focus on three motives: “job security”, “social responsibility” and “working with children”. The sample consists of 98 beginning teachers from Austria and represents a subsample of a quasi-experimental evaluation study conducted in 5 European countries comparing traditional and alternative pathways into the teaching profession. Data are analysed using multivariate regression models. A dummy variable for participation in the intervention is included. Results show that for the intervention group “job security” is a significantly less important factor in choosing to become a teacher, whereas “social responsibility” is of significantly higher importance. The motivation of wanting to “work with children” is not effected by participation in the intervention group. However, women find this motive more important in choosing a teaching career than men and the time spent on voluntary work also has a significant effect on the importance of this teacher motive. Possible explanations for the results and limitations of the study are discussed.

Session N 8

1 September 2017 15:45 - 17:15

Main Building D - D11

Symposium

Assessment and Evaluation, Motivational, Social and Affective Processes

Self-assessment: where we are, where to next.

Keywords: Assessment methods and tools, Cognitive skills, Educational policy, Higher education, Meta-analysis, Metacognition, Self-efficacy, Self-regulation, Workplace learning

Interest group: SIG 01 - Assessment and Evaluation

Chairperson: Arttu Mykkänen, University of Oulu, Finland

Organiser: Ernesto Panadero, Universidad Autonoma de Madrid, Spain

Discussant: Philip Winne, Simon Fraser University, Canada

Since the earlier work conceptualizing self-assessment as just self-marking to the latest connections to self-regulated learning, a significant amount of research has been conducted. It is time to a recap what has been achieved, what is known and what are the plausible new directions. The first paper presents a meta-analysis exploring the effects of self-assessment interventions in self-regulated learning and self-efficacy, emphasizing the high impact that self-assessment has in those two variables. More importantly, the paper also addresses future lines of research. The second paper explores one of those new lines: what are the different processes playing a part in self-assessment? Self-assessment has been conceptualized as an activity on its own. However, it can be decomposed into different subprocesses which are explored here. The third paper investigates the relationship of self-assessment implementation in higher education and the development of the subsequent professionals at their workplace. This paper emphasizes the importance of self-assessment as a basic competence that university graduates need to develop. The last paper presents a new term 'evaluative judgments' in which self-assessment classroom practices can be theoretically and practically embedded to avoid some missuses of the term (i.e. self-marking). The authors propose, in connection with the third paper, that using evaluative judgment will empower and develop university students' assessment capabilities. This approach would have a significant impact in how self-assessment is implemented which aligns with previous research pointing out that self-assessment should be a core skill for most educational programmes to enhance students' self-regulated learning.

Self-assessment, self-regulated learning and self-efficacy: A meta-analysis

Presenting Author: Anders Jonsson, Kristianstad University, Sweden; **Co-Author:** Ernesto Panadero, Universidad Autónoma de Madrid, Spain

Research about student self-assessment (SSA) has shown that academic performance tends to increase for students trained in SSA, but also that SSA training may increase the use of self-regulated learning (SRL) strategies. Consequently, there is widespread advocacy for SSA, not least through the "assessment for learning" reform agenda. The educational gains from SSA are suggested to be related to the enhancement of ownership of learning and use of self-regulatory strategies. In addition, SSA has been suggested to support students' self-efficacy (SE). These relationships between SSA and SRL/SE, have been claimed theoretically, but without proper empirical support. This study therefore uses meta-analytic methodology to explore the relationships between SSA and SRL/SE. The 21 studies included in the analysis were found by a database search and meta-analyses were conducted using a random-effect model. Inter-study variance was estimated by the maximum likelihood method. The findings from this study confirms the theoretical connection between SSA and SRL/SE. By training in SSA, students' use of self-regulating strategies for learning increase, while their use of performance/avoidance strategies decrease. SSA interventions also support students' SE (.73), meaning that they have a more adequate perception of their own capabilities. The findings also confirm what has been noted in some of the individual studies on the effects on SRL/SE from SSA interventions that girls tend to benefit more from such interventions, at least in relation to SE.

A cyclical self-assessment process: An analysis of how university students engage in self-assessment

Presenting Author: Zi Yan, The Education University of Hong Kong, Hong Kong; **Co-Author:** Gavin Brown, University of Auckland, New Zealand

While significant progress has been made on understanding the effects of student self-assessment, the inner processes of self-assessment are surprisingly understudied. Previous studies either simply described self-assessment as a package of instruments or tools that could be used to self-assess, or a flow of instruction/learning procedure which is facilitated by self-assessment, but very few have gauged the way in which the self-assessment was conducted. The self-assessment process still remained in a "black box" in literature. This study aims to identify the actions and processes involved in university students' self-assessment in the Hong Kong context. A qualitative method was used to analyse 17 individual interviews of undergraduate students at a teacher education institute. The analysis of the interview data revealed a cyclical self-assessment process which involved three actions including: (1) determining relevant performance criteria against which students build their self-assessment, (2) self-directed feedback seeking regarding the performance from either external (e.g., teacher feedback, previous test scores) or internal (e.g., motivation, emotions) sources, and (3) self-

reflection by which students consider their performance, enhance their understanding of the problem and identify their own strengths and weaknesses. By carrying out these three sequenced actions, students arrived at self-assessment judgments which are subject to continuous calibration and refinement based on various sources of feedback and ought to lead to increasingly accurate or veridical self-assessments. This study helps better understanding of the self-assessment process and shed light on the mechanisms and structures that students use when asked to self-assess.

Self-assessment in tertiary education: Developing ontological awareness

Presenting Author:Gavin Brown, University of Auckland, New Zealand; **Co-Author:**Roseanna Bourke, Massey University, New Zealand

The development of self-assessment tasks into higher education courses involves a conceptual shift of the role and function of assessment for both learners and teachers. This paper explores how self-assessment can be used as an innovative assessment and learning initiative to foreground ontological knowledge and professional identity in tertiary contexts, especially where external professional bodies require additional competencies for learners to be work-ready. As a tool to develop learners' metacognitive strategies such as self-regulation, self-determination and building self-efficacy, self-assessment into tertiary courses challenges views around learning and assessment. The defined task that constitutes 'self-assessment' must be considered for two key reasons. First it is fundamentally a tool to reflect student-staff partnership in learning and assessment if students are positioned as agentic in the assessment process, and second it challenges the relationship between assessment and learning; no longer dichotomous, and more culturally relevant. This paper outlines a case study across three years that explores the impact on tertiary education policy and practice when introducing innovative forms of self-assessment in a post-masterate educational psychology training programme, where developing student-staff partnerships emerge. Through Cultural Historical Activity Theory (CHAT), a framework of analysis that recognizes multiple networks of activity, multi-voiced motives (Engeström, 2009), the question 'what constitutes a self-assessment task?' is addressed. Results show that the development of self-assessment tasks need to be considered in the learning-assessment nexus, and while these forms of assessment initially unsettle students, they participate with an eye on their learning, not the grade.

From student self-assessment to developing evaluative judgement: repositioning a limiting discourse

Presenting Author:David Boud, University of Technology Sydney/ Deakin University, Australia; **Co-Author:**Rola Ajjawi, Deakin University, Australia; **Co-Author:**Joanna Tai, Deakin University, Australia; **Co-Author:**Philip Dawson, Deakin University, Australia

This conceptual paper critiques the ways student self-assessment has typically been used and portrayed in the higher education literature. It identifies the discourse of self-assessment as located within assessment practices. It takes up the journey of one of the key authors in this view as he sought to position and reposition self-assessment and assessment itself in a way that took account of assessment for the benefit of learners in the longer term, that is, beyond the length of any given course. Following a discussion of the limitations of such a positioning, it argues that a more fruitful discourse would place self-assessment as a learning practice within a wider conception of curriculum and pedagogy rather than within assessment as measurement. It builds on Sadler's notion of evaluative judgement to suggest that building the capacity to make effective judgements of one's own work and that of others should be a central goal of any curriculum and that it can be fruitful to locate the pedagogic features of self-assessment as enabling all learning outcomes and equipping students for future practice in any domain.

Session N 9

1 September 2017 15:45 - 17:15

Pinni B - B3110

Symposium

Higher Education

Investigating and designing for situated knowledge in a world of change

Keywords: Action research, Collaborative Learning, Communities of learners, Competencies, Design based research, Distributed cognition, Higher education, Knowledge creation, Philosophy, Reasoning

Interest group: SIG 04 - Higher Education

Chairperson: Niels Dohn, Aarhus University, Denmark

Discussant: Daniel Hickey, Indiana University, United States

The world of today is characterized by diversity, frequent change, and globalization. Humans are therefore required to traverse a range of different settings and to accommodate to a variety of knowledge and competence demands. Often we have to use knowledge, which we have learned in one setting, in new contexts. This goes for both knowledge learnt in education and knowledge learnt more informally in work and other everyday life settings. However, research in practice theory and situated learning has shown that knowledge is situated, i.e. acquires form and content from the context in which it is learnt (Dreyfus, 1979; Lave, 1988). This challenge raises a number of theoretical, methodological, empirical, and practical educational questions. How is situated knowledge transformed across contexts? Can the accomplishment of such

transformations be learned? If yes, how can educators design learning opportunities for others to support them in learning to transform knowledge across contexts? How can these issues be investigated methodologically; what are barriers to their investigation in present-day research practice; and how can these barriers be subverted? This symposium aims to address these questions. Between them, its papers take on the theoretical and empirical questions of what goes on in knowledge transformation; provide an example of practice-based research into ways of facilitating the learning hereof; and discusses methodological issues of how to investigate – and support investigation of – such questions. Dreyfus, H. (1979). *What Computers Still Can't Do*. New York: Harper & Row. Lave, J. (1988). *Cognition in Practice*. Cambridge: Cambridge University Press.

Conceptualizing context, transfer, and transformation

Presenting Author: Stig Børsen Hansen, University of Southern Denmark, Denmark; **Co-Author:** Nina Bonderup Dohn, University of Southern Denmark, Denmark; **Co-Author:** Søren Harnow Klausen, Department of the Study of Culture, Denmark

As noted in the symposium description, a recurrent theme within educational research is the context-dependency of knowledge and learning and the challenges it raises for their transfer. Sometimes, knowledge transformation across contexts is suggested as alternative focus. However, the concepts of context, transfer and transformation are far from clear. In this paper, we provide an elucidation of them. We identify a common core in conceptions of context concerning its functional roles in relation to the focal object (i.e. the phenomenon for which it is context): Context *supplements* the understanding of the focal object, and is *determined relative* to it. The question of knowledge's context-dependency is the question of how knowledge as a focal object is completed by the context. The question of how it transfers or transforms across contexts is the question of whether and how the way it is completed by one context can be exchanged for completion by another context. We identify an internalist and externalist perspective on this question and argue for a reconciliation of them. Our conclusion is 1) Knowledge transfer across contexts will always involve knowledge transformation 2) The transformation may be partial or full; but cannot be conceived of as a metamorphosis 3) It is an empirical question what actually transforms and how; but not a question which agents can necessarily answer 4) It is necessary empirically to study transformational processes both *within* and *across* context-knowledge complexes. Both inform our understanding of how to design for learning to transform knowledge across contexts.

Designing for situated knowledge: methodological issues and more

Presenting Author: Rob Martens, Open University of the Netherlands, Netherlands; **Co-Author:** Maarten de Laat, Open University, Netherlands; **Co-Author:** Steven Verjans, Open University of the Netherlands, Netherlands

When it comes to the type of complex questions such as how to design for situated knowledge, there is a strong need for suitable research methodology to address such complex and interwoven problems. This problem not only occurs in this context (design for situated knowledge), but is an underlying problem of educational research in general. It has to do with (lack of) societal impact and relevance to educational practice (i.e. teachers, schools, etc.), which is the central theme of this conference. Analyses show that a major cause might be the fact that educational science (and social science) in general struggle with research methods capable of dealing with 'complex' and 'realistic' problems, with strongly interwoven variables at different levels of analysis (Kuhl, 2001). Research methods developed to address this problem will be summarized in this paper, but we argue that the availability of such methods (e.g., design-based research) clearly is not enough to solve the underlying issue. Therefore, in a second step, we will also look at the academic research context for possible explanations: its reward systems and publication strategies which are also important pieces of this puzzle. As a case study a recent national initiative in the Netherlands will be described as an attempt to change this reward and evaluation system at universities. It may indeed lead to a strongly improved impact of educational science and solve the (research) issues addressed in this symposium.

Students' transformational practices

Presenting Author: Thomas Ryberg, Aalborg University, Denmark; **Co-Author:** Jacob Davidsen, Aalborg University, Denmark

In this paper we analyse video data and observational data from long-term (3 months), collaborative problem-based project work conducted by groups of Architecture and Design students. The data we draw on encompass more than 100 hours of video data of group work that we approach from both a video ethnographic perspective, as well as an analytic perspective grounded in embodied interaction analysis. We analyse how students engage in a range of transformational practices: How they shift between different modes of knowing and doing for example between digital 3D models, sketches, physical models; How they alternate between digital and physical spaces and create hybrid spaces encompassing and mixing these modalities; How they alternate between thinking, reflecting and modelling in their group room and exploring the real properties of materials, sites and human practices; How the development of their theoretical and practical understandings are mediated by various artefacts, spaces and procedures, but also how their understanding become reified in these. From this we argue that artefacts, spaces and procedures are essential to understanding the transformation of situated knowledge. Thus our analysis contributes with detailed empirically founded perspectives on 'knowledge transformations' that can inform the symposium's wider question of 'designing for situated knowledge in a world of change' and how knowledge is transformed across contexts.

Designing simulated social practices

Presenting Author:Jens Jørgen Hansen, University of Southern Denmark, Denmark; **Co-Author:**Nina Bonderup Dohn, University of Southern Denmark, Denmark

This paper presents the design experiment “Learning for work-life skills in simulated social practice”. We created and tested a learning design aimed at facilitating students in acquiring academic knowledge and skills and transforming these into workplace skills through participation in simulated social practices within the formal university setting. The design experiment involved the MSc course ICT-pedagogics in organizations. The learning objectives of the course were translated into a profile of work-life skills for the profession of an educational designer. Portfolio tasks simulated the use of these work-life skills. Teacher and peer feedback activities supported student learning. The design is focused both ‘horizontally’ (the learning activities relate to other ‘areas’ of the students’ lives) and ‘vertically’ (relation to future contexts of application). The ‘vertical’ learning aspect concerned the students’ engagement in the academic university practices based on the anticipation of tasks and challenges of their future careers as educational designers. The ‘horizontal’ aspect was supported by students’ choice of cases which allowed them to bridge to their out-of-school practices. Throughout the course, the students were encouraged to negotiate the social systems of university practice and of the workplace in relation to each other and to reflect on the knowledge transformational processes involved. Students filled out questionnaires concerning the relevance of work-skills profile, tasks, and feedback activities for their understanding of learning objectives; experience of relevance for employment; achievement of learning objectives; experience of alignment and progression in the course. Responses were positive, especially to impact on understanding of learning objectives.

Session N 10

1 September 2017 15:45 - 17:15

Virta - 112

Symposium

Higher Education

Researching sustainability in higher education – focusing the social science disciplines

Keywords: Attitudes and beliefs, Citizenship education, Cognitive development, Educational policy, Environmental education, Higher education, Qualitative methods, Quantitative methods, Social sciences, Teacher Professional Development

Interest group: SIG 04 - Higher Education

Chairperson: Peter Davies, University of Birmingham, United Kingdom

Organiser: Cecilia Lundholm, Stockholm University, Sweden

Discussant: Gale Sinatra, University of Southern California, United States

This symposium presents recent empirical studies on teaching and learning sustainability in and outside of Europe. The novelty lies in the focus on social sciences in higher education as much research has been concerned with for example engineering education for several years. Education and professional programs in the social sciences such as business, economics, law and political science are among the most attractive for students and are therefore of particular importance and relevance to address. The papers range from studies of pedagogy and sustainability in Chinese business education, outcomes of pedagogy used in entrepreneurship education in the UK, to student learning in economics, law and political science at Swedish universities. The latter presents results from research on the effects of knowledge and values for supporting environmental policy instruments to mitigate climate change. The studies are important for advancing our understanding of teaching and learning sustainability in higher education as well as for advancing educational practice in this field. Furthermore, the symposium brings in to focus the role and relevance of sustainability and higher education in the context of dealing with societal and challenging issues such as climate change.

Teaching sustainability in Economics and Business in China: Implications for transnational education

Presenting Author:Jennie Winter, University of Plymouth, United Kingdom; **Co-Author:**Deborah Cotton, University of Plymouth, United Kingdom

This paper reports on research which investigated the ways in which sustainability is incorporated into Business and Economics curricula in China. The study utilised a culturally sensitive interpretive research strategy involving 30 Faculty in 3 leading Chinese universities. The findings indicate that sustainability is present in Chinese Business and Economics curricula but its inclusion is often at odds with Eurocentric ideas about sustainability education. This is potentially problematic when considering the movement of international Business and Economics students from a Chinese to European study context which is common in these disciplines. The authors suggest points of reflection for European lecturers involved in teaching Chinese students about sustainability themes.

A tale of two ‘educations’: Bringing Entrepreneurship and Sustainability Education into dialogue

Presenting Author:Lynne Wyness, University of Plymouth, United Kingdom

This paper reports on the empirical findings of a research project that explored examples of current best practice in Entrepreneurship Education (EE) and Sustainability Education (ESD) in Higher Education in a national and international context, and asked what pedagogies work best in the cultivation of enterprising and sustainability-literate graduates in the respective fields. It argues that a dialogue between these two diverse educations would be beneficial, by inspiring and

informing pedagogical innovations in each field that might support students in their acquisition of those 21st century skills, knowledges, and attitudes deemed essential for the creation of a more sustainable and socially just future.

Trust in government? Investigating trust and value orientations for environmental policy support

Presenting Author:Cecilia Lundholm, Stockholm University, Sweden; **Co-Author:**Tomas Torbjörnsson, Stockholm University, Sweden; **Co-Author:**Niklas Harring, University of Gothenburg, Sweden

In this study we investigate how trust in the state and value orientations among Swedish students (N = 1 923) are related to their attitudes to different environmental policy instruments. A questionnaire with items measuring i) altruistic, biospheric and egoistic value orientation, ii) trust in the state, and iii) attitudes to environmental taxes, regulations and subsidies was answered by the students in the very beginning of their education. Statistical analyses revealed that biospheric value orientation was the strongest predictor of positive attitudes to all environmental policy instruments, but also, which we believe is important to highlight, that trust in the state is a moderating the effect of biospheric value orientation on the level of support for environmental policy instruments. These findings underline that addressing societal trust may be an important aspect of environmental education.

Knowing 'social dilemmas' – effects on willingness to sacrifice and accept environmental regulation

Presenting Author:Niklas Harring, University of Gothenburg, Sweden; **Co-Author:**Cecilia Lundholm, Stockholm University, Sweden

There is a debate on whether education can be a way to generate more civic norms. Where some argue that higher education within disciplines such as economics and political science can have a negative effect on such norms. Lecturers of take as a point of departure concepts such as “tragedy of the commons”; “social dilemmas” or “collective action problems”, where societal problems, such as environmental degradation is described in terms of coordination problems. Individuals are unable to coordinate themselves, since the (short-sighted) individual rationality is at odds with collective rationality. In this article we investigate what that knowledge actually does to students own willingness to make sacrifices for environmental protection? We make use of a unique dataset of Swedish college students, and surprisingly find that students with better knowledge about collective action problems are more prepared to make own sacrifices for environmental protection. They are also more likely to support an increased tax on carbon dioxide. We elaborate on why this may be the case and propose ideas for future research.

Session N 11

1 September 2017 15:45 - 17:15

Linna - K103

Symposium

Learning and Special Education

Students' Difficulties with Algebra: Causes and Solutions

Keywords: Cognitive development, Conceptual change, Developmental processes, Educational Psychology, Learning and developmental difficulties, Mathematics, Misconceptions, Primary education, Quantitative methods, Secondary education

Interest group: SIG 03 - Conceptual Change

Chairperson: Jake McMullen, University of Turku, Finland

Discussant: Jon Star, Harvard University, United States

Research at the intersection of educational psychology and mathematics education has recently been focused on issues related to fraction and decimal learning, providing a much needed perspective on learning and instruction surrounding these topics. In contrast, algebra learning and teaching lacks a strong unified research agenda in the EARLI community, despite the importance of algebra learning to later achievement in academic and non-academic areas of life. To remedy this, the proposed symposium brings together a collection of studies which examine the students' difficulties with algebra, and the potential causes and solutions for differing outcomes. First, understanding literal symbols and the mathematical objects they represent is a fundament component of learning algebra, yet students face many difficulties in interpreting what these symbols represent, as described by Christou. Trezise and Reeve expand upon this work by looking more inclusively at how the aspects of algebraic equivalence and negative numbers are stumbling blocks in students' algebra development. McMullen and Lehtinen put these difficulties in a broader context by outline potential pathways to success in examining the structures of students' procedural and conceptual knowledge of algebra. Finally, Ziegler and colleagues show that it is possible to provide strong instructional support for students in learning about complex features of algebra, in which students often face severe difficulties. Based on his boundary-crossing, extensive research on algebraic development, discussant Jon Star will then synthesize these findings and provide a coherent outline for the future of research on algebra development in the field of learning and instruction.

Stumbling blocks in algebra: Difficulties with equivalence and negative number concepts

Presenting Author:Kelly Trezise, The University of Melbourne, Australia; **Co-Author:**Robert Reeve, University of Melbourne, United Kingdom

An understanding of equivalence and negative number is crucial for algebraic reasoning. Surprisingly little research however has examined the ways in which different mathematical representations of these two concepts affect algebraic

problem solving. We conducted three studies to better understand how variations in algebraic equation representation involving the two concepts affect the ability to solve equations. In each study, students solved five types of linear algebraic equations that differed in complexity with respect to the “structural” properties of equations (i.e., $x+b=c$, $ax+b=c$, $-ax+b=-c$, $-a=-bx+c$, $-ax+b=-cx+d$). Study 1 showed similar levels of algebraic abilities in 13- and 14-year-olds, with both ages experiencing difficulties with negative signs and equations with an increasing number of operations. Study 2 showed 14-year-olds’ algebraic problem solving abilities remained stable: their problem solving abilities did not change over the school year. Study 3 showed while 14-year-olds’ had begun to acquire a more sophisticated understanding of equivalence, their understanding of the negative sign remained limited. Together, the three studies showed adolescent students do not improve in their ability to solve equations that demand a more detailed understanding of equivalence and the negative sign. The findings highlight students’ difficulties with two core algebraic concepts and the need for research to better understand the nature of these difficulties.

The Natural Number Bias Also Affects the Representational Form of Arithmetic Operation Results

Presenting Author:Konstantinos Christou, University of Western Macedonia, Greece

Most students face great difficulties understanding algebra. This often stems from inappropriate use of their knowledge of natural numbers when reasoning about non-natural numbers, a phenomenon characterized as Natural Number Bias. The current study focuses on a certain aspect of this bias, namely the way it influences students’ intuitions about the result of each arithmetic operation. All previous studies in this field focused exclusively on the size of the results of each operation and the main finding was students’ tendency to think that addition and multiplication result in numbers bigger than the initial numbers, while subtraction and division result in smaller numbers. The current study goes one step further to also investigate the kind of the result of the operations, meaning students’ tendency to expect results of the same number representation as the operand numbers, i.e., that operations on natural numbers should result in natural numbers, and operations on rational numbers should result in rationals. A paper-and-pencil test, was administered to 91 7th and 8th grade students, from a Greek public school. The results indicated a strong effect of the Natural Number Bias not only considering the size but also the kind of the results of operations. The students showed strong tendency to think that multiplication result in bigger numbers while division in smaller, and also, that operations on natural numbers result in natural number, and operations on decimal numbers decimal numbers result in decimal numbers. The ways this phenomenon affects learning algebra will be discussed.

Confronting confusion of similar algebraic concepts by teaching multiplication before addition

Presenting Author:Esther Ziegler, ETH Zurich, Switzerland; **Co-Author:**Peter Edelsbrunner, ETH Zurich, Switzerland; **Co-Author:**Jon Star, Harvard University, United States

A main difficulty in students’ algebra learning is the prevalent confusion of similar concepts, as for example addition and multiplication of expressions. The instructional order often follows the operation signs from addition to multiplication. Another frequent order is to follow complexity of concepts, starting with the simpler ones. These two orders do not always match. In arithmetic, addition is introduced before multiplication because it is the simpler concept. In algebra, introducing addition before multiplication is also the common order, but here the complexity is reversed. We examined whether reversing the complex-first order (addition-before-multiplication) to the counterintuitive order (multiplication-before-addition) facilitates learning. We also examined a third condition of simultaneous introducing of addition and multiplication problems. A total of 138 sixth-graders participated and were randomly assigned to the conditions: complex-first, simple-first, and simultaneous. Differences were found between the results on the more complex and the simpler problems. On the more complex addition problems, the simultaneous and simple-first conditions performed equally well, but both better than the complex-first condition. On the simpler multiplication problems, differences were only found in the 3-month delay with an outperformance of simultaneous processing over both sequential conditions. Summarized, we have shown learning benefits by reversing the instructional order without changing instruction or material. To deal with complex concepts, two beneficial ways appear to exist: a simultaneous or simple-to-complex approach. To deal with simpler concepts, the key is contrasting, as it guides students’ attention to crucial points of material initially felt as being easy.

Individual Differences in Procedural and Conceptual Knowledge of Algebra

Presenting Author:Jake McMullen, University of Turku, Finland; **Co-Author:**Erno Lehtinen, University of Turku, Finland

The debate surrounding the effects of procedural or conceptual knowledge on mathematical development has had a strong effect on the focal points and methods of mathematical education research. This large body of research has uncovered inconsistent findings about how procedural and conceptual knowledge impact mathematical development. Recent research on the learning of fractions has suggested that there may be inter-individual differences in the relative weight placed on procedural and conceptual knowledge, which may explain the inconsistencies in previous findings. In order to investigate the possibility of inter-individual differences in procedural and conceptual knowledge further, the present study applies this question to algebra learning. Results from 240 Finnish students in grades 7 to 9 indicate that there were indeed substantial individual differences in their relative strength of procedural and conceptual knowledge of algebra. A Latent Profile Analysis revealed that some students had relatively more procedural knowledge than conceptual (21%), others had relatively more conceptual knowledge than procedural (9%), while most students had fairly even levels of knowledge, many with lower levels (60%) and a few with higher levels (10%) of both procedural and conceptual knowledge. Group level differences revealed that at the intermediate level there was little difference between those students who relied more heavily on

procedural knowledge and those who relied on conceptual knowledge on a test of their mathematics performance on a related topic.

Session N 12

1 September 2017 15:45 - 17:15

Pinni B - B3111

Symposium

How Do Learners Understand Scientific Disagreement and What Do They Do About It?

Keywords: Argumentation, Developmental processes, Metacognition, Reasoning, Science education

Interest group: SIG 26 - Argumentation, Dialogue and Reasoning

Chairperson: Eva Thomm, University of Erfurt, Germany

Organiser: Sarit Barzilai, University of Haifa, Israel

Organiser: Clark Chinn, Rutgers University, United States

Discussant: Barbara Hofer, Middlebury College, United States

Diversity of ideas and dissent have long been hallmarks of science. However, with the spreading use of the Internet, public exposure to scientific disagreement has dramatically increased. Hence, there is growing awareness that learners require skills for comprehending and evaluating conflicting scientific claims, arguments, and evidence. The goal of this symposium is to advance understanding of the psychological and discursive resources that learners employ to comprehend and resolve scientific disagreements. Better models of how learners deal with disagreement can inform the design of instruction promoting productive engagement with disagreements. The contributions to this symposium share a dual perspective of scientific disagreement both as a contemporary educational challenge and as an opportunity to improve learners' reasoning and argumentation. The first two papers focus on learners' understandings of the causes of disagreement. Weinstock and Israel demonstrate that development of interpretive theory of mind underlies understandings of how people come to disagree about questions of fact. Barzilai, Thomm, and Bromme show that students have a range of explanations of scientific disagreement that they apply adaptively in light of the specific controversy and their epistemic stances. The second two papers examine learners' engagement with disagreements during classroom discourse. Zimmerman, Av-Shalom, Chinn, and Duncan investigate how students discuss and resolve disagreements during science inquiry. Iordanou and Kuhn examine the effects of an argumentative intervention on how students deal with scientific disagreements. Collectively, the papers argue for the value of addressing scientific disagreement and point to specific student strengths and challenges that could be addressed instructionally.

Children's Developing Understanding of Interpretation as a Source of Disagreement

Presenting Author: Michael Weinstock, Ben-Gurion University of the Negev, Israel; **Co-Author:** Vardit Israel, Ben-Gurion University of the Negev, Israel

Children's attainment of theory of mind is commonly assumed to be the watershed moment in understanding the role of interpretation as a source of knowledge and disagreement between knowers. In the false-beliefs task, 4-5-year-old children recognize that someone with incorrect information will form a different belief about an event than someone with correct information. Disagreement is understood to arise when there are two sets of "facts," one associated with a real event and the other with a different event mistakenly assumed to be real. However, disagreements also arise when people have information about the same event. With a truly interpretive theory of mind, attained at about age 7, children understand that people might disagree because they interpret the same information differently. Disagreement is understood as a possible product of the mind's active, interpretive processes in knowing. This longitudinal study investigates the relationship between the attainment of interpretive theory of mind and understanding that disagreement might arise from how different people create their knowledge-bases and interpret information. 227 children, ages 5-10, were assessed over three years for interpretive theory of mind. They also responded to a story in which two experts disagreed about a biological phenomenon. A quantitative analysis found that attainment of interpretive theory of mind predicted the developing understanding of the nature and sources of discrepant accounts. Qualitative analyses showed that developing understandings of more than one possible perspective on a question of fact was related to attributing interpretive processes as a source of experts' discrepant accounts.

Adaptively Explaining Scientific Disagreements

Presenting Author: Sarit Barzilai, University of Haifa, Israel; **Co-Author:** Eva Thomm, University of Erfurt, Germany; **Co-Author:** Rainer Bromme, University of Münster, Germany

Prior research has identified several categories of lay explanations for disagreements among scientists. The aims of the present study were to examine (1) if students adapt their endorsement of conflict explanations to the information provided about the dissenting scientists, (2) whether such adaptation of conflict explanations is related to students' epistemic perspectives regarding the nature of knowledge and knowing, and (3) if conflict explanations predict subsequent decision making. In an experimental within-subject design, university undergraduates responded to an epistemic thinking assessment and then read three scenarios of scientific disagreements in which information about scientists' areas of expertise, methodologies, and benevolence was manipulated. Following each scenario, participants rated the credibility of the scientists, reported claim agreement, and rated conflict explanations. The findings revealed that participants generally

adapted their conflict explanation to differences in scientists' backgrounds. Nonetheless, evaluativist views of knowing were associated with stronger emphasis on explanations involving scientists' areas of expertise and interpretation of data. Thus awareness of the constructed nature of knowledge might increasingly sensitize students to differences in researchers' theoretical approaches and interpretations as possible reasons for disagreement. Endorsement of conflict explanations was found to predict claim agreement directly as well as indirectly through perceptions of researchers' credibility. The findings suggest that to make sense of scientific controversies learners require familiarity with a range of possible conflict explanations as well as the capacity to adaptively apply these explanations to the specifics of the controversy in question.

Disagreement Discourse and Resolution Strategies in a Middle School Science Classroom

Presenting Author:Randi Zimmerman, Rutgers University Graduate School of Education, United States; **Co-**

Author:Na'ama Av-Shalom, Rutgers University Graduate School of Education, United States; **Co-Author:**Clark Chinn,

Rutgers University, United States; **Co-Author:**Ravit Golan Duncan, Rutgers University, United States

Through argumentation, students achieve a deeper understanding of scientific models and explanations and how these are supported by evidence (e.g., Sandoval & Millwood, 2005). However, students often avoid sustained argumentation (Authors, 2013) because of discomfort with direct disagreement with their peers (Nussbaum & Bendixen, 2003), failure to appreciate argumentation as a reliable means to achieve knowledge (Authors, 2014), or underdeveloped skills in engaging in productive argumentation. Disagreement is typically at the heart of productive dialogic argumentation in science. In this study, we examine disagreements during classroom discourse. We selected seventeen transcripts of class periods that included prompts intended to foster argumentation. Seventy episodes of disagreement were identified in these transcripts. We were able to identify and describe a variety of classroom approaches to disagreement, who is involved, what students disagree about, and when these disagreements are taken up and sustained. We also found that more than half of all disagreements ended when the teacher changed the topic. Our results suggest that teachers have an important role in disagreements during classroom inquiry. We also show that students attend to the reliability of science methodologies, which often become the topics about which they disagree. Teachers may be able to promote productive discourse by allowing disagreements to continue for longer period of time and providing opportunities for students to disagree about high and low quality reliable processes of scientific inquiry.

The Effect of an Argumentative-Based Intervention on How Learners Deal with Disagreement

Presenting Author:Kalypso Iordanou, University of Central Lancashire, Cyprus; **Co-Author:**Deanna Kuhn, Columbia University, United States

The aim of the present work is to examine the effect of engagement in an argumentative-based activity about a controversial socio-scientific topic on how elementary school students deal with scientific disagreements. We particularly examined the effect of engagement in an argumentative activity, where students had discussions with peers who held either the same opinion as themselves – collaborative condition – or an opposing position – adversarial condition. 83 5th and 6th graders engaged in an argumentative curriculum over nine 90-minute sessions. Students' individual argument skills were assessed at both initial and final assessments through written essays on a non-intervention topic. Results showed that students in the adversarial condition increased the use of evidence from initial to final assessment. No change was observed in evidence use in students in the collaborative condition. The majority of evidence used served to support students' own position. Our findings show that engagement in adversarial argumentation is a promising pathway for developing an appreciation of the role of evidence.

Session N 13

1 September 2017 15:45 - 17:15

Virta - 109

Symposium

Educational Policy and Systems

Effects of early childhood education with high-risk-families: New directions for public policy

Keywords: At-risk students, Developmental processes, Early childhood education, Educational policy, Experimental studies, Parental involvement in learning, Quasi-experimental research

Interest group: SIG 05 - Learning and Development in Early Childhood

Chairperson: Andrea Lanfranchi, University of Applied Sciences of Special Needs Education, Switzerland

Discussant: Andreas Eickhorst, Germany

Early intervention programs with high-risk families aim at increasing educational opportunities by providing children with early support from birth onwards. The goal is to improve parenting behavior by invigorating their awareness of child development, and their own attitudes and feelings towards the child. Intervening early in a child's life has been shown to be effective from a biological and economic perspective (Bull et al, 2004; Heckman & Masterov, 2006). The evidence base was initially restricted to a small number of US studies. Notwithstanding, Europe is catching up, and in the last five years some European programs have been implemented and systemically evaluated (Jungmann et al., submitted). The findings suggest that early intervention can significantly improve developmental outcomes. There is also some evidence that the programs raise the efficacy of parental investment by improving the quality of the home environment and parenting skills. However, the problem is now not to provide scientific evidence, but to ensure the continuity of the programs after the

research, i.e. to implement the programs into the public systems of child welfare and family support (see Pianta et al., 2009; Gormley, 2011). The question is: how to convert scientific results into political decisions? How to promote the use of research by public officials? Generating evidence about early interventions requires a longer-term research funding perspective. Furthermore, replication and accumulation of trial findings remains important. Dealing with negative or conflicting trial results in the interim is a policy challenge which researchers should pay an active contributing role.

Facilitating Linguistically Diverse Parents to Enhance Toddler's Vocabulary Development

Presenting Author:Rosa Teepe, Radboud University Nijmegen, Netherlands; **Co-Author:**Inge Molenaar, Radboud University Nijmegen, Netherlands; **Co-Author:**Ludo Verhoeven, Radboud University Nijmegen, Netherlands; **Co-Author:**Ron Oostdam, University of Amsterdam, Netherlands

AimsThe aim is to investigate effects of a Dutch FLP on linguistically diverse children's vocabulary, specifically curriculum-based and general vocabulary. Moreover, we investigate additional effects including technology-enhanced activities in a FLP. **Theoretical background**Vocabulary knowledge in preschool children is essential for expressing themselves and communicating with others, and is related to later academic success. At this young age, vocabulary develops mainly informally via parent-child interaction and both the quantity and the quality of this interaction are important for a rich vocabulary. Acknowledging the influence of parents, FLP's aim to promote vocabulary of linguistically diverse children by supporting parent-child interaction. Nowadays, FLP's also contain technology-enhanced activities that include real-time interaction support. **Method**Using a quasi-experimental pre-post-test between subjects design, 223 preschool children (2;6-3;4 years of age) and their parents were followed over a school year. 145 parent-child dyads participated in the FLP and 78 dyads formed a no-treatment control group. 73 dyads in the FLP condition were additionally provided a technology-enhanced storytelling activity. **Findings**Preliminary analysis suggest that children in the FLP condition made greater curriculum-based vocabulary progress than children in the control condition. Technology enhanced storytelling activities did not lead to additional effects on vocabulary. However, large standard deviations indicate that the further planned multilevel analyses should pay attention to the diversity and complexity (multilingual, educational background) of the sample.

Conclusions for policy

When investing in family support, the government should consider that municipalities and families differ in their need and approach for support.

The prevention dilemma in early interventions: How to recruit and randomise at-risk families?

Presenting Author:Alex Neuhauser, University of Applied Sciences of Special Needs Education, Switzerland; **Co-Author:**Erich Ramseier, PHBern – University of Teacher Education, Switzerland; **Co-Author:**Simone Schaub, University of Applied Sciences of Special Needs Education, Switzerland; **Co-Author:**Susan C.A. Burkhardt, University of Applied Sciences of Special Needs Education, Switzerland; **Co-Author:**Andrea Lanfranchi, University of Applied Sciences of Special Needs Education, Switzerland

AimsPresentation of a concept for the recruitment of families in psychosocial at-risk situations in a randomised controlled trial (RCT) using the example of the Swiss ZEPPELIN 0-3 project. **Theoretical background**It is often found that the targeted population group with a strong need for prevention, in particular families with a migration background, only rarely participates in early interventions. This prevention dilemma is especially obvious when it is unclear whether the family will get support or not by the time they give consent for participation – as in RCTs. **Methods**ZEPPELIN is a longitudinal intervention study evaluating effects of the Parent as Teachers program (PAT) at three sites in the canton of Zurich, Switzerland. Families were recruited during one year and afterwards randomly assigned to the intervention (137 families) and control group (118 families) by stratified block randomisation. After baseline data collection, children's outcomes were assessed annually until three years of age. **Findings**Results show that the targeted number of 252 recruited at-risk families was met. Randomisation was successful regarding crucial characteristics like sociodemographic characteristics or stress constellation. Moreover, several significant intervention effects were found, mainly on the learning environment at home and language development. Educational significance of the researchZEPPELIN demonstrates how to realise a highly complex RCT intervention study with at-risk families – particularly with migration background. **Conclusions for policy** High standard evaluation studies in families with the highest need for prevention require a high effort, but are essential for policy decision making regarding educational opportunities.

Effects of the German NFP adaption "ProKind" on mothers and children: Policy implications?

Presenting Author:Andrea Lanfranchi, University of Applied Sciences of Special Needs Education, Switzerland; **Co-Author:**Verena Daehne, University of Leipzig, Child and Adolescent Psychiatry, Psychotherapy, and Psychosomatics, Germany; **Co-Author:**Tanja Jungmann, University of Rostock, Germany; **Co-Author:**Tilman Brand, Leibniz Institute for Prevention Research and Epidemiology – BIPS, Bremen, Germany

Aims: Evaluation results of an adapted version of the NFP program in Germany. **Theoretical background:** The home visiting program "ProKind" offered support for socially and financially disadvantaged first-time mothers from pregnancy until the children's second birthday in three German federal states. **Methods:** A multi-centered, longitudinal randomised controlled trial (RCT) was conducted to assess program effectiveness. A total of 755 women with multiple risk factors were recruited, 394 received regular home visits (treatment group), while 361 only had access to standard community services (control group). **Findings:** ANOVAs with repeated measures showed small benefits over time for the home-visited mothers regarding parental self-efficacy, knowledge on child rearing, feelings of attachment, parenting style, and social support. No program

effects on child development were detected. Positive changes over time in maternal feelings of attachment were associated with a better quality of the helping relationship, lower risk status, and younger age. Educational significance of the research: In comparison to other rigorously evaluated programs with a home visiting component, "ProKind" is among those 50 % with an impact on at least one outcome domain. In line with most European NFP adaptations, our program effects were few and small in magnitude. Conclusions for policy: In states offering liberal and high-quality public health insurance coverage for families, such as Germany, early interventions may not be able to produce large or various effects on mothers and children. Thus, home visitation should be linked with and adapted to existing social and health care services.

Generating evidence and informing policy: The Building Blocks trial of the FNP in England

Presenting Author: Michael Robling, Cardiff University, United Kingdom; **Co-Author:** Julia Sanders, Cardiff University, United Kingdom; **Co-Author:** Rebecca Cannings-John, School of Healthcare Sciences, Cardiff University, United Kingdom

Aims To assess the effectiveness of a nurse-delivered home visiting programme in England. **Theoretical background** Supporting teenage mothers to achieve a healthy pregnancy, successful parenting and socio-economic stability is a policy priority. The Family Nurse Partnership (FNP) provides intensive support to young mothers in selected areas of England. FNP comprises up to 64 structured home visits by Family Nurses during pregnancy and until the child's second birthday. **Methods** Building Blocks investigated the effectiveness of offering FNP, in addition to usual care, at 18 sites. Participants were nulliparous, aged under 20 and recruited before 25 weeks gestation. Following randomisation data were collected from mothers at baseline, late pregnancy, and 6, 12, 18 and 24 months postpartum. Primary outcomes were tobacco use at late pregnancy, birth weight, second pregnancy by two years postpartum and emergency hospital episodes for the child. Secondary outcomes included measures of pregnancy and birth, child health and development, and parental life course. **Findings** 1645 women were recruited. There were no group differences for any primary outcome with high rates of smoking at late pregnancy (56%) and of second pregnancy (66%) in both study arms. Some secondary outcomes suggested small positive programme impacts. **Educational significance of the research** In contrast to previous US-based evaluations, the short-term evidence provides only limited support for FNP in England. **Conclusions for policy** When an effective early years intervention is expanded into areas of different geography, culture or usual care provision, generalisability of benefit cannot be assumed. Instead further and longer-term evaluation is required.

Session N 14

1 September 2017 15:45 - 17:15

Main Building E - E301

Symposium

Teaching and Teacher Education

Professional learning communities in primary education: results from four (multiple) case studies

Keywords: Action research, Case studies, Collaborative Learning, Communities of learners, Cooperative / collaborative learning, Early childhood education, Literacy, Parental involvement in learning, Primary education, School effectiveness, Social interaction, Teacher Professional Development

Interest group: SIG 14 - Learning and Professional Development

Chairperson: Isil Sincer, Erasmus University Rotterdam, Netherlands

Organiser: Eke Krijnen, Erasmus University Rotterdam, Netherlands

Organiser: Marina Iliás, VU University Amsterdam, Netherlands

Discussant: Geert Devos, Ghent University, Belgium

Professional learning communities (PLCs) are considered by many researchers as a promising tool to realize sustained school improvement (Hargreaves & Fullan, 2012; Lomos, Hofman, & Bosker, 2011). In a PLC, educational professionals engage in a collective, ongoing reflexive enquiry into their own and colleagues' teaching practice in order to improve the school's practice with the final aim of fostering students' learning (Lomos et al., 2011). Other individuals who are involved in the school, such as parents, may also be included in a PLC (Bolam, Stoll, & Greenwood, 2007). Though the research on PLCs is growing rapidly, insight into the functioning of PLCs in day-to-day practice of schools is limited (Lomos et al., 2011). Moreover, little is known on how PLC-characteristics, such as a reflective dialogue, can be stimulated by interventions in the school. The aim of this symposium is to deepen our understanding of the functioning of PLCs in elementary schools. By using qualitative (multiple) case study methodology, the presentations in this symposium analyze different aspects of PLCs in the context of primary education. The functioning of PLCs in a school's day-to-day practice is the topic of the first half of the symposium, focusing on collaborative teacher learning and the organization of teamwork. PLC-interventions including parents form the topic of the second half of the symposium, focusing on the working process of a PLC with the aim of sustaining a school innovation and on the specific role parents can fulfill in a PLC.

Collaborative teacher learning: Individual and shared perceptions

Presenting Author: Jannet Doppenberg, Eindhoven University of Technology, Netherlands

This study aimed to obtain a detailed and diverse picture of collaborative teacher learning during moments perceived by teachers as powerful for learning. A case study was conducted, within which primary school team meetings were observed across a period of eight months. In addition, questionnaires and interviews were conducted with participating teachers

regarding the learning moments in the particular meetings. Results showed that the collaborative teacher learning processes varied depending on the collaborative activity observed and the degree of agreement and recognition between teachers with regard to the topic interacted on. Four types of interactions could be identified, with different interaction processes and different patterns of individual learning processes. These patterns concerned both observable and non-observable activities as well as outcomes. Moreover, teachers' individual learning processes showed similarities as well as differences.

Teamwork as a tool for collaboration and professional development

Presenting Author:Birna María Svanbjörnsdóttir, University of Akureyri, Iceland

The main line of inquiry was on how school leaders and teachers used teamwork in developing a professional learning community (PLC) in a new compulsory school in Iceland. The emphasis in the school was to develop a school policy that focused on learning in all levels, involving students, teachers and paraprofessionals. The research was developed in the form of a practical action research project for 3 ½ years, focusing on local practice in the school and designed in plan, do, reflect and act cycles. I became a critical friend with the school leaders as leadership has shown to be a strong driver for school improvement and they supported the staff. I reflected with them and collected all the data needed to explain and connect activities in the school to find out what contribution teamwork made to build up a PLC when school leaders provided support through their leadership. Collaboration is a critical issue in school as it can improve practice that can support student achievement. Goal-oriented teamwork can be a useful tool in building a PLC as a forum for collaboration and shared practice. The main focus in the presentation is on how the school improved teamwork as a tool for collaboration and professional development towards a PLC.

Professional learning communities aiming to sustain the implementation of a family literacy program

Presenting Author:Eke Krijnen, Erasmus University Rotterdam, Netherlands; **Co-Author:**Roel Van Steensel, Erasmus University Rotterdam / VU University, Netherlands; **Co-Author:**Marieke Meeuwisse, Erasmus University Rotterdam, Netherlands; **Co-Author:**Sabine Severiens, Erasmus University Rotterdam, Netherlands

Many schools encourage parents to support their children's literacy development at home, with the aid of a *family literacy program* (FLP). Research on whether and how schools sustain FLPs is scarce, though in establishing educational partnerships with parents sustainability is a crucial factor. It is assumed that sustainable innovation is easier to achieve in schools that function as so called *professional learning communities* (PLCs), in which educational professionals work and learn together to improve pupils' learning. In the current project, PLCs focusing on the implementation of a FLP are established in four schools, to improve sustainable implementation of the FLP. The current study investigated firstly whether characteristics of a PLC were observable in the intervention process after one year, secondly which elements of the school and the PLC-intervention facilitated and hindered the occurrence of these characteristics, and thirdly whether and how a sense of ownership of the FLP was observable in the PLCs. A cross-case study design was applied in which the PLC-interventions function as the units of analysis. Data consists of transcripts of meetings of the PLCs (n=27), meeting minutes, field notes and interview transcripts with PLC members (n=27). Data were coded and interpreted using a qualitative content analysis method (Schreier, 2012). Preliminary results show the occurrence of PLC-characteristics through the participation of parents, the crucial role of school factors in facilitating PLC-characteristics and the importance of a shared vision in the PLC on educational partnerships with parents to acquire ownership of the FLP in the school organization.

Professional learning communities with teachers and parents: supporting educational partnerships

Presenting Author:Marina Iliás, VU University Amsterdam, Netherlands; **Co-Author:**Agnes Willemsen, VU University Amsterdam, Netherlands; **Co-Author:**Marjolein Dobber, VU University Amsterdam, Netherlands; **Co-Author:**Carlo Schuengel, VU University Amsterdam, Netherlands; **Co-Author:**Mirjam Oosterman, VU University Amsterdam, Netherlands; **Co-Author:**Trees Pels, VU University Amsterdam, Netherlands

It can be beneficial for children's socio-emotional and cognitive development if parents and teachers form an educational partnership in which they attune their support of the child. Despite large investments, parents and teachers encounter difficulties in establishing and continuing such partnerships in practice. Research suggests that a Professional Learning Community (PLC) in which parents and teachers cooperate could be beneficial for the formation and/or improvement of this partnership. This research examined how *equality* and *diversity* were expressed during the PLC in discussions about educational partnership. Furthermore, this study examines to what extent participants were able to reflect on their opinions and practices. Lastly, the practical returns of the PLC for the schools were investigated. Four schools formed PLC's that consisted of kindergarten teachers and parents and met five times. Transcripts of these meetings were made and analyzed using a Thematic Coding Approach. Results showed that equality and diversity were expressed in several ways. Equality in communication and attention to individual experiences and differences became important topics. Depending on the school context, parents and teachers were able to reflect more or less thoroughly on their opinions and practices, especially regarding their communication. At each school practical returns from the PLC were translated into applications in the school. Differences between schools were discussed. Further research should determine whether these events lead to improved long-term educational partnership that is anchored in the school policy.

Session N 15

1 September 2017 15:45 - 17:15
Main Building A - A05
Symposium
Teaching and Teacher Education

How teachers act: The development of professional classroom competencies

Keywords: In-service teacher education, Language (Foreign and second), Mathematics, Meta-analysis, Pre-service teacher education, Science education, Teacher Effectiveness, Teacher Professional Development

Interest group: SIG 11 - Teaching and Teacher Education

Chairperson: Stefan Keller, School of Teacher Education Basel, Switzerland

Chairperson: Jens Möller, University of Kiel, Germany

Discussant: Johannes König, University of Cologne, Germany

The central aim of this symposium is to present recent research on teachers' professional competencies. Two training studies, an experimental study and a meta-analysis deal with the effect of teacher education in the field of science instruction (Stern, CH), with the effect of cooperative lesson studies (Vermunt, GB), with teachers' assessments of students' cognitive abilities (Machts, D) and with teachers' diagnostic competencies on students' essays (Keller, CH). As dependent variables, the presentations deal with different teacher- and student-outcomes which are key to how teachers act as professionals in an educational context. These factors include, a) teachers' knowledge of their subject and its impact on their students' learning; b) professional interactions (quality of dialogue) and their impact on teachers' own learning; and c) the relationship between their professional knowledge and teachers' ability to form a picture of their students' capabilities. The educational purpose of this symposium is to understand the way teachers act in relation to core personal and contextual factors. These findings contribute to the development of our theoretical understanding of the impact and results of teacher learning. While the individual papers are concerned with different aspects of the teaching profession, and involve different subject areas (Physics, Mathematics, Foreign Languages), the results all contribute to our understanding of the relationship between how teachers are educated, how they interact with each other and how they act as professionals.

How regular elementary school teachers can boost their student's conceptual knowledge in physics

Presenting Author:Ralph Schumacher, ETH Zurich, Switzerland; **Co-Author:**Peter Edelsbrunner, ETH Zurich, Switzerland; **Co-Author:**Lennart Schalk, ETH Zurich, Switzerland; **Co-Author:**Anne Deiglmayr, ETH Zurich, Switzerland; **Co-Author:**Elsbeth Stern, ETH Zurich, Switzerland

A main barrier to learning secondary school Physics is not so much what a student lacks, but what he or she has, namely, alternative conceptual frameworks. These alternative conceptual frameworks often work well in ordinary life, but are incompatible with the scientific explanations, and impede children's understanding of Physics concepts. Implementing curricula in elementary school that help children to overcome such misconceptions at an early stage can therefore be considered a worthwhile approach to prepare future learning. However, the relevant expertise for teaching conceptual Physics knowledge cannot be taken for granted in regular elementary school teachers. We wanted to find out whether an intensive training on the use of four curricula for early Physics learning will enable regular elementary school teachers to boost their students' understanding of Physics concepts. 87 elementary school teachers were trained to apply 60 lessons of inquiry-based instruction on the four topics Floating & Sinking, Air & Atmospheric Pressure, Sound & Spreading of Sound, and Stability of Bridges to third- and fourth-graders ($n = 1739$ children). The instructed children made significant progress in their conceptual understanding from pre- to posttests on the four curricula (all $ds > 1.0$). Control groups of uninstructed children did not spontaneously improve their understanding of physics concepts.

Teacher learning in Lesson Study: learning patterns, dialogue & teacher professional identity

Presenting Author:Jan Vermunt, University of Cambridge, United Kingdom; **Co-Author:**Maria Vrikk, University of Cambridge, United Kingdom; **Co-Author:**Paul Warwick, University of Cambridge, United Kingdom; **Co-Author:**Neil Mercer, University of Cambridge, United Kingdom

This paper aims to investigate the development of teacher learning patterns in the context of Lesson Study (LS) and to understand the way teachers learn in relation to core personal and contextual factors. In LS teachers jointly plan and discuss lessons in small groups, with a focus on subject matter teaching and students' learning. Primary and secondary Mathematics teachers formed LS groups within their schools. Twenty-one schools participated in the first year and 56 schools in the second year of the project. A survey was developed and administered at three time points. It consisted of two main parts in all three administrations: Perceptions of LS and Inventory of Teacher Learning. Moreover, survey 3 measured the following variables: quality of dialogue; support of school context; student learning outcomes; and teacher professional identity. The findings showed a large positive effect of time on meaning oriented learning and a large negative effect of time on problematic learning. The quality of teachers' dialogue in LS discussions, the patterns in their learning, their professional identity and their observations of student learning outcomes proved to be all strongly interlinked. It was concluded that LS, with its focus on case pupils and subject matter teaching, may provide a suitable platform for these development processes to take place. These findings contribute to the development of our theoretical understanding of teacher learning as they provide evidence of the impact of LS on teacher learning processes and student learning outcomes.

Accuracy of teachers' judgments of students' cognitive abilities: A meta-analysis

Presenting Author:Nils Machts, University of Kiel, Germany; **Co-Author:**Jens Möller, University of Kiel, Germany; **Co-Author:**Johanna Kaiser, University of Kiel, Germany; **Co-Author:**Fabian T. C. Schmidt, Leibniz Institute for Science and Mathematics Education (IPN), Germany

We present a meta-analysis of the accuracy of teachers' judgments of students' cognitive abilities. The array of cognitive abilities includes intelligence, giftedness, other cognitive abilities, and creativity. The integration of 106 effect sizes from 33 studies with a meta-analytical multilevel approach led to a mean judgment accuracy of cognitive abilities of $r = 0.43$. Moderation analyses revealed moderate to large effects for intelligence: $r = 0.50$, other cognitive abilities: $r = 0.42$, giftedness: $r = 0.36$, and creativity: $r = 0.34$. Lower judgment accuracy was shown for preselected student samples and for judgments without eligible frames of reference. We discuss an academic achievement bias as selected studies revealed higher correlations between judgments of intelligence and academic achievement measures ($r = 0.61$) than between judgments of intelligence and measures of intelligence.

Influence of linguistic features in English essays on teachers' assessments

Presenting Author:Stefan Keller, School of Teacher Education Basel, Switzerland; **Co-Author:**Cristina Voegelin, University of Applied Sciences Northwestern Switzerland, Switzerland

This paper aims to analyse the effect of two linguistic features in English essays – spelling and lexical complexity – on judgments by teachers of English as a foreign language (TEFL). It is part of the research project ASSET, which analyses the effects of student-, text- and teacher characteristics on teachers' judgments of authentic English argumentative essays. Responding to students' essays is one of the central competences in teaching English in higher education. From a formative perspective, teacher judgments (TJ) influence classroom activities, feedback and subsequent tasks which teachers might set their learners. From a summative perspective, assessing the outcome of learning processes adequately and objectively is a major aspect of fairness and equality in any educational system (Kronig, 2007). In the two studies reported in this paper, English teacher trainees in Switzerland and Germany were asked to assess four authentic English argumentative essays on a "holistic" and an "analytic" rubric. In each case, two texts representing "low" quality of writing and two representing "high" quality were chosen and the features "spelling" (study A) and "lexical complexity" (study B) were experimentally varied for each text. For study A, results show that the spelling quality of a text also influenced teachers' judgements in areas such as "quality of vocabulary" or "organisation", hinting at distortion effects due to poor spelling. We expect similar effects for lexical complexity in study B, which will be presented at the conference.

Session N 16

1 September 2017 15:45 - 17:15

Main Building D - D14

Symposium

Higher Education

The Impact of Individual and Contextual Factors on the First Year in Higher Education

Keywords: Achievement, Competencies, Educational Psychology, Higher education, Motivation, Quantitative methods, Self-regulation, Student learning, Teaching approaches

Interest group: SIG 04 - Higher Education

Chairperson: Elke Bosse, University of Hamburg, Germany

Discussant: Edith Braun, University of Kassel, Germany

In the light of growing entry rates and the political concern for study success, the transition to higher education and the first-year experience (FYE) receive increased attention. Current research widely acknowledges the need to investigate the interactive effects of individual factors on first-year students' achievement. However, the variety of concepts and instruments employed results in findings that are difficult to compare. Furthermore, insights into the role of contextual factors (e.g. learning environment, education system) seem to be limited. To gain a deeper understanding of the FYE, there is a need for a broader research approach and, partly, for the development of new instruments or the adaptation of existing ones to the particular educational context. While this may reduce comparability across studies, it may also provide context-specific insights and innovative ways to capture the complexity of the FYE needed to inform educational development. Including examples of (cross-)institutional and national research, the symposium seeks to shed light on the research approaches, results and implications of studies on the FYE in order to discuss how to obtain both compatible and context-specific findings. Demonstrating how academic achievement is studied including a range of individual factors one presentation from The Netherlands and one from Belgium indicate the relevance of the study programme. Two studies from Germany expand the insights into the FYE by analysing the interplay of individual factors and selected characteristics of the learning environment.

The Importance of Academic Adjustment for a Successful Transition to University

Presenting Author:Els van Rooij, University of Groningen, Netherlands

Considering the pivotal role of academic adjustment for student success, it is important to gain more insight into how several motivational and behavioural factors affect academic adjustment as well as the extent to which academic

adjustment influences student success. This empirical study investigated how academic motivation, academic self-efficacy, self-regulated study behaviour, and satisfaction with the chosen degree programme influenced successful academic adjustment in university and how these variables and adjustment affected three important indicators of student success: grade point average (GPA), attained number of credits (ECTS), and intention to persist. The sample consisted of 243 first-year university students in the Netherlands. Structural equation modelling showed that academic adjustment was influenced by academic motivation, self-regulated study behaviour, and degree programme satisfaction, which together explained 70% of the variance in adjustment. Motivational and behavioural variables did not influence GPA and ECTS directly but only through academic adjustment. Furthermore, only satisfaction with the degree programme predicted intention to persist. These results point to the importance of academic adjustment in predicting university GPA and ECTS and the pivotal role of satisfaction with the degree programme in predicting intention to persist. Universities could integrate the development of self-regulated study skills – the biggest contributor to academic adjustment – in the first-year programme. Moreover, looking at the importance of students' satisfaction with the programme, communication and collaboration between secondary schools and universities should be enhanced in order to help students to choose a university degree programme that matches their abilities, interests, and values.

Investigating the context-specificity of academic adjustment to higher education

Presenting Author: Mikaël De Clercq, Université catholique de Louvain (UCL), Belgium

The first year experience has been extensively documented in the literature. Many variables were identified as playing an important role in the students' transition processes. Yet, contextual factors have often not been part of the investigation. The majority of studies assume similar effects in different programs. However, differences between institutions or programs could result in specific learning contexts leading to different adjustment processes. As an attempt to overcome this limitation, the present study investigates the impact of study programs on academic achievement through multifactorial multilevel analyses. 1173 first-year students from 27 study programs from a Belgian university participated in this study. The results highlight that achievement interclass variation is about 15%. Eight factors remain predictive in multivariate analysis namely, past performance, socioeconomic status, informed choice, self-efficacy beliefs, value, study time, extracurricular activities and teaching practices. Finally, significant slope variations were identified for gender, peer support, attendance and external engagement. These results indicate that the effects of these variables on academic adjustment significantly differ from one study program to another. The implications and limitations of this study are discussed in the conclusion.

The Interplay of Institutional Requirements and First-Year Students' Academic Competence

Presenting Author: Miriam Barnat, University of Hamburg, Germany; **Co-Author:** Elke Bosse, University of Hamburg, Germany

The first-year experience is an important issue in German higher education (HE), because entry rates into university-level education have doubled over the last decade – while drop out shifted from end of studies to first year. As HE research appears to lack knowledge regarding the interactive effects of student characteristics and institutional context, the paper seeks to shed light on the nexus of first-year students' academic competence and institutional requirements. It is based on the data of a longitudinal student survey currently conducted at four German HE institutions. To examine academic competence, the survey includes individual factors such as self-concept, motivation and learning strategies, while using goal commitment and regulation as outcome variables in the first wave and adding self-perceived success measures (e.g., study progress) in the second. Apart from type of institution and study programme, contextual factors are examined in terms of institutional requirements identified in a previous study. Confirmatory Factor Analysis of the requirements tested 7 factors with acceptable fit. Academic competence in the first wave was analysed via structural equation modelling and latent profile analysis which will be complemented by latent transition analysis based on the second wave. First results indicate that the identified profiles of academic competence correspond with the perception of institutional requirements. The data of the second wave is expected to provide further insights into the interrelations of the development of academic competence and the learning context. The findings will be discussed with regard to implications for HE research and development.

The First Year in Higher Education: The Role of Individual Factors and the Learning Environment

Presenting Author: Hildegard Schaeper, DZHW - German Centre for Research on Higher Education and Science Studies, Germany

The transition to higher education and the initial phase of studying play a crucial role for future educational decisions and academic development. For this reason the study seeks to explain the outcomes of the first year in higher education and to assess the impact of a wide range of predictors. Referring to sociological or sociopsychological theories, which focus on structure and agency, we examine both individual and contextual factors with respect to important outcome variables such as academic integration and dropout intention. We use data from a panel study that longitudinally observes a large sample of randomly selected first-year students of the winter term 2010. The study is part of the German National Educational Panel Study (NEPS). Almost 10,000 students participated in the first three waves on which our analyses are based. First empirical results show that student experiences during the initial phase of studying are contingent upon both individual characteristics and attributes of the context. However, we found interaction effects indicating that different students react differently to their learning environment. These results and the multicollinearity present in our data once again provide

evidence for the fact that empirical findings are dependent on model specification. This calls for caution when comparing the findings from different studies and drawing conclusions for educational planning and practice in higher education.

Session N 17

1 September 2017 15:45 - 17:15

Main Building D - D10B

Symposium

Cognitive Science

Constructing situational and mathematical models of word problems: analysis and improvement

Keywords: Cognitive skills, Comprehension of text and graphics, Educational Psychology, Mathematics, Problem solving

Interest group:

Chairperson: Lieven Verschaffel, KU LEUVEN, Belgium

Discussant: Bethany Rittle-Johnson, Vanderbilt University, United States

Mathematical word problem solving is considered to be an important part of the mathematics curriculum. However, many children have great difficulties solving these problems. Particularly the problem-solving steps of constructing a representation of the problem situation and transforming that situational model into an accurate mathematical model turn out to be of great difficulty, esp. when the problem is of a non-standard nature. Many researchers try to further unravel the variables that affect the way in which learners build such situational and mathematical models and, ultimately, their problem-solving performance. Others evaluate various instructional attempts to help learners to make these initial steps of the mathematical modeling cycle, e.g. by providing them various kinds of pictorial and/or schematic representations or by developing in them the competence in constructing a representation of their own. Despite all these attempts, we still do not have a good insight into the complex processes and mechanisms involved in learners' creation or use of such situational and mathematical models nor in the optimal ways of teaching them these competencies. The goal of the symposium is to bring together four papers that report recent research on learners constructing situational and mathematical models of word problems and to discuss them from a psychological and (math) educational perspective. The four papers approach the theme from different theoretical and methodological angles and using a variety of problems and populations, ranging from elementary school children solving one-step arithmetic word problems to middle school students solving more complex mathematical modeling tasks.

Using retelling data in the study of pupils' representations of P-items

Presenting Author:Wim Van Dooren, KU Leuven, Belgium; **Co-Author:**Febe Goemare, KU LEUVEN, Belgium; **Co-Author:**Lieven Verschaffel, KU Leuven, Belgium

Studies have amply shown that elementary school pupils have a tendency to neglect their everyday life knowledge when solving school mathematical word problems (Verschaffel et al., 2000). Most evidence comes from studies that confronted pupils with words problems that are problematic from a realistic point of view (so-called P-items). Weyns et al. (in press) tried to help pupils to solve such P-items more realistically by adding a warning sentence at the end of each problem emphasizing the realistic modelling complexity. The findings showed a modest but significant positive effect of such warnings about the realistic modelling complexity at the end of the problem text. In the present study, we used the retelling method to obtain further insight into this warning effect. 72 upper elementary school pupils were randomly divided into a warning or no-warning condition wherein they had to retell and solve five P-items that, respectively, did or did not contain a warning sentence. The retellings of almost half of the pupils from the warning condition did not refer to the realistic modelling complexity, but we found a strong relationship between the presence of a reference to the realistic modelling complexity in a pupil's retelling and the realism of his or her reaction to the P-item. Theoretical, methodological and educational implications are discussed.

Dutch third to sixth graders' word-problem solving: student and problem factors

Presenting Author:Marian Hickendorff, Leiden University, Netherlands

In contemporary mathematics education, word problems are very prevalent in instruction and assessment. Although many researchers assume that word problems are particularly difficult because they require representational steps before one can solve the 'hidden' arithmetic problem, others argue that word problems may instead facilitate problem solving because they activate real-world knowledge eliciting meaningful strategies. Two previous studies' results (Hickendorff, 2013a, 2013b) suggested that the influence of problem presentation format (symbolic vs. standard word problem) diminished with more years of schooling, possibly because the ample experience with word-problem solving resulted in well-developed cognitive schemata for solving the typical school arithmetic word problems. The current study aimed to investigate this interpretation empirically by (1) testing third to sixth graders, and (2) including more challenging problems by adding two-step arithmetic problems and non-standard word problems, the latter including an irrelevant number. A sample of 444 Dutch third to sixth graders solved a total of 48 arithmetic problems, distributed over three presentation formats: symbolic (no context), standard word problems, and non-standard word problems. Results showed that the performance on standard word problems did not differ from the performance on symbolic problems, while the non-standard word problems (with irrelevant number) were more difficult than the other two problem types. Contrary to our expectations, these differences did not depend on the students' grade. Furthermore, individual student factors (reading comprehension competence, working

memory, and non-verbal intelligence) were all positively correlated with the performance on the different problems, but these relations hardly differed between the problem formats.

Measuring strategic knowledge about drawing for solving real-world problems

Presenting Author:Stanislaw Schukajlow, University of Münster, Germany; **Co-Author:**Johanna Rellensmann, University of Münster, Germany; **Co-Author:**Claudia Leopold, University of Fribourg, Switzerland

Strategic knowledge is an important precondition for strategy use and achievement. However, to date, instruments for measuring strategic knowledge with regard to one specific strategy and its execution are largely lacking. In this presentation, we will report on the construction and validation of an instrument that was designed to measure students' strategic knowledge about drawing with respect to the solving of real-world problems: the *Strategic Knowledge about Drawing Scale*. We conducted both qualitative and quantitative evaluations of the instrument in a sample of ninth-grade students. The findings provide evidence for the scale's reliability, content validity, internal validity, and external validity. Its use in future studies promises new insights into the role of strategic knowledge for the efficient use of self-generated drawings to solve real-world problems.

The percentage bar as visual strategy to solve word problems

Presenting Author:Timo Leuders, University of Education Freiburg, Germany; **Co-Author:**Benjamin Thiede, University of Freiburg, Germany; **Co-Author:**Lars Holzäpfel, University of Freiburg, Germany

Students of grades 7, 8 and 9 learn to apply different strategies to solve word problems that involve percentages (formula insertion, proportional calculation). However in later years we encounter very low solution rates of percentage problems. This may be explained by the incapability to create a situation model as a first solution step using these strategies. A bar diagram, however, that visualizes the magnitudes and the respective percentages, which are involved in a typical percentage problem, is supposed to support students to create an appropriate situation model and thus increase solution rates. In a quasi-experimental design students are trained to use either a percentage bar as a visual strategy (which was unknown to them before) or to use a proportional calculation (as learned before) for one lesson in each case. Both groups show increased solution rates compared to a control group with no treatment. Among the students who were trained with the percentage bar, those who actually use it perform better at more complex tasks than those who stick to their previously used strategy.

Session N 18

1 September 2017 15:45 - 17:15

Pinni A - A1081

Symposium

The role of play in advancing child learning and development

Keywords: Developmental processes, Early childhood education, Educational Psychology, Game-based learning

Interest group: SIG 05 - Learning and Development in Early Childhood

Chairperson: Esther Adi-Japha, Bar-Ilan University, Israel

Discussant: David Whitebread, University of Cambridge, United Kingdom

Play is not only an activity that children enjoy, but is also an educational tool for enhancing children's knowledge, skills, and well-being. Early childhood educators and scholars have addressed the value of play as a facilitator of cognitive and social-emotional development. These authors suggest that engaging children in different types of play leads to increased performance in problem-solving, and prepares children to take part in group activities. The question remains: what are specific play activities, and how should these be taught to best prepare children for their lives in the future. The current symposium addresses this issue by presenting theoretical considerations, followed by specific manifestations of play activity that advances child development in several domains. Hildebrandt and Weisshaupt's theoretical paper discusses the nexus between abstract and counterfactual thinking in play, and the joy of play. In light of these, the paper examines the significance of specific types of play (e.g., construction play, fantasy play) with regard to the development of scientific literacy. Next, Hauser and his team will describe a board game—The Bunny Race—that enhances math skills. Leseman and colleagues will present two experimental studies in support of the embodied-embedded cognition view, whereby early childhood play is regarded as exploration of the spatial-physical environment, paving the way for later exploration of the social-symbolic environment. Adi-Japha will end the session by illustrating the association between drawing facial expressions and understanding mixed-emotions, where this specific drawing activity is viewed as a form of transformative play.

Play as a prerequisite for scientific literacy

Presenting Author:Elke Hildebrandt, University of Applied Sciences Northwestern Switzerland, Switzerland; **Presenting Author:**Mark Weisshaupt, University of Applied Sciences Northwestern Switzerland, Switzerland

This theoretical paper aims to work out the nexus between abstract and counterfactual thinking in play, and the joy of play. In light of these, the paper examines the significance of specific types of play with regard to the development of scientific literacy. Drawing upon research on young children's scientific reasoning together with research on play, the paper will outline play as a mode of activity involving skills that are prerequisite for scientific learning. These include the ability to think

counter-to or beyond the immediate sensual appearances of objects and situations in various forms of play, e.g. being able to form and convey different abstract mental models of objects in meta-communication. Such ability is constitutive for construction play, role play/thematic-fantasy play, and for scientific discourse. The paper will discuss not only the common elements of play that are prerequisite for scientific literacy, but also the differences between the two in formal or temporal dimensions. To conclude, contrary to the widespread notion that during play children are absorbed and unaware of the counterfactual nature of play, we propose, that play requires awareness processes that are keys to both learning and joy of play. Regarding practical conclusions, the paper revises the role of the play tutor as well as that of the schoolteacher, in terms of teaching styles, linking playful with experimental elements of knowledge.

Promoting the linear ruler representation by 4-year old children through playing number board games

Presenting Author:Bernhard Hauser, University of Teacher Education St.Gallen, Switzerland; **Co-Author:**Cornelia Rüdüsüli, Institute of research in teaching and learning, University of Education St. Gallen, Switzerland; **Co-Author:**Carolin Burmeister, Institute of research in teaching and learning, University of Education St. Gallen, Switzerland; **Co-Author:**Sara Siomos, Institute of research in teaching and learning, University of Education St. Gallen, Switzerland

Recent results of the development of numerical representations show that an adult and a child playing the linear number board game "the great race" in a one-to-one situation strongly enhances young children's numerical knowledge in the preschool years. In particular, this game is fostering the shift from a logarithmic to a linear representation of number, where the difference in magnitude between 3 and 4 is the same as the difference between 9 and 10. In this study, we investigated, using the game "bunny race", an adapted version of the game "the great race" (i) whether younger children between 4 and 5 years are also able to make this shift toward linear representation, and (ii) whether it is possible for children to play this enhanced board game with less adult support than the original version of the game "the great race". The sample comprised 140 children (intervention group: 75; control group: 65) between 4 and 5 years, from 16 kindergarten classes in St. Gallen, Switzerland. The intervention was implemented in 4 sessions of 20 minutes each within 2 weeks. The tests (pretest, posttest and follow-up) included 4 diverse numerical tasks: numerical magnitude comparison, number line estimation, counting, and numeral identification. Preliminary results show significantly greater learning gains for the intervention group. The contribution presents the research findings, discusses the role of adult support and game features in play-based-learning for early mathematics and highlights questions and consequences for further research.

Exploratory play as affordances-guided learning about the physical, social and symbolic world

Presenting Author:Paul Leseman, Utrecht University, Netherlands; **Co-Author:**Ora Oudgenoeg-Paz, Utrecht University, Netherlands; **Co-Author:**Ine van Liempd, Utrecht University, Netherlands

In traditional play theories, play is conceived of as a special activity of young children, intrinsically motivated by the joy that play generates. Play is separated from learning and in the field of early childhood education and care debates are ongoing about the appropriate balance between play and learning activities, leading to dissociated activity formats (e.g., circle time for instruction vs. free play for pleasure and social development). In the embodied-embedded cognition view, play is regarded as exploration, first of all of the spatial-physical environment, but in later stages also of the social-symbolic environment. Exploration, in this view, is intrinsically motivated by the possibilities offered to act upon the environment and, thereby, to learn about the environment and to develop skills to act upon more complex action possibilities in the environment. Data from two studies were used to develop and test the theoretical model. Solitary (and parallel) in-breadth exploration of elementary affordances at younger ages can be regarded as a developmental precursor of social in-depth play at older ages in which more complex affordances are explored and integrated with language. Developmental progress is skill-based. The increasing skill in acting upon increasingly complex affordances provides the sensorimotor grounding of verbal concepts and reasoning.

Drawing facial expressions and understanding mixed-emotions

Presenting Author:Esther Adi-Japha, Bar-Ilan University, Israel; **Co-Author:**Naomi Nadler, Bar-Ilan University, Israel; **Co-Author:**Norman Freeman, Bristol university, United Kingdom

It is commonly agreed that transformation is a feature of play. Some types of drawing require children to transform a typical representation, thereby suggesting that drawing can be viewed as a form of transformative play. Children's typical drawing of a facial expression is happy. Drawings of other facial expressions is described as a transformation of that typical drawing (e.g., the upward curve of the happy mouth is turned to a downward curve in a sad mouth). In contradistinction, the verbal expression of emotional expressions merely represents reality. Here, we tested the role of verbal and pictorial single-emotion expressions in explaining mixed-emotion understanding. Ninety 4- to 6-year-olds were given executive-function tests, including a self-regulation task and a cognitive-flexibility imaginative-drawing test. Next, the children heard eight single- and mixed-emotion scenarios, and they were asked to: (a) verbalize the protagonists' emotions, (b) point to corresponding pictorial expressions, and (c) draw the protagonists' facial expression. Mixed-emotion scores formed target data. Predictors were single-emotion scores in verbalizing, pointing, and drawing, plus executive-function scores. The findings indicated that single-emotion drawing was more strongly associated with mixed-emotion scores than were executive-function scores. Additionally, drawing-flexibility was associated with mixed-emotion drawing. Therefore, general self-regulatory skills are insufficient for explaining mixed-emotion attributions, and one needs skill-specific abilities, which may be developed by means of playful drawing activity. Interestingly, the drawings of mixed emotions revealed that younger children drew two separate expressions, suggesting a developmental trend of awareness of two emotions

concomitantly before merging their representations in mind.

Session N 19

1 September 2017 15:45 - 17:15

Virta - 114

Symposium

Diverse methodologies for investigating and supporting the development of historical reasoning

Keywords: Argumentation, History, Interdisciplinary, Reasoning

Interest group:

Chairperson: Marjaana Puurtinen, University of Turku, Finland

Chairperson: Clark Chinn, Rutgers University, United States

Discussant: Jouni-Matti Kuukkanen, University of Oulu, Finland

This symposium aims at strengthening the theoretical and methodological groundings of investigations that target the development of historical reasoning and related instructional practices. Research on this topic touches on multiple scholarly literatures, including the philosophy and theory of history, history didactics, educational psychology, the learning sciences, and history education. More thorough exchanges of ideas among all these areas would be fruitful. Despite sharing many common overall goals, scholars in these fields employ diverse theoretical and methodological frameworks, and these differences have seldom been explicitly explored and discussed. In this symposium, we will bring these issues to the front by inviting the authors to openly describe and discuss the benefits and drawbacks of their selected theoretical frameworks and associated methodologies, with the intention of promoting increased coherence and collaboration within the field, while also making room for innovative openings. The presentations will be discussed by a philosopher of historiography, who is invited to approach the matter by pondering on ways to start bridging philosophical work and experimental research within this domain. In terms of educational relevance, the presentations offer a variability of methods for investigating both secondary and university students' reasoning and thus modifying teaching practices accordingly.

Historians' epistemic aims: interviewing experts

Presenting Author: Mikko Kainulainen, University of Turku, Finland; **Co-Author:** Marjaana Puurtinen, University of Turku, Finland; **Co-Author:** Clark Chinn, Rutgers University, United States

Despite the vast amount of research on philosophy and theory of history, and the growing interest in training students to work with historical sources and historiography as historians do, there is still relatively little empirical evidence on historians' epistemic authority. Thus, the present study targets professional historians' considerations of the *epistemic aims* of their work. It is positioned at the intersection of historical theory, expertise research, and research on epistemic cognition. Twenty-six academic historians were interviewed about their work practices and understanding of historical research. Preliminary analysis of four historians' interviews allowed the identification of considerable between-respondent variety in four different respects: type of end products, agency, source, and structure of epistemic aims. The theoretical triangulation of epistemic cognition, expertise research and historical theory will add to current understanding of the nature of expertise in this multifaceted domain and provide tools for planning further studies on experts' historical reasoning. Our findings also provide insights into ways to support novices' development in this respect. By detailing historians' situated aims systematically these results contribute significantly to future work on historical theory and education.

Reading, reasoning, and writing like a historian: what concurrent think-alouds reveal

Presenting Author: Michael Bolz, University of Illinois at Chicago, United States; **Co-Author:** Susan Goldman, University of Illinois at Chicago, United States

Historical essays that rely on students' use of historical source documents have been a dominant means of assessing the presence and quality of high school students' historical reasoning. However, a written essay combines demands of historical reasoning, often based on documents that must be read, with rhetorical demands of writing an organized narrative or evidence-based argument about an historical event or issue. This study uses a concurrent think-aloud methodology in a case study design to examine students' historical reasoning in the context of a document-based historical essay task. Think-aloud protocols were analyzed for evidence of how students were processing the sources, their reasoning about them, ways in which they reflected historical reading and inquiry reasoning, and the relationship of these to the final written product. Of particular interest were ways in which the written essay product failed to capture historical inquiry processes evident in students' reading and reasoning processes.

Formative assessment of historical causal reasoning: development of a theory-driven cognition model

Presenting Author: Uddhava Rozendal, University of Amsterdam, Netherlands; **Co-Author:** Carla Van Boxtel, University of Amsterdam, Netherlands

As history education has changed from memorization to emphasize historical thinking and formative assessment has emerged as an alternative approach to summative testing in secondary education, new assessment practices are needed. The design of assessment should be grounded on models of cognition that detail the goals of learning within a specific domain or an aspect thereof. In this paper we present a theory-informed model of cognition for historical causal reasoning as a part of historical thinking. Its primary use is as a reference tool to inform teachers on instruction and curriculum

choices and students on the required knowledge, beliefs and skills they should develop in order to become better causal thinkers in history. The creation of this model was based on relevant literature in the fields of historical theory and history education. Subsequently, our model was submitted to two expert panels consisting of historians, educational researchers and history teachers in secondary education. Their feedback was then used to further develop the model. This approach resulted in a staged progression of three separate but intertwined dimensions of beliefs and knowledge and associated student behavior: an epistemic dimension, a first-order knowledge dimension and a second-order knowledge dimension. The next step is to design formative assessment tasks that can measure (aspects of) historical causal reasoning based on our model. The design and testing of these tasks forms the subject of our current studies.

Understanding teacher growth in facilitating whole-class text-based discussions in history

Presenting Author: Abby Reisman, University of Pennsylvania, United States

The case for classroom discussion as a core method for subject matter learning stands on stable theoretical and empirical ground. Nevertheless, several decades of research on classroom discourse suggest that classroom discussion is exceedingly rare and dominated by teacher-initiated evaluative questions. This study explores how four middle school history teachers who received professional development in a document-based history curriculum develop in their practice of whole-class text-based discussion facilitation over the course of two years. Preliminary analyses reveal that all four teachers grew in their facilitation of text-based, whole-class discussion, albeit from different starting places and along varying trajectories. Although two of the teachers did not engage students in text-based historical discussion in Year 1 of the study, they did at moments in Year 2. We conclude that although deep understanding of the curriculum is not *sufficient* to facilitate disciplinary discussion, it may be a necessary precondition before teachers can demonstrate flexibility and engage in deliberate practice. By exploring teacher development in the complex practice, the study contributes to our understanding of the dispositions and understandings required to support productive disciplinary engagement in history.

Session N 20

1 September 2017 15:45 - 17:15

Pinni A - Paavo Koli

Symposium

Assessment and Evaluation

Innovative Applications of Technology-Based Assessment

Keywords: Artificial intelligence, Assessment methods and tools, At-risk students, Cognitive skills, Computer-assisted learning, Educational Technology, Inquiry learning, Learning and developmental difficulties, Reading comprehension, Reasoning, Technology

Interest group: SIG 01 - Assessment and Evaluation

Chairperson: Mari-Paaulina Vainikainen, University of Helsinki, Finland

Discussant: Samuel Greiff, University of Luxembourg, Luxembourg

During the recent years, educational assessments have been increasingly transferred to technology-based platforms. This has opened up possibilities for assessing novel contents and tailoring the assessment to address individual situations of different target groups. With technological solutions, we have been able to shorten testing time while simultaneously improving measurement accuracy. Technology has also changed the way we process and report assessment data and give feedback to the participants.

In international large-scale assessment studies, technology-based assessment (TBA) is a relatively new concept. However, many local assessment systems in Europe have utilised technology-based solutions already for a decade. It is important for the international development of the field to learn from these national experiments and experiences. Therefore, this symposium gathers together researchers and developers of TBA solutions from four European countries to present and discuss the latest advancements in this area.

One advantage of TBA is that it can be adapted to meet the needs of different target groups. The symposium introduces innovative ways of how TBA has been utilised with pre-schoolers, primary-school-aged children, lower-secondary-school students and youth with special educational needs. In three applications, the focus is on assessing generic competences, whereas the fourth presentation concentrates on innovative automatised coding of text responses. One of the applications is a computer adaptive test. All four papers present an application of log data analysis for different purposes. The symposium as a whole demonstrates many of the advantages of TBA, but it also points out areas where further development and research is needed.

Developing Online Diagnostic Instruments for Assessing Pupils' Skills at the Beginning of Schooling

Presenting Author: Benő Csapó, University of Szeged, Hungary; **Co-Author:** Ágnes Hódi, MTA-SZTE, Hungary; **Co-Author:** Renáta Kiss, MTA-SZTE Research Group on the Development of Competencies, Hungary; **Co-Author:** Attila Pásztor, MTA-SZTE Research Group on the Development of Competencies, Hungary; **Co-Author:** Attila Rausch, Eötvös Loránd University, Budapest, Hungary; **Co-Author:** Gyongyver Molnar, University of Szeged, Hungary

Further research is necessary to examine the predictive validity of these instruments and explore their usefulness in

adjusting teaching and learning processes to students' individual needs.

The assessments did not cause difficulties; time on task analyses indicated that students were motivated and attentive throughout the testing sessions. The tests proved to be highly reliable with good Cronbach's alphas (.90, .89, .94, .90, respectively). Confirmatory factor analyses were conducted to test the underlying measurement models for inductive reasoning, early literacy and early numeracy tests; they indicated good model fit in general.

The participants of the study were 5996 pupils drawn representatively from the school entering population of Hungary. The instruments were four online tests: an early literacy and an early numeracy test, a test to assess pupils' ability of following instructions and an inductive reasoning test. Pupils completed the tests in their own schools using the locally available computers in four sessions.

The first school years determine later achievements but teachers of these pupils face the difficulties that there are large developmental differences within the classrooms in a number of dimensions that are mostly invisible for simple observation. Without objective instruments to identify pupils' deficiencies the possibilities of differentiated personalized teaching in heterogeneous classrooms are limited. The purposes of this study are to devise an easy-to-use online diagnostic test-battery to assess pupils' precursor skills relevant for successful learning, to examine its applicability in general educational settings and to explore its psychometric characteristics.

Online Assessment of Inductive Reasoning and Its Predictive Power on Inquiry Skills in Science

Presenting Author:Attila Pásztor, MTA-SZTE Research Group on the Development of Competencies, Hungary; **Co-Author:**Gyongyver Molnar, University of Szeged, Hungary; **Co-Author:**Erzsébet Korom, University of Szeged, MTA-SZTE Science Education Research Group, Hungary; **Co-Author:**Mária B. Németh, MTA-SZTE Research Group on the Development of Competencies, Hungary; **Co-Author:**Benő Csapó, University of Szeged, Hungary

The objectives of this study were to develop a computer-based assessment tool for inductive reasoning and to explore the predictive power of inductive reasoning on inquiry skills in science. The sample for the study was drawn from fourth grade ($N=5017$, age $M=10.26$, $SD=.49$) students in Hungary. The online inductive reasoning test comprised 56 items with four subtests: 20 figural series, 21 figural analogies, 8 number series and 7 number analogies. The inquiry test consisted of 13 tasks with 32 items assessing different types of inquiry stages: identifying research questions and hypothesis, designing experiments, interpreting data and drawing conclusions (Cronbach's $\alpha=.80$). The data collection for the inductive reasoning test was conducted in Autumn 2014. A year later we administered the inquiry test on the same sample ($N=3338$ for both tests). Measurements were carried out via the eDia system in the schools' ICT rooms. Our online test for assessing inductive reasoning proved to be reliable: Cronbach's $\alpha=.93$ for the entire inductive reasoning test and the indices were .83 for figural series, .85 for figural analogies, .73 for number series and .70 for number analogies. Empirical evidence for construct validity was also provided: the four dimensional model had the best model fits where all subtests represented different factors (Chi-Square= 5507.24 $df=1478$ p

Automatically Analyzing PISA Text Responses: Reading Gender Gap and Trends across the Mode Change

Presenting Author:Fabian Zehner, German Institute for International Educational Research (DIPF), Germany; **Co-Author:**Frank Goldhammer, German Institute for International Educational Research (DIPF), Centre for International Student Assessment (ZIB), Germany

This study analyzed student text responses to a reading test using natural language processing techniques. Focusing on semantic response features, it investigated (i) the reading gender gap and (ii) trends in the Programme for International Student Assessment (PISA) from 2012 to 2015 alongside the change from paper-based to computer-based assessment. The study demonstrates how text responses can be a new source of information enriching the core constructs like it is typically done using process data. For this, a theoretical framework from previous work was used that allows mapping of response features to the preceding cognitive components such as micro- and macropropositions in the situation model. In total, $n = 33,604$ responses from the German PISA 2012 sample and $n = 9792$ responses from 2015 have been analyzed in order to characterize the genders' cognitive types. This abstract only describes the results for PISA 2012 due to the data embargo for PISA 2015. The results for 2012 showed that girl types used more propositions (2.8–4.9) from the situation model, irrespective of the response correctness. They integrated relatively more relevant propositions and more successfully adapted to the level of the question focus and category. It appears that boy types struggle with retrieving and integrating propositions from the situation model while girl types liberally juggle these to formulate their responses.

Computer Adaptive Learning Preparedness Test (CAT-LPT) for Vocational Upper Secondary Education

Presenting Author:Jukka Marjanen, University of Helsinki, Finland; **Co-Author:**Mari-Paaulina Vainikainen, University of Helsinki, Finland; **Co-Author:**Mikko Asikainen, University of Helsinki, Finland; **Co-Author:**Sirkku Kupiainen, University of Helsinki, Finland; **Co-Author:**Risto Hotulainen, University of Helsinki, Finland

In Finland, students with special education needs or lacking or incomparable school grades can opt for an alternative method to apply for upper secondary education instead of participating in the report-card-based student selection. To facilitate the placement of students with special needs and to organise them support for completing vocational studies, national educational authorities gave an assignment to a university research centre to develop a computer adaptive

learning preparedness test (CAT-LPT). Computer adaptive testing was chosen due to the possibility to adjust test difficulty according to the level of the very heterogeneous target group and to keep the testing time manageable. Adhering to theoretical and empirical understanding about cognitive development and learning difficulties, three independent subtests were developed for assessing verbal, quantitative and spatial reasoning. Itembanks were developed and calibrated through two pilot studies and a large-scale calibration study (N = 1059). In this study, we evaluate how accurately the CAT-LPT measures the three subdomains of learning preparedness. We also analyse whether the 60-minutes testing time allowed for the test is sufficient to provide accurate approximations of the students competence levels on the three subdomains. The results show that spatial and quantitative reasoning could be measured accurately using CAT-LPT within the predefined time limit. However, the verbal subtest still needs further development. The findings are important as CAT considerably decreases testing time especially when working with heterogeneous target groups. It may also reduce test anxiety when the difficulty level is adapted to the respondents' competence level.

Session N 21

1 September 2017 15:45 - 17:15

Linna - Väinö Linna (K104)

Symposium

Teaching and Teacher Education

Connecting theory and practice: Enacting practice in teacher education

Keywords: Comparative studies, Pre-service teacher education, Qualitative methods, Quantitative methods, Teacher Professional Development, Teaching / instruction, Teaching approaches

Interest group: SIG 11 - Teaching and Teacher Education

Chairperson: Hilda Borko, Stanford University, United States

Discussant: Kirsti Klette, University of Oslo, Norway

Policy makers as well as teacher educators are paying increasing attention to how teacher candidates learn to enact practice and to ground teacher education more deeply in the work of teachers' classroom practice. In the US, scholarship on 'core' or 'high leverage' teaching practices reveals fruitful means to focus more closely upon the enactment of teaching. Yet we know little about the degree to which candidates in other countries have opportunities to learn to enact practice in teacher education, how contexts might differ, and how such opportunities are built into overall program design across different settings. Building upon calls for more international, comparative research in teacher education, this symposium shares scholarship on these questions from various contexts such as, but not limited to: Chile, Estonia, Norway, and the US. It provides data regarding models of enactment in teacher education in international settings using shared measures and approaches. We start with a conceptualization of the enactment of practice, supported by classroom observation data from campus courses of six teacher education programs. Next, using survey data from five programs in five countries, we investigate the teacher candidates' perspectives on the opportunity to enact practice. Thirdly we dive into an additional program and compare different groups of candidates, investigating differences based on study level, curriculum, and teaching experience. Lastly, we describe the process of curriculum redesign in one teacher education program, showing how research into the enactment of teaching can be used to improve such a program.

Exploring the 'problem of enactment' in teacher education coursework

Presenting Author:Inga Staal Jensen, University of Oslo, Norway; **Co-Author:**Kirsti Klette, University of Oslo, Norway; **Co-Author:**Karen Hammerness, American Museum of Natural History, United States

Teacher education is criticized for its disconnect from practice, and it traditionally holds a strict division of labor, where "practical" aspects have taken place at the field placement site. We argue against this divide and emphasize the responsibility of the campus site to ground its teaching in practice, in order to meet the 'problem of enactment'. This paper examines the research question: What characterizes the opportunities teacher candidates have to enact practice within their coursework on campus? We draw upon the data and analytical framework from an international cross-case study of six teacher education programs in the US, Norway, and Finland. We focus on observations of language arts and mathematics methods courses, covering a three-week period (N=104 hours). Analyses focused on eight dimensions tapping teacher candidates' opportunities to enact practice. Using a four-point scale, we scored the extensiveness, i.e. quantity and quality, of the opportunities. Our findings partly reveal progress on the 'problem of enactment' within coursework compared to earlier studies. Across programs, teacher candidates had extensive opportunities to include teaching materials and take pupils' perspective. Still, given the recent interest in teacher education that is centered on the actual work of teaching, our findings suggest that across all programs, attention to the enactment of practices more directly connected to routine classroom teaching practices may still be insufficient. This especially holds for opportunities related to rehearse distinct teaching practices and to analyzing pupils' learning. Our findings thus accentuate the 'problem of enactment' within distinct elements of teacher preparation.

A student perspective: Opportunities to enact practice in campus courses

Presenting Author:Esther Canrinus, University of Agder, Norway; **Co-Author:**Kirsti Klette, University of Oslo, Norway; **Co-Author:**Ole Kristian Bergem, University of Oslo, Norway; **Co-Author:**Karen Hammerness, American Museum of Natural

Although teacher educators often provide their students with general ideas and principles of good teaching, they provide fewer opportunities to actually translate these ideas into specific classroom practices. Various scholars have stated that university courses should, to a larger degree, include opportunities for students to try out and rehearse actual classroom practices. The aim of this article is to explore similarities and differences in opportunities to enact practice in campus courses in five teacher education programs, located in Norway, Finland, USA, Cuba, and Chile. Paper and pencil surveys were distributed among student teachers (N=488) to measure their perception of their opportunities to enact practice in campus courses. Across programs the students report the least opportunity to examine transcripts of classroom talk or pupils' discussions and to watch or analyze videos of classroom teaching. They report the most opportunity to talk about their field placement and to plan for their teaching. Using Analysis of Variance, differences between the programs were studied. Students in a program which has explicitly made efforts to connect theory and practice over a period of 15 years do report more opportunities to enact practice. Students from a program that has been constantly working on improvements but not a major redesign conceptualized around coherence, report experiencing fewer opportunities to enact practice. Based on our findings, we believe that within campus courses, focusing on teaching practices closer to pupils' actual learning process is a linkage between theory and practice in need of improvement.

Student teachers' perceptions on connecting theory and practice during university studies

Presenting Author:Liina Malva, University of Tartu, Estonia; **Co-Author:**Äli Leijen, University of Tartu, Estonia

Connecting theory and practice is a challenge for teacher educators. In order to reduce the gap between schools and universities giving opportunities to transfer knowledge between different contexts is essential. In 2013 several changes in the teacher education curricula were implemented at the University of Tartu in order to have better connection between theoretical studies and fieldwork. A survey from the Coherence and Assignment Practices in Teacher Education (CATE) study was used to examine student teachers' perceptions of the connection of theory and practice in the updated curricula. The results show that the teacher education could be strengthened by giving students more opportunities to examine students' own pupils' work or samples of pupils' work and experience a demonstration of effective teaching practices in the university coursework. When comparing different groups of students, Independent Samples T-test and ANOVA showed significant difference in the perceptions of students from different study levels, different curricula and students with or without teaching experience. The results of the study can be used for reducing the gap between theory and practice in teacher education by giving student teachers more opportunities to use real teachers' work tasks in university coursework.

Are we doing well? Monitoring teacher students' perceptions of opportunities to learn core practices

Presenting Author:Magdalena Muller, Pontificia Universidad Católica de Chile, Chile; **Co-Author:**Pilar Alamos, University of Virginia, United States

The challenge of integrating theory and practice in the curriculum of initial teacher training is a critical issue in the field. This study presents the results of a survey based on the CATE (Coherence and Assignments in Teacher Education) questionnaire on perceptions of students in relation to learning opportunities for the development of core practices in their Teacher Education Programs. The survey was designed with the purpose of monitoring a curriculum redesign process, aimed to move towards a practice-based curriculum, and gather evidence for adjustments. The instrument asked 2.039 students (of three different cohorts) about their opportunities to approach practice in disciplinary courses, teaching method courses and field experiences. We describe the perception of the students in each type of course in the first year and compare students' perception of their opportunities to learn core practices over time in the teaching method courses (i.e., years 2 and 3 of the curriculum redesign process).

Session N 22

1 September 2017 15:45 - 17:15

Virta - 113

Symposium

Higher Education

Researching the experiences, identities and career visions of international doctoral students

Keywords: Doctoral education, Educational Psychology, Multicultural education, Qualitative methods, Researcher education

Interest group: SIG 24 - Researcher Education and Careers

Chairperson: Sofie Kobayashi, University of Copenhagen, Denmark

Discussant: Margaret Kiley, Australian National University, Australia

International doctoral students are seen as an asset for the internationalization agenda of the host universities as well as agents of change for their home countries. In this symposium, we explore the lived experiences of international doctoral students, their transitions and identities as they cross national, educational and cultural borders. Globally, governments have increased investment in tertiary education to meet expected needs of the knowledge economy, owing to the tremendous increase in the number of PhD graduates as well as mobility in doctoral education over the last few decades (Pedersen, 2014; Robinson-Pant, 2009). In this development, however, new issues emerge that lead to increased interest

and research into cross-cultural doctoral education (c.f. Manathunga, 2014). This symposium addresses aspects that are arguably under-researched in the growing body of literature on international doctoral education. From their local contexts in Finland, Denmark and Australia each paper presents a different aspect of international doctoral education primarily using qualitative methods. Together, the four papers help shed light on the lived experiences of transition between academic cultures, the personal and academic learning journey, career visions and prospects, and the supportive roles of universities and supervisors.

Manathunga, C. (2014). *Intercultural postgraduate supervision: Reimagining time, place and knowledge*. London: Routledge.

Pedersen, H. S. (2014). New doctoral graduates in the knowledge economy: trends and key issues. *Journal of Higher Education Policy and Management*, 36(6), 632-645.

Robinson-Pant, A. (2009). Changing academies: exploring international PhD students' perspectives on 'host' and 'home' universities. *Higher Education Research & Development*, 28(4), 417-429.

Do PhD supervisors play a role in bridging academic cultures?

Presenting Author: Dely Elliot, University of Glasgow, United Kingdom; **Co-Author:** Sofie Kobayashi, University of Copenhagen, Denmark

Our study reports a phenomenological investigation of ten international PhD students' and nine supervisors' first-hand experience of being in doctoral supervisory relationships in a Danish setting. In-depth qualitative data were gathered through face-to-face individual interviews, which explored differences and challenges experienced as a result of diversity with respect to their educational background and practices, particularly the pedagogic variation. In the same way that the literature suggests that educators play a crucial role in mediating such diversity in the teaching and learning contexts, we strongly argue that PhD supervisors also have a significant part to play in facilitating successful transition of their PhD students to a new academic culture.

Literature in doctoral education recognises the importance of 'pastoral care' in the supervisory bond for nurturing students' overall learning, e.g. confidence and capacity-building in preparation for independent research (Cotterall, 2013; Wright, 2003). Pastoral care arguably includes supervisors' efforts to facilitate the transition to the new learning environment. Yet, more in-depth examination of this aspect of the supervisory relationship (that crosses over academic and non-academic concerns) and the distinct role it plays deserves further attention.

Cotterall, S. (2013). More than just a brain: emotions and the doctoral experience. *Higher Education Research & Development*, 1-14.

Wright, T. (2003). Postgraduate research students: people in context? *British Journal of Guidance and Counselling*, 31(2), 209-227.

The PhD experience of international students in Denmark: the story through photos

Presenting Author: Sofie Kobayashi, University of Copenhagen, Denmark

This paper presents the findings of a small-scale exploratory study of the PhD experience of international students in Denmark. Though the number of international doctoral students in Denmark has increased significantly over the recent years, and especially in technical and natural sciences, where they comprise around one third of all students, their experience of conducting PhD studies in this country has rarely been researched. The present study aims to offer new insights in this regard, based on narrative interviews with 7 finishing doctoral students, who used, among other things, photos to tell the story of their PhD experience. The findings indicate that the social support offered by and within university has a particular significance for international students, and that PhD studies in the context of international mobility include an important element of personal learning and growth, outside the research work.

Becoming a researcher: international doctoral students' learning experience in Australia

Presenting Author: Lily T. H. Nguyen, The University of Melbourne, Australia; **Presenting Author:** David Beckett, The University of Melbourne, Australia

Researcher development in doctoral education is a challenging process. These processes are "not simply the matter of 'coming to know' but also of 'coming to be', that is, of becoming and being a certain authorised form of research(er) identity" (Green and Lee 1995). The experience is believed to be more significant and sometimes more challenging for students who undertake their studies off-shore. In this paper, I will present part of the findings of my PhD research that investigates international Vietnamese doctoral students' learning experience in Australian universities. A phenomenological approach has been taken to carry out the fieldwork and explore students' "lived experiences" and show how complex meanings are built out of those experiences. It was found that these students, being the transnational subjects in the in-between space of home and host countries, go through a dynamic and on-going process of identity negotiation and development, inspired by the ability to imagine alternative possibilities in an expanding global social imaginary. The students experience a whole-person transformation and growth, and demonstrate a strong sense of agency. The theoretical framework for analysis builds on identity theories, adult learning theories, the idea of transnational space and global social imaginary (Taylor 2004). Green, B. and A. Lee (1995). "Theorising Postgraduate Pedagogy." *Australian Universities' Review* 38(2): 40-45.

Taylor, C. (2004). *Modern social imaginaries*, Duke University Press.

International doctoral students' perceptions of factors contributing to their career visions

Presenting Author:Yusuke Sakurai, University of Tokyo, Japan; **Co-Author:**Viivi Virtanen, University of Helsinki, Finland; **Co-Author:**Jenna Vekkila, University of Helsinki, Finland; **Co-Author:**Kirsi Pyhältö, University of Oulu / University of Helsinki, Finland

This paper examined international doctoral students' perceptions of factors affecting their career visions during their studies. It also examined whether the perceptions of their career visions differed in relation to their genders. Through semi-structured interviews with 10 females and 10 male international doctoral students, our analysis resulted in five major themes concerning students' perceptions of factors affecting their career visions: "personal", "development", "family", "scholarly community", and "job market". The experiences pertaining to the "personal" theme were most likely to empower their career visions. Students' enthusiasm for research, own flexibility in pursuing different careers, preference of future residential location were the key resources in envisioning positive career trajectories. Demanding employment conditions due to the competitiveness, scarcity, and instability of potential jobs, which formed the theme of "job market" decreased students' confidence in developing clear career visions. The female and male students showed a substantial difference in regard to the "family" theme. Many females described their familial responsibilities as challenges to achieve their ideal careers, while most male students made no comments on the theme, or even one male student perceived that his family would support his decisions about his future workplace. The results showed that students' career visions may rely too much on their personal values in work and life preferences. Questions seemed to be unaddressed regarding how supportive mechanisms can be constructed in scholarly communities and societies which may forge positive career visions of international doctoral students who contribute to the local and worldwide advancement of the public good.

Session N 23

1 September 2017 15:45 - 17:15

Pinni B - B4113

Symposium

Cognitive Science

Insights in the writing process: From transcription to writing fluency to text quality.

Keywords: Assessment methods and tools, Cognitive skills, Educational Psychology, Language (L1/Standard Language), Literacy, Student learning, Writing / Literacy

Interest group: SIG 12 - Writing

Chairperson: Markus Linnemann, University of Koblenz-Landau, Germany

Organiser: Valerie Lemke, Germany

Organiser: Markus Linnemann, University of Koblenz-Landau, Germany

Discussant: Markus Linnemann, University of Koblenz-Landau, Germany

Writing competence is one of the key competencies in a highly literate society. Studies of the writing process are, compared to the study of reading, still rare with a low impact on test development and writing education. With the development of research tools such as keystroke logging or 'digital ink' to record handwriting, insights into the writing process are given comparatively easy. Nevertheless some phenomena constituting written text composition are still not well enough understood to initiate research on teaching or training writing. One of these phenomena is writing fluency. In the context of research about writing fluency, writing bursts and pauses are of decisive relevance. Bursts, however, show that writing is not only a cognitively structured process but it is also linguistically structured. Moreover, bursts build a bridge between transcription and writing fluency, and text quality respectively. The aim of this symposium is to provide more insights in the writing process, focussing fluency aspects. It addresses the following questions: What constitutes writing fluency and how can it be measured validly? How can writing fluency be improved? What disrupts and interrupts writing fluency? What is the role of linguistic knowledge? What does the construct of bursts contribute to the discussion about writing fluency on the one hand and transcription and text quality on the other hand? What happens during bursts? What do bursts contain linguistically? Moreover the symposium discusses how writing fluency, and subsequently text quality, can be improved and what the didactical and educational 'adjusting screws' are.

Writing Fluency: Definition, Assessment and Relationships

Presenting Author:Sabine Stephany, University of Cologne, Germany; **Co-Author:**Pia Claes, University of Cologne, Germany; **Co-Author:**Valerie Lemke, Mercator Institute for Literacy and Language Education, Germany

As writing fluency is said to build a bridge between transcribing and text composition, the aim of the present study is to define writing fluency and investigate its relationships. International research shows a correlation between writing fluency and text composition. It is assumed, that cognitive resources used to perform basic processes, that are not proceduralized, hinder the execution of higher order skills. We did a correlational study to investigate writing fluency, that was defined as the ability to produce legible letters, correctly spelled words and sentences and locally coherent text at a reasonable pace. According to this definition we developed a writing fluency test comprising four scales: fluency on letter, word and sentence levels and on text level by writing two texts. In the latter tasks the writing was recorded using Handspy. To pre-test our material and to investigate the relationships 150 4th to 9th grade students took part in the study.

We also assessed the students working memory, reading ability, motor skills, text quality, vocabulary and sociobiographical variables. Preliminary results (not all the data was processed until now) show medium to high reliability scores of the scales (Cronbach alpha > .6) and mainly medium to high intercorrelation. Furthermore there were substantial correlations between a writing fluency factor value and working memory involving the central executive ($r=.46$), reading ability (word decoding $r=.61$, sentence comprehension $r=.57$, text comprehension $r=.48$) and motor skills involving a speed component ($r=.35$). In our paper we will present a structural equation model and discuss the results.

Modelling the relationship between transcription and writing: The mediating role of bursts and pauses

Presenting Author: Rui Alexandre Alves, University of Porto, Portugal; **Co-Author:** Teresa Limpo, University of Porto, Portugal

One of the first processes that beginning writers need to master is transcription, which draws on spelling and handwriting to externalize language into the form of written text. Though it is well established that transcription constrains children's writing, little is known about the factors underlying this relationship. This study examined the putative mediating role of bursts and pauses on the link between transcription (handwriting and spelling) and writing fluency or text quality. For that, 174 second graders did the alphabet task and wrote a story using HandSpy. Path analyses indicated that writing fluency and text quality models were excellent descriptions of the data, with 80% and 46% of explained variance. Concerning the fluency model, there was evidence of full mediation. We found that handwriting and spelling contributed to writing fluency indirectly via burst length ($\beta = .20$ and $\beta = .09$, respectively). A small indirect effect of handwriting via short pauses duration was also observed ($\beta = .02$). Concerning the quality model, there was evidence of partial mediation. We found that whereas only handwriting contributed to writing quality directly ($\beta = .15$), both handwriting and spelling contributed to writing quality indirectly, via burst length ($\beta = .16$ and $\beta = .07$, respectively). Overall, better transcription skills allowed students to write more words without pausing, which in turn resulted in more fluent and better writing. These findings support the claim that burst length is a key mediator of the transcription-writing link, at least in initial phases of learning to write.

Exploring the differences between production- and revision-bursts of written language

Presenting Author: Thierry Olive, CNRS & Université de Poitiers, France; **Presenting Author:** Georgeta Cislaru, Université Sorbonne nouvelle, France; **Co-Author:** Sirine Bouriga, Université de Poitiers, France

In this talk, we will focus on dysfluencies of writing, i.e. when production of a new segment of text is stopped by a revision episode. We will describe bursts of written language, which correspond to uninterrupted periods of transcription of a segment of text, and more precisely production and revision bursts. Production bursts refer to new segment of text that continue the already written text, while revision bursts modify the text already produced. As suggested by Baaijen, Galbraith, and De Glopper (2012), revision strategy, and more generally the writing strategy, appears to be a major determinant of presence and nature of revision bursts. Accordingly, a better understanding of the (dys)fluency of writing requires a detailed description of production and revision bursts. In this perspective, we analysed the writing and re-writing operations for composing social reports on at-risk children. Each key press and all textual operations to modify the reports were recorded with Inputlog (Leijten and van Waes 2006). We analysed 80 writing sessions for composing 10 reports, corresponding to a total of 28 pages of text composed in 52 hours. We will present the chronometric parameters of production and revision bursts. We will also present how their syntactical forms differ. To go further, we will pursue these analyses according to the revision operations they carry out, following Baaijen et al (2012) who showed that insertion bursts are shorter than usual production or revision bursts.

Revising at the leading edge: shaping ideas or clearing up noise?

Presenting Author: Eva Lindgren, Umeå University, Sweden; **Co-Author:** Asbjorg Westum, Umeå University, Sweden; **Co-Author:** Hanna Outakoski, Umeå University, Sweden; **Co-Author:** Kirk Sullivan, Umeå University, Sweden

In this paper we focus on the leading edge of on-going text production and specifically where fluency is being interrupted by revision. The leading edge represents the point in the writing process where internal text, concepts as well as form, becomes externalised. We explore how linguistic analyses may contribute to the understanding of how writers elaborate on ideas and meaning when they produce new text. We analyse in depth all the revisions at the leading edge in six texts by a multilingual 15-year-old writer (three language, two text types). We explore the idea of revisions at the leading edge as being 'open' or 'closed', where open revisions provide more than one alternative route while closed revisions only allow one option. Preliminary results show that a substantial amount of the writer's revisions are open and that they occur on different syntactic levels. Results also show that language competence impacts on writers 'open' and 'closed' revisions; the stronger the language the more open revisions. Results confirm previous findings and we argue that revision at the leading edge indicate that processing of ideas and meaning occur constantly during text production, more or less during transcription and without substantial pausing, and that the dynamics of idea generation is affected by language competence. Knowing that language impacts on different levels of writing, including idea generation, can provide input to educators to develop the didaktik of writing that better accounts for the multilingual classroom and learners' different strengths and areas of development.

Session N 24

1 September 2017 15:45 - 17:15

Main Building C - C8

Development and learning in elderly people: A sociocultural approach

Keywords: Cultural psychology, Developmental processes, Learning approaches, Lifelong learning, Mixed-method research, Morality, Qualitative methods, Social interaction

Interest group: SIG 10 - Social Interaction in Learning and Instruction

Chairperson: Aleksander Baucal, University of Belgrade, Serbia

Organiser: Michèle Grossen, University of Lausanne, Switzerland

Discussant: Asa Makitalo, University of Gothenburg, Sweden

This symposium is linked to one of the Centres for Innovative Research launched by EARLI in 2015. Called “Ages for learning and growth: sociocultural perspectives (AGILE)”, this project aims at expanding sociocultural psychology to learning and development of elderly people. The first paper (Aleksandar Baucal) frames the project and examines how sociocultural psychology may contribute to the study of elderly people, and conversely how the latter might feed up sociocultural theory. It points to some possible research directions or some critical issues that are then developed by the other papers: *lifespan development* and its theoretical and methodological assumptions, that tend to be based on unidirectional models of development (Roger Säljö); *the transition into the nursing home*, as a new life experience in which material and symbolic artefacts act as psychological instruments that support the residents in their attempts to actively create their environment and to keep a sense of continuity (Michèle Grossen & Tania Zittoun); *wisdom* as a research topic which have prompted many studies based on quantitative methods and might be enriched through qualitative methods (i.e., life narratives) that inform us about the enactment of wisdom in context and its meaning for the persons (Jelena Radisic & Aleksandar Baucal).

Toward sociocultural approach to learning in elderly people: Extending Vygotsky's theory

Presenting Author: Aleksander Baucal, University of Belgrade, Serbia

Learning and development in the “third age” is not a typical topic for Vygotsky's theory. However, demographic changes have increased a need for a better understanding of elderly people's life and for ensuring supports that would enable them to participate actively in social life. It is even more important if we consider various negative stereotypes about elderly people resulting in a lack of opportunities for meaningful aging and expanding learning and development. Most of the current studies dealing with learning and development in the third age are not based on an overarching theory. They are mostly focused on particular functions with a focus on losses and negative trends. Here, I reflect what Vygotsky's theory can provide to this field of inquiry, but I also intend to show that the application of the theory to the issue of learning and development of elderly people can contribute to an improvement of the theory. In the first part of the paper, I will identify key assumptions and concepts of Vygotsky's theory, whereas in the second part, I will focus on an analysis of critical differences with regard to learning and development in children and elderly people since Vygotsky's theory has typically been applied to younger people. Finally, I will examine the possible contribution of Vygotsky's theory for the study of learning and development in the third age, and explore what theoretical benefits could derive from the extension of this theory to a new field of inquiry.

Development, ageing and the hybrid mind: Growth and decline and ecologies of human functioning

Presenting Author: Roger Säljö, University of Gothenburg, Sweden

The background of this paper is an interest in human development through the life span, and the methodological and theoretical assumptions that underpin such research. Such a research interest is important in its own right, since it provides knowledge about an important field, but also because it introduces significant dilemmas about how to conceive of changes in human habits and functioning in rapidly changing societies. But these kinds of inquiries into development through the life span are important also because of the wider social implications of the metaphors of development and ageing that research suggests and endorses.

It is argued that deterministic and unidirectional models of functioning have limited value in societies undergoing rapid transformations. In the paper, the idea is one of viewing human cognitive (and social) development within the framework of “a hybrid mind” suggested by Merlin Donald. Here, human capacities are viewed in terms of their interconnectedness with the inputs, supports and resources provided by “the distributed cognitive system of culture” (2008, p. 192). This implies that claims about development cannot be made without adopting a “unit of analysis” which incorporates people, communities, activities and the use of external resources. In such a model, views of human development are not premised on age; rather, the interesting issues concern how people participate in established and novel practices and communities during the life-span.

Creativity and continuity of the self in the transition into the nursing home

Presenting Author: Michèle Grossen, University of Lausanne, Switzerland; **Co-Author:** Tania Zittoun, University of Neuchâtel, Switzerland

The transition into the nursing home can be seen as one of the many occasions for learning and development in the lifecourse of a person: it requires an adjustment to a new environment and challenges a person's sense of continuity. Drawing on a sociocultural framework, we try to articulate symbolic and material elements with a person's psychological

activity involved in learning. On an empirical level, it requires to study the person in context and to use qualitative methods that account for the psychosocial processes through which persons actively creates their environment and keep a sense of continuity of their self. Consequently, this study is based on a one-year ethnographic field work in a nursery home and asks the following question: what material and symbolic resources do the residents use to keep a sense of continuity of the self and, in Winnicott's words, to keep the feeling of a life which is worth living? The study consists of three parts: (1) analysis of the written documentation produced by the institution and its context; interviews with the direction, members of the personnel, and members of the residents' family; (2) observations and mapping of the building; (3) observations of the residents' daily activities and rooms; interviews with residents. The results account for the institutions' values, spaces and places, as well as the residents' experiences and uses of symbolic and material resources. They show the creative processes through which the residents reconfigure their environment and keep a sense of continuity.

Personal wisdom as a mirror of lifespan development: Affordances of a mixed-method approach

Presenting Author: Jelena Radisic, University of Oslo, Norway; **Co-Author:** Aleksander Baucal, University of Belgrade, Serbia

This paper discusses the notion of wisdom from a viewpoint drawing on a sociocultural perspective. Firstly, we observe that wisdom develops out of life experiences that bring about fundamental change; secondly, that 'wisdom' may be enacted differently depending on the social settings and its locally embedded practices. Drawing on these assumptions, this study aimed at grasping the concept of wisdom and personal wisdom within two age groups. The data were gathered within an international project concerning two age groups: 65 and above and 21 to 30 year olds (100 participants, balanced by age and sex). The study applied a two-stage mixed-method design. The first part included structured interviews based on the following instruments: *Foundational Values Scale*, *3-Dimensional Wisdom Scale* and *Satisfaction with Life Scale*. In the second phase, some participants from the previous phase (balanced by age group and sex) were selected on the basis of their score on the 3-Dimensional Wisdom Scale and participated in a semi structured interview on their personal life stories and notions of wisdom. The analysis focuses on the life narratives collected in both the younger and the elderly group, depicting participants' enactment and understanding of wisdom in everyday life and how the meaning of 'being wise' and 'wisdom' are shaped in different settings and life circumstances for the two groups. The affordances of the mixed-method design are discussed in the light of its contribution to the understanding of how 'wisdom' is portrayed and put into practices in concrete situations.

Session N 25

1 September 2017 15:45 - 17:15

Main Building A - A3

Invited Symposium

The "FRONTLINE" mission of the Frontline Learning Research Journal

Keywords: Action research, Case studies, Comparative studies, Content analysis

Interest group:

Chairperson: Filip Dochy, KU LEUVEN, Belgium

Discussant: Erno Lehtinen, University of Turku, Finland

Frontline Learning Research is EARLI's open access journal that publishes articles with new ideas, methodologies or discoveries that might be risky but have potential to open up new avenues in the field of learning and instruction.

Frontline Learning Research is an open-access electronic-only journal that publishes articles on issues and trends occurring internationally in research on learning and educational sciences. Among others, the journal focuses on articles in the following fields of research: research on learning and instruction in formal and informal contexts, multidisciplinary research on learning and learning environments, new theoretical and methodological approaches in learning sciences, insights into learning research from disciplines other than educational sciences or psychology.

FLR also welcomes commentaries aimed at triggering discussion about important theoretical and methodological questions about the published articles.

FLR's ambition should be to publish:

- Studies focusing on issues and ideas encountered in relatively new fields, lacking a long line of research.
- Studies showing internal inconsistencies, phenomena which appear inconsistent with the predictions derived from earlier theoretical frameworks and available empirical evidence
- Studies indicating flaws in earlier research work
- Studies seeking to make connections between previously unconnected established lines of research so as to integrate different theoretical frameworks
- Studies using an innovative research methodology that offers a different perspective on how to conceptualise and pursue certain research questions
- Studies setting up new lines in research
- Studies providing new interdisciplinary approaches to specific subjects

- . Studies that explore or predict the unknown future applications in the field of learning and development
- . etc.

Currently, FLR has published many issues with mixed 'frontline' value. Authors are requested to make their 'frontline' value of their work explicit.

After a few years, the editorial board asks itself whether the time has come now to make 'stricter selections' of submissions to be published based on their 'innovativeness' or 'frontline value'. This session wants to explore the desirability and feasibility of such an approach, and possibilities to do so.

Session O 1

1 September 2017 17:30 - 19:00

Main Building C - C6

Single Paper

Teaching and Teacher Education

Teaching and Pre-service Teacher Education - B

Keywords: Achievement, Attitudes and beliefs, Cognitive skills, Comparative studies, Competencies, E-learning / Online learning, Educational Psychology, Integrated learning, Mixed-method research, Phenomenography, Pre-service teacher education, Teacher Professional Development, Vocational education

Interest group: SIG 11 - Teaching and Teacher Education

Chairperson: Minna Törmänen, University of Helsinki, Finland

Personality, opportunities to learn and teaching skills in field experiences of student teachers

Keywords: Competencies, Educational Psychology, Pre-service teacher education, Teacher Professional Development

Presenting Author: Antje Biermann, Saarland University, Germany; **Co-Author:** Isabelle Grassmé, University of Erlangen-Nuremberg, Germany; **Co-Author:** Michaela Glaeser-Zikuda, University of Erlangen-Nuremberg, Germany; **Co-**

Author: Roland Bruenken, Saarland University, Germany

The development of teaching skills in student teachers is influenced by a set of personality variables as well as the quality of the opportunities to learn (OPL) at university and during practical phases. Another important factor is the usage of these OPL by student teachers but until now no evidence exists about the mediating effect of OPL between personality variables and teaching performance. The present study examines this mediating effect between the personality factors extraversion, neuroticism and conscientiousness as well as motivation for choosing teacher education, the usage of OPL as a mediating variable and teaching skills of student teachers ($N=404$) in a practical phase during teacher education as an outcome. The results of a path analysis show that students with higher values on the factors extraversion as well as on the intrinsic motivational dimensions pedagogical interest and ability used more OPL resulting in higher values of self-assessed teaching abilities. A direct path only leads from motivational factor ability to teaching skills. The results show the vital importance of OPL during practical phases and the necessity for a complex view on processes of development of teaching skills in teacher education. Nevertheless, for future studies it is essential to evaluate the mediating processes in longitudinal studies and consider other relevant personality factors (cf. beliefs or self-efficacy).

Conceptions of connecting learning across education and workplace settings

Keywords: Comparative studies, Integrated learning, Phenomenography, Vocational education

Presenting Author: Viviana Sappa, Swiss Federal Institute for Vocational Education and Training, Switzerland; **Co-**

Author: Sarojni Choy, Griffith University, Australia; **Co-Author:** Carmela Aprea, Friedrich Schiller University Jena, Germany

Integrating learning across education and workplace settings is an important, but challenging task in most VET systems. Several strategies were developed in different countries to encourage collaborations between VET actors to design and implement integrated curricula. However, effective connection between learning and teaching in the different locations depends also on the conceptions of different actors. Specifically, scholars adopting a socio-cultural perspective stressed the need for key actors to develop a shared view of such learning as a transitional and dialogical process across different socio-cultural contexts and practices. The main aim of this study was to identify and compare conceptions of vocational teaching and learning across education and workplace settings in Switzerland and Australia. A total of 35 VET actors were interviewed in Switzerland and Australia, asking them about their view and experience of learning and teaching across educational and workplace settings. A phenomenographic procedure was applied as the main strategy for data analysis. Two sets of four conceptions were identified, respectively. Conceptions were first interpreted using a socio-cultural perspective. Similarities and differences between Swiss and Australian conceptions were then discussed in relation to the structural peculiarities of VET systems in the two nations.

Esposued and Enacted Beliefs about Intelligence and Teaching Among Preservice Teachers

Keywords: Attitudes and beliefs, Educational Psychology, Mixed-method research, Pre-service teacher education

Presenting Author: Leila Eve Ferguson, University of Oslo / Kristiania University College, Norway; **Co-Author:** Ivar Bråten, University of Oslo, Norway

This study focused on espoused and enacted beliefs about students' intelligence and sources of teaching knowledge

among 68 Norwegian preservice teachers. To assess espoused beliefs, participants responded to a questionnaire measuring to what extent they believed students' intelligence to be fixed and malleable, respectively, and a questionnaire measuring to what extent they believed knowledge about teaching knowledge to come from formalized sources, own experiences, and social and popular media, respectively. Cluster analysis was used to create profile groups based on participants' scores on these belief measures, resulting in three distinct cluster profiles. To assess enacted beliefs, all participants also responded in writing to three scenario-based classroom problems designed to elicit their beliefs about student learning and teaching. The three cluster groups were compared with respect to how they solved the scenario problems, suggesting that their espoused beliefs were reflected in their responses to the scenarios and were differentially adaptive in those contexts.

Training Success in an Online Training Course for Teachers

Keywords: Achievement, Cognitive skills, E-learning / Online learning, Pre-service teacher education

Presenting Author:Klaus Stiller, University of Regensburg, Germany; **Co-Author:**Regine Bachmaier, University of Regensburg, Germany

According to Cognitive Load Theory and associated studies the way of presenting information in an instructional environment is primarily essential to the success of learning. By avoiding unnecessary extraneous load rising from badly designed instructions and other sources learners are more likely to successfully construct knowledge. In addition it is known that learner characteristics like prior knowledge affect learning. Therefore, this study explores the effects of some learner characteristics (intrinsic motivation, domain-specific prior knowledge, computer attitude, computer anxiety, and learning strategies) on learning success (cognitive load ratings, subjective success of learning, and test performance) in an online training about media pedagogy for trainee teachers by using regression analyses. The training consists of eight modules. The core element of each module was an instructional text. Trainee teachers who worked through one or more modules received a training certificate listing all of the mastered modules. A module completion was suggested as possible with a workload of 60 to 90 minutes. The data of 191 trainee teachers, who worked on all eight module task and requested a training certificate, were analyzed. Teachers evaluated modules (domain-specific prior knowledge test, cognitive load ratings, subjective success of learning, and performance test) and answered questionnaires before starting the course (intrinsic motivation, computer attitude, computer anxiety, and learning strategies). Subjective success of learning could be modelled by learning strategies and load ratings ($R = .71$), test performance by learning strategies, prior knowledge and load ratings ($R = .46$).

Session O 2

1 September 2017 17:30 - 19:00

Pinni B - B1097

Single Paper

Assessment and Evaluation, Learning and Instructional Technology, Learning and Social Interaction

Learning and Development in Early Childhood

Keywords: Assessment methods and tools, Early childhood education, Educational attainment, Language (L1/Standard Language), Peer interaction, Primary education, Quantitative methods, Survey Research

Interest group: SIG 05 - Learning and Development in Early Childhood

Chairperson: Eileen Lübcke, Germany

Capturing children's evaluation of educational technologies with "BiCo"

Keywords: Assessment methods and tools, Primary education, Quantitative methods, Survey Research

Presenting Author:Lara Johanna Schmitt, Saarland University, Germany; **Co-Author:**Jochen Rick, Saarland University, United States; **Co-Author:**Armin Weinberger, Saarland University, Germany

One challenge of child-computer interaction research is how to survey children's attitudes towards software applications by self-report. One frequent bias is the opinion ceiling effect with children tending towards giving very high ratings for every question, which makes it difficult to draw statistically backed conclusions. Addressing this bias, we developed BiCo: a bipolar continuous rating scale. We compare results from BiCo with Smileyometer, an established instrument designed to measure fun (Read, 2008), demonstrating that fourth graders (mean age: 10 years and 5 months; 44% female) are able to use BiCo and that this bias lessens. In addition, a broader range of questions can be asked with BiCo.

What underlies peer rejection? Conditional process analyses in early childhood education

Keywords: Early childhood education, Language (L1/Standard Language), Peer interaction, Quantitative methods

Presenting Author:Femke van der Wilt, VU Amsterdam, Netherlands; **Co-Author:**Claudia van Kruistum, Vrije Universiteit Amsterdam, Netherlands; **Co-Author:**Chiel van der Veen, Vrije Universiteit Amsterdam, Netherlands; **Co-Author:**Bert van Oers, Vrije Universiteit Amsterdam, Netherlands

In the current study, the relationships between receptive vocabulary knowledge, oral communicative competence, and peer rejection were investigated in a sample of $N = 135$ preschool children. Children's receptive vocabulary knowledge was assessed with the Peabody Picture Vocabulary Test, their oral communicative competence was measured with the Nijmegen Test for Pragmatics, and peer rejection was indicated by means of a nomination procedure. Outcomes of

conditional process analyses revealed that oral communicative competence was directly related to peer rejection: children with poorer oral communicative competence were more often rejected by their peers. In addition, receptive vocabulary knowledge was indirectly related to peer rejection, through oral communicative competence: poorer receptive vocabulary knowledge was associated with poorer oral communicative competence, which, in turn, was related to a higher level of peer rejection. Findings indicate the need of focussing both on oral communicative competence and receptive vocabulary knowledge when addressing peer rejection. Early childhood education teachers are encouraged to pay more specific attention to their pupils' communicative abilities, above and beyond their current focus on children's vocabulary.

Structural and process quality in home based and centre based infant child care

Keywords: Assessment methods and tools, Early childhood education, Educational attainment, Quantitative methods

Presenting Author:Hester Hulpia, Ghent University, Belgium; **Co-Author:**Michel Vandenbroeck, Ghent University, Belgium; **Co-Author:**Jeroen Janssen, Ghent University, Belgium

The aim of the current paper is to unravel structural quality dimensions and their differential associations with process quality in home based child care and centre based child care. The study examined effects of structural features at the teacher, classroom and centre levels on observed process quality using CLASS Infant in 167 child care centres. The results suggest that in both home based and centre based child care emotional support is moderate to high, whereas educational support is low. Next, the results show that different structural features influence the process quality in home based child care compared to centre based child care.

Progressive feedback in Finnish Early Childhood Education and Care (ECEC)

Keywords: Assessment methods and tools, Early childhood education, Peer interaction, Quantitative methods

Presenting Author:Jyrki Reunamo, University of Helsinki, Finland; **Co-Author:**Li-Chen Wang, Chang Gung University of Science and Technology, Taiwan; **Co-Author:**Hui-Chun Lee, Tzu Chi University, Taiwan; **Co-Author:**Shu-Chuan Shih, National Taitung University, Taiwan; **Co-Author:**Hui-Hua Chen, Dong Hwa University, Taiwan

In Finland, we are building progressive feedback with the intention of integrating the targets of quality goals, curriculum, enhancing pedagogical work, engaging families and communities and advancing in data collection, research and monitoring of ECEC. According to OECD (2015), monitoring was found to have generated the least international comparative research. In this EARLI 2017 conference, also our colleagues with similar tools from Hong Kong and Taiwan describe their projects. In Finland, 12 municipalities (which covers 30% of the children in ECEC) participate in making progressive feedback a permanent practice. We aim to build a progressive feedback loop, in which the staff, directors and policy makers can monitor the activities, learning and children's well-being in ECEC almost in real time. In the presentation, we describe the procedures to do this.

Session O 3

1 September 2017 17:30 - 19:00

Virta - 109

Single Paper

Assessment and Evaluation, Motivational, Social and Affective Processes

Motivation and Emotion - M

Keywords: Achievement, Attitudes and beliefs, Educational Psychology, Emotion and affect, Experimental studies, Mixed-method research, Motivation, Qualitative methods, Reading comprehension, Secondary education, Social aspects of learning and teaching, Student learning

Interest group: SIG 08 - Motivation and Emotion

Chairperson: Minna Torppa, University of Jyväskylä, Finland

The Role of Emotional Reactivity in the Comprehension of Online Multiple Texts

Keywords: Educational Psychology, Emotion and affect, Reading comprehension, Student learning

Presenting Author:Sara Scrimin, University of Padova, Italy; **Co-Author:**Lucia Mason, University of Padova, Italy; **Co-Author:**Sonia Zaccoletti, University of Padova, Italy

When students search the Web to retrieve information for school assignments, they must necessarily deal with multiple texts and comprehend the information contained within and across them. This study investigated the role of students' emotional reactivity in the comprehension of online conflicting information on the controversial topic of health risks associated with the use of cell phones. Emotional reactivity in terms of arousal was measured by changes in electrodermal activity (skin conductance) as response to an emotionally school-related stimulus presented in a video. Emotional reactivity in terms of valence was measured using self-reports of affective states. One hundred and four 7th graders read six texts about the debated topic in websites varying for reliability and stance on the controversy. After reading, a sentence verification task assessed their surface comprehension and a short essay assessed their comprehension across them at intertextual level. Results revealed that two reliably distinct profiles of emotional response – high reactive and low reactive – emerged from a cluster analysis when considering both arousal and valence of emotionality. These profiles differentiated deeper, intertextual comprehension while controlling for a number of possible interfering variables. Low reactive students outperformed those who showed a more intense emotional response. Findings indicate the role of students' differences in

emotional reactivity at the *micro*-level of a crucial task in the Internet era.

Examining the Self-Generation of Subjective Task Value: A Mixed-Methods Investigation

Keywords: Achievement, Attitudes and beliefs, Mixed-method research, Motivation

Presenting Author: Stuart Karabenick, University of Michigan, United States; **Co-Author:** Jeffrey Albrecht, University of Michigan, United States; **Co-Author:** Nicole Rausch, University of Michigan, United States

A recently developed *self-generated relevance intervention* requires students to write brief essays describing how course content might be relevant to their lives, which has promoted student performance and motivation in high school and college courses (Harackiewicz et al., 2014). A recent review highlighted the need for greater conceptual clarity to more closely align this intervention with motivation theory and explain why self-generating relevance connections improve students' academic value beliefs (Rosenzweig & Wigfield, 2016). To address that challenge, the present mixed-methods study employed a qualitative approach that examined student-generated essays through the lens of expectancy-value theories of achievement motivation to account for quantitative results obtained from a relevance intervention replication among American college students in introductory statistics. In contrast to prior studies, our replication did not find positive main effects of the relevance intervention on students' task value beliefs or final grades. Women in the intervention did report increased value for statistics. Qualitative findings demonstrated that students did not typically generate (novel) beliefs about the value of statistics. Most problematically, students rarely generated value that was personally important, rather than merely expedient. This is a critical theoretical distinction in expectancy-value theory that interventions should acknowledge and address. In this presentation, we use mixed-methods findings to suggest how intervention practices can more closely align with expectancy-value theory and make recommendations to improve future relevance intervention efforts.

Reference Group Effects on Task Interest in an Academic Learning Task - An Experimental Study

Keywords: Achievement, Motivation, Social aspects of learning and teaching, Student learning

Presenting Author: Jannis Bosch, Universität Potsdam, Germany; **Co-Author:** Jürgen Wilbert, Universität Potsdam, Germany

Social comparison information is one of the major factors used to evaluate academic achievement, both formally (e.g. grades) and informally (e.g. contact with peers). While social comparison feedback can have desirable effects, it can also have considerable downsides, such as diminished interest, especially in lower-achieving students. In this study, we wanted to explore potential reference group effects on task interest. Trautwein et al. (2006) could show a *big-fish-little-pond effect* (BFLP) on task interest in an observational study. In this study, we wanted to investigate whether BFLP effects on task interest could be replicated in an experimental study. To do that, 267 elementary school children received social comparative performance feedback in a computer-based learning task. The performance feedback presented to the participants was independent of actual performance. Both *social position* (*high vs. low*) and *peer performance* (*strong vs. weak reference group*) were experimentally manipulated. Before and after working on the academic learning task, task interest was retrieved. Results show an increase in task interest only in the *high social position / strong peer performance* condition. Further, linear mixed models suggest that both *social position* and *peer performance* differentially influence development of task interest from pre- to post-test measurement. The practical and scientific benefit of the results of this study will be critically discussed.

Antecedents and consequences of student responsiveness to a relevance intervention in the classroom

Keywords: Experimental studies, Motivation, Qualitative methods, Secondary education

Presenting Author: Brigitte Brisson, German Institute for International Educational Research (DIPF), Germany; **Co-Author:** Chris S. Hulleman, University of Virginia, United States; **Co-Author:** Isabelle Haefner, University of Tübingen, Germany; **Co-Author:** Hanna Gaspard, University of Tübingen, Germany; **Co-Author:** Barbara Flunger, Utrecht University, Netherlands; **Co-Author:** Anna-Lena Dicke, University of California, Irvine, United States; **Co-Author:** Ulrich Trautwein, University of Tübingen, Germany; **Co-Author:** Benjamin Nagengast, Eberhard Karls Universität Tübingen, Germany

Why do some students profit from interventions and others do not? Although research on interventions implemented in real-life educational settings is steadily growing, systematic studies on the processes leading to the effectiveness of these interventions are still rare. By investigating the antecedents and consequences of students' responsiveness to written intervention material, the current study aims to shed a closer light on the components that make classroom-based motivational interventions work. Using a sample of 1916 ninth grade students in 82 classrooms, students' responsiveness to two written intervention tasks about the personal relevance of mathematics (quotations condition: evaluating quotations; text condition: writing a text) was assessed. First, students' responsiveness was analyzed by coding 1280 essays on three theory-driven fidelity indicators (positive arguments, personal connections, in-depth reflection) which were combined into a responsiveness index. Second, linear regression analyses showed that students' conscientiousness, gender, math achievement, and math motivation predicted the responsiveness index. Third, complier-average causal effects analyses revealed that intervention effects on students' utility value beliefs compared to the control group were stronger for responsive than for nonresponsive students. The current study highlights the importance of investigating the processes underlying the intervention effects (e.g., subgroup effects) in order to optimize the designs of classroom-based motivational

interventions.

Session O 4

1 September 2017 17:30 - 19:00

Linna - Väinö Linna (K104)

Single Paper

Developmental Aspects of Instruction, Motivational, Social and Affective Processes

Motivation and Self-Regulation

Keywords: Achievement, Computer-supported collaborative learning, Early childhood education, Emotion and affect, History, Mathematics, Metacognition, Motivation and emotion, Parental involvement in learning, Qualitative methods, Quasi-experimental research, Secondary education, Self-regulation

Interest group: SIG 08 - Motivation and Emotion, SIG 16 - Metacognition, SIG 27 - Online Measures of Learning Processes

Chairperson: Kathy Sylva, University of Oxford, United Kingdom

Parents and adolescent students' views on the stimulation of self-regulation in the home environment

Keywords: Parental involvement in learning, Qualitative methods, Secondary education, Self-regulation

Presenting Author:Valérie Thomas, Vrije Universiteit Brussel, Belgium; **Co-Author:**Koen Lombaerts, Vrije Universiteit Brussel, Belgium; **Co-Author:**Jeltsen Peeters, Vrije Universiteit Brussel (VUB), Belgium

Parents play an important part in adolescents' life and are therefore to be considered significant contributors for their youngsters' development of self-regulatory skills. Research on stimulating self-regulation in a home environment with secondary education students is scarce. Therefore, the present study explores perceptions of parents and secondary education students on the different dimensions of self-regulation during learning activities using semi-structured interviews with 20 students and their parents. Specific parental practices and support that promote adolescents' self-regulation are investigated. Results show that parents promote rather general dimensions of self-regulation, e.g. self-regulation of behavior and motivation, instead of the direct stimulation of self-regulated learning activities. However, due the interrelatedness of self-regulated subdimensions it can be assumed that these subdimensions (e.g. self-regulation of motivation) impact the other dimensions (e.g. self-regulation of learning). Overall, the insights of this study provides deeper understanding in the development and stimulation of self-regulation in another context than school. In addition, these insights also give schools a more profound understanding on how to reinforce self-regulation at home and consequently supplement the teaching-learning context in the classrooms to make learning activities even more effective.

Interplay of temporal changes in self-regulation, academic success and perceived group challenges

Keywords: Computer-supported collaborative learning, Metacognition, Self-regulation, Motivation and emotion

Presenting Author:Muhterem Dindar, University of Oulu, Finland; **Co-Author:**Jonna Malmberg, University of Oulu, Finland; **Co-Author:**Sanna Järvelä, University of Oulu, Finland; **Co-Author:**Paul A. Kirschner, Open University of the Netherlands, Netherlands

Conventional self-report questionnaires with multiple items have often been administered in self-regulated learning (SRL) research. However, such self-reports can be criticized for measuring SRL as a single event and not being able to capture transitory changes in SRL processes. This study investigates the relationship between temporal changes in SRL constructs and academic success through the application of single-item measures at multiple times in a high school advanced physics course. The current study combines self-report data with qualitative analysis to inform about the types of challenges and solutions reported when situation-specific self-report measures indicate deterioration, enhancement or fluctuation in SRL constructs during collaborative learning.

An analysis of students' written accounts in first and third person empathy tasks.

Keywords: Emotion and affect, History, Quasi-experimental research, Secondary education

Presenting Author:Carla Van Boxtel, University of Amsterdam, Netherlands; **Co-Author:**Tessa de Leur, University of Amsterdam, Netherlands; **Co-Author:**Arie Wilschut, Amsterdam University of Applied Sciences (AUAS), Netherlands

Empathy tasks, which invite students to identify with historical actors or describe their perspectives, are a common phenomenon in history education. The aim of this study is to explore the differences in students' answers when completing an empathy task asking for an account written in first person ("imagine *you* are in the past") or in third person ("imagine *someone* in the past"), or a task in which no empathy at all is asked. Students in Dutch secondary education (N = 254) participated by completing a task on the Dutch Iconoclasm. Our analysis of student answers focused on aspects of historical empathy: historical contextualization, affective elements and perspective taking.

We found that both empathy tasks stimulated students to include concrete details and emotions of historical actors. The texts of students who were not asked to empathize included more multiple perspectives. Students who completed the empathy task in first person, showed more presentism and moral judgements of the past than students who completed a task in third person.

Classroom Organization: Mitigating the effects of children' self-regulation on math achievement

Keywords: Achievement, Early childhood education, Mathematics, Self-regulation

Presenting Author:David Munez, National Institute of Education / Nanyang Technological University, Singapore; **Co-Author:**Kerry Lee, Nanyang Technological University/National Institute of Education, Singapore; **Co-Author:**Rebecca Bull, National Institute of Education/Nanyang Technological University, Singapore, Singapore

The development of behavior regulation is deeply influenced by the family environment. Significant differences in behavior regulation exist among children when they enter kindergarten. Deficits in behavior regulation may cause social and academic difficulties in early childhood. It is well documented that the ability to self-regulate has greater influence on children's academic performance than basic cognitive abilities (i.e., IQ). Self-regulation has been found to predict children's math achievement at school entry, and in early elementary school. Whereas the extant literature suggests that preschool quality influences the development of children's self-regulation, it is unknown whether specific aspects of classroom quality may contribute to ameliorate the effects of disparities in self-regulation at kindergarten entry. The present study explores whether three domains of classroom quality, as measured by the CLASS, mitigate the effects that self-regulation has on math achievement (n= 694). Results indicate that higher-quality classroom interactions, specifically those related to better classroom management and organization, reduce the differential effects that children's self-regulation possess on math achievement. Findings suggest that children with lower self-regulation skills benefit from better classroom practices. In this context, fostering teachers' skills to adequately organize classroom interactions may help to mitigate the negative effects of low self-regulation on math achievement.

Session O 5

1 September 2017 17:30 - 19:00

Pinni B - B1096

Single Paper

Teaching and Teacher Education

Teacher Professional Development - B

Keywords: Competencies, Educational Psychology, Educational Technology, Higher education, Motivation, Pre-service teacher education, Qualitative methods, Reasoning, Reflection, Student learning, Teacher Effectiveness, Teacher Professional Development

Interest group: SIG 11 - Teaching and Teacher Education

Chairperson: François Lombard, University of Geneva, Switzerland

Beginning teachers' profiles of professional competence: Who are the more successful teachers?

Keywords: Competencies, Educational Psychology, Motivation, Teacher Effectiveness

Presenting Author:Christina Linninger, Goethe-Universität Frankfurt, Germany; **Co-Author:**Doris Holzberger, Technical University of Munich (TUM), Germany; **Co-Author:**Mareike Kunter, Goethe-Universität Frankfurt, Germany

The present study aims to, first, identify beginning teachers' patterns of professional competence at their transition into practice and to, second, investigate differences in professional success (referring to occupational behavior and well-being) between groups of teachers with these different patterns. The participants were 579 beginning teachers from various school subjects and school types who had just finished their formal teacher education in Germany. We conducted a latent profile analysis and included 16 subscales from different aspects of competence, which were educational knowledge, beliefs, motivation, and self-regulation. We found three patterns of competence among the beginning teachers which can be characterized as "overall competent teachers", "teachers with reduced knowledge", and "teachers with reduced motivation". The main finding of the group comparisons is that teachers with reduced motivation rated themselves as significantly less professional in their behavior and scored significantly lower on occupational well-being than the other two groups. This pattern of results is also found in student ratings of the teachers' behavior and well-being for a subsample of 52 teachers, although not all comparisons reach statistical significance. We conclude from our data that teachers do not graduate from formal teacher education with the same "starting competence". Moreover, apart from cognitive aspects of competence also non-cognitive aspects seem to be an important part of beginning teachers' starting competence with respect to their ability to operate professionally at school.

A review on ICT-training in Scandinavian teacher education

Keywords: Educational Technology, Higher education, Pre-service teacher education, Teacher Professional Development

Presenting Author:Fredrik Mørk Røkenes, Norwegian University of Science and Technology, Norway; **Co-Author:**Rune Krumsvik, University of Bergen, Norway

In today's digital Scandinavian schools and in higher education, teachers and lecturers are expected to integrate information and communications technology (ICT) in their teaching to prepare pupils for the complex demands of the knowledge society. Consequently, teacher education programs in Scandinavian countries (Denmark, Finland, Iceland, Norway and Sweden) are also expected to prepare student teachers to teach their subject disciplines with ICT so that they can fulfill curricular demands and meet pupils' learning expectations. However, the use of ICT in teacher education in countries such as Norway has been criticized for being teacher-centered, tool-focused, and slow to implement new and innovative pedagogies involving digital technologies. Although Scandinavian schools and higher education institutions are digitally well-equipped, there is little knowledge about how these technologies are used in the preparation of future school

teachers. Therefore, the current study is a state-of-the-art review of the research literature on the use of ICT in Scandinavian teacher education from 2010 until 2016. The aim of the study is to shed light on how student teachers are prepared to teach with ICT in their subject disciplines, thus developing their professional digital competence. The research question is: *How are student teachers in Scandinavian teacher education prepared to teach with ICT?* The method is literature review which draws on methods from systematic review. A total of 45 studies were included in the final review. The findings discuss key strategies, current technological trends and future directions regarding the use of ICT in teacher education in the Scandinavian countries.

Stories of student teachers about their practice: a learning tool for students and teacher educators

Keywords: Higher education, Reflection, Student learning, Teacher Professional Development

Presenting Author:letje Pauw, Katholieke Pabo Zwolle, Netherlands; **Co-Author:**Wenckje Jongstra, Katholieke Pabo Zwolle, Netherlands

Stories of student teachers about their practice: a learning tool for students and teacher educators Student teachers develop their professional identity gradually. As an aspect of the development of their professional identity we teach student teachers to reflect on their own practical school-based experiences by writing stories and analysing these. Could these stories also be a learning tool for teacher educators? In two studies we examined this question. In one study the plots of the story were analysed of 45 freshmen with five of the categories of Booker (2004). In another study both the hidden and the expressed values in verbal acts in stories of seven 3rd year students were analysed, categorizing these values. It appeared that the category of Booker 'Overcoming the Monster' was the main theme (archetype) junior students encounter and that students seldom show traces of reaching the second phase of professional identity: expanding personal power. It seems students possess only a few scripts for their acts and a rather narrow frame (image) of their profession. In these studies we show that teacher educators can help their students by asking them questions about their stories and can reveal in cooperation with the students their values. They also can help them to get insight in the actual phase of their professional identity and show them other scripts to widen their frame of the profession of the teacher. In this way stories are as well useful as a learning tool for student teachers as for teacher educators.

The role of experience-based and research-based knowledge for teachers' instructional decision-making

Keywords: Qualitative methods, Reasoning, Teacher Effectiveness, Teacher Professional Development

Presenting Author:Ulrike Franke, Ludwig-Maximilians-Universität (LMU), Germany; **Co-Author:**Christof Wecker, Ludwig-Maximilians-Universität (LMU), Germany

Abstract It appears that teachers' instructional decision-making is influenced more by the experience-based knowledge that is developed over a long series of episodes than by research-based knowledge of scientific theories and empirical findings. Therefore, the present study was designed to investigate what types of knowledge teachers provide as reasons for particular instructional decisions and whether their experience-based knowledge is in fact based on experienced episodes. In the present on-going study, in-service teachers of different types of school and different subjects are interviewed subsequent to a videotaped lesson. At least three scenes involving an instructional decision are employed as stimuli for the interview. Based on a structured interview guideline, teachers are asked for a reason for each instructional decision. A coding scheme comprising different types of knowledge that can be provided as a reason was developed. The results so far suggest that experience-based knowledge was the dominant type of knowledge mentioned as a reason for an instructional decision, whereas research-based knowledge was rarely cited. Specific characteristics of underlying episodic experiences that could testify to the authenticity of these experiences were hardly mentioned. These initial findings raise interesting questions about the nature of the teachers' experience-based knowledge: Have the particular episodic experiences been encapsulated in automated routines or is it conceivable that in many cases real episodic experiences never actually occurred in the past? It may be difficult to differentiate empirically between these competing explanations, yet further analyses of the data from the present study will shed further light on these issues.

Session O 6

1 September 2017 17:30 - 19:00

Pinni B - B3118

Single Paper

Cognitive Science, Instructional Design

Metacognition and Self-regulation - B

Keywords: Cognitive skills, Early childhood education, Intelligence, Metacognition, Mixed-method research, Motivation, Problem solving, Reading comprehension, Self-regulation, Student learning

Interest group: SIG 16 - Metacognition

Chairperson: Antti Rajala, University of Helsinki, Finland

Associations between metacognition and executive functions in 2-5 year olds during problem-solving

Keywords: Early childhood education, Metacognition, Problem solving, Self-regulation

Presenting Author:Loren Marulis, Connecticut College, United States; **Co-Author:**Lindsey Nelson, Connecticut College, United States

Metacognition (Mc) and executive functions (EF) have evolved conceptually, in parallel for the most part, the former being more prevalent in educational research and practice; the latter more in cognitive science. Both constructs are correlated with school and life outcomes.

Though researchers have acknowledged conceptual and functional similarities between Mc and EF (Brown, 1987; Efklides, 2008; Fernandez-Duque, Baird, & Posner, 2000; Lyons, & Zelazo, 2011), empirical evidence is scarce, particularly targeting young children. Examining relations between these skills early in development may clarify theoretical frameworks of each construct, interrelations and how they function together across development, and implications for fields such as education and clinical psychology.

The current study focused on Mc (knowledge, monitoring and regulation of cognition) and EF (a set of skills important for planning and engaging in complex, goal-directed activity, including working memory, inhibition, and cognitive flexibility) and associations between these processes in children aged 2-5 (cross-sectional). We targeted this important age when these skills are emerging using contextualized, developmentally appropriate, and meaningful tasks in a College lab school. Specifically, associations between children's metacognitive skills (observational measure targeting metacognitive behaviors during a challenge puzzle and an interview measure of children's metacognitive knowledge about the puzzle) and EF (task-based measure of EF similar to "Simon-says") were examined (controlling for language). Significant relations were found for 4 and 5-year olds but not for 2 or 3-year olds indicating a clear developmental trend. Results will contribute to theory and practice by explicating relations between these critical developmental capacities across early development.

Modeling relations between epistemic cognition, interest, and science knowledge across gender

Keywords: Cognitive skills, Metacognition, Motivation, Student learning

Presenting Author: Christian Brandmo, University of Oslo, Norway; **Co-Author:** Ivar Bråten, University of Oslo, Norway;

Co-Author: Helge Strømsø, University of Oslo, Norway

In the current study, we examined justifications for knowing in science and interest in controversial science topics as predictors of domain- and topic-specific science knowledge. Participants were 281 Norwegian upper secondary school students. Using previously validated measures and structural equation modelling, the results indicated that students' justifications for knowing predicted their science knowledge, with justification by multiple sources being a positive and justification by personal opinion being a negative predictor. Moreover, it was found that topic interest played a greater role for female than for male students. Finally, results indicated a positive relationship between justification by multiple sources and topic interest. Theoretical and practical implications are discussed.

The use and effects of motivational and metacognitive strategy hints

Keywords: Metacognition, Mixed-method research, Reading comprehension, Self-regulation

Presenting Author: Danny Kostons, University of Groningen, Netherlands

From recent review and meta-analytical research on the effectiveness of learning strategies, it seems a combination of cognitive, metacognitive and motivational learning strategies is most effective for self-regulated learning (Donker, De Boer, Dignath, Kostons & Van der Werf, 2014). The same research showed that whilst there are a plethora of studies on explicit cognitive and metacognitive strategy instruction, the number of studies focusing on motivational strategy use has been far more limited. Although studies often include motivational outcomes, such as self-efficacy, beneficial effects on these outcomes are more often attained through the stimulation of cognitive or metacognitive strategy use than through motivational strategy use. In this study, we compared the effects on text comprehension scores and MSLQ scores of hints with regards to either metacognitive or motivational strategy use. Although the quantitative results of this pilot study did not show differences between the two types of hints, qualitative investigations of reports about the use of the hints yielded favorable results for motivational strategy hints.

Does mind wandering and metacognition predict verbal and figural creativity in high school students?

Keywords: Cognitive skills, Intelligence, Metacognition, Self-regulation

Presenting Author: David Preiss, Pontificia Universidad Catolica de Chile, Chile; **Co-Author:** Dominga Ortiz, Pontificia Universidad Católica de Chile, Chile

We implemented an individual differences study in a sample of 228 Chilean high school students. The main purpose of this study was to clarify whether mind wandering and metacognition impact verbal and figural creativity. The results showed mixed evidence regarding the relationship between mind wandering and creativity. Mind wandering only predicted one of three tests of creativity, specifically the one measuring creative problem solving. It did not predict divergent thinking and figural creativity. On the other hand, metacognition predicted the three creativity scores after controlling by fluid intelligence and attentional capacity and taking into consideration mind wandering. Reading difficulties were also accounted for in the models assessing the predictors of verbal creativity. Theoretical implications are discussed.

Session O 7

1 September 2017 17:30 - 19:00

Main Building A - A3

Single Paper

Instructional Design, Learning and Instructional Technology

Instructional Design - C

Keywords: Cognitive skills, Educational Psychology, Informal learning, Instructional design, Lifelong learning, Mathematics, Metacognition, Out-of-school learning, Primary education, Science education, Social interaction, Student learning, Teaching / instruction

Interest group: SIG 06 - Instructional Design

Chairperson: Bobby Hoffman, University of Central Florida, United States

Learning from Diagrams: Effects of Strategy Training

Keywords: Cognitive skills, Instructional design, Metacognition, Science education

Presenting Author:Marco Kragten, Amsterdam University of Applied Sciences, Netherlands; **Co-Author:**Wilfried Admiraal, Leiden University, Netherlands; **Co-Author:**Gert Rijlaarsdam, University of Amsterdam, Netherlands

The present study evaluated effects of a multiple-strategy training on student learning from biological process diagrams. The training focussed on a stepwise working-routine that included when and where to employ cognitive and metacognitive learning strategies and on affective strategies to invest effort in the implementation of this stepwise working-routine. The study followed an experimental pretest-posttest design. Students ($N = 180$) were randomly assigned to the training or the comparison group. We did not find a significant direct effect of multiple-strategy training on learning from biological process diagrams. However, we found a positive significant effect of multiple-strategy training, mediated by invested mental effort, on learning from process diagrams.

How to improve managers' social interaction strategies during blended leadership training?

Keywords: Educational Psychology, Instructional design, Social interaction, Lifelong learning

Presenting Author:Kirsti Lonka, University of Helsinki, Finland; **Co-Author:**Markus Talvio, University of Helsinki, Finland; **Co-Author:**Kitte Marttinen, HAAGA-HELIA University of Applied Sciences, Finland; **Co-Author:**Elina E. Ketonen, University of Helsinki, Finland

A major insurance company in Finland wanted to implement an organizational change process and they needed to train their middle managers. Our aim was to create a blended learning environment and to develop an innovative training program for them. *Engaging Learning Environment (ELE) model* (Lonka, 2012) was applied for the 3-month training focusing on how to support well-being and work engagement. The participants were 108 middle managers from a major Finnish insurance company (ELE intervention group $n=23$; E-learning group, $n=43$ who had access to the materials; a 2nd comparison group, $n=42$). To investigate the participants' *knowledge* on managing their employees 16 MCQs were asked. The skills were tested by utilizing Dealing with Challenging Interaction (DCI) method (Talvio et al., 2012), consisting of cases that managers need to handle. After each case the participants were asked to describe how they would react. The descriptions given by the participants in how they would act in challenging situations were content analyzed and quantified. A repeated-measures MANOVA was carried out to determine whether participants' knowledge and skills would change during the leadership training, and whether their belonging to a group had bearing on such changes. The ELE intervention group increased more both in knowledge of the company's strategy and also, in readiness to deal with challenging interaction than the two comparison groups.

Deep structure similarity explains effectiveness of Guided Cognition homework across content domains

Keywords: Cognitive skills, Informal learning, Instructional design, Out-of-school learning

Presenting Author:William B. Whitten II, Fordham University, United States; **Co-Author:**Mitchell Rabinowitz, Fordham University, United States; **Co-Author:**Sandra E. Whitten, Fordham University, United States

Guided Cognition improves learning from homework by structuring study tasks to engage students in specific, observable *cognitive events* that elicit underlying learning-effective *cognitive processes*. We identified cognitive events that occur in classrooms and have correlates in the experimental literature, then designed some into homework. The cognitive events were: Role Play, in which the student answers as if he or she is the character; Visualize and Illustrate, in which the student creates a simple line drawing to help answer the question; Relate to Prior Experience, in which the student answers the question within the context of previous knowledge; and Divergent Thinking in which the student answers the question from more than one point of view. Guided Cognition homework has been found to improve seventh-grade students' abilities to comprehend and recall literature and also to improve seventh-grade students' abilities to interpret and work mathematics story problems. On the surface, students are performing much different tasks when studying literature and mathematics, yet Guided Cognition style homework facilitates learning in these very different content domains. We will present an experiment comparing learning literature from Guided Cognition homework to learning literature from traditional homework, and we will present an experiment comparing learning mathematics from Guided Cognition homework to learning mathematics from traditional homework. Then we will show literature-specific and mathematics-specific homework design frames for cognitive events and will show, through logical analysis, that the deep structures (cognitive processes) can be similar even though the surface structures (cognitive events) appear very different across these content domains.

The use of manipulatives in mathematics classrooms from the pedagogical and practical perspective

Keywords: Mathematics, Primary education, Student learning, Teaching / instruction

Presenting Author:Darane Lehtonen, University of Tampere, Finland; **Co-Author:**Jorma Joutsenlahti, University of Tampere, Finland

It has been evidenced that when being utilised appropriately, manipulative materials—hands-on learning tools—can facilitate

students' understanding of mathematical concepts. However, research has demonstrated that teachers usually favour traditional teacher-centred and paper-and-pencil mathematics instruction over manipulatives. Therefore, this signals that pedagogical benefit is not the only factor influencing the manipulatives use in mathematics classrooms. To discover how to elevate the beneficial use of mathematics manipulatives, we conducted qualitative research in third- to sixth-grade classes. Our empirical research results and analysis of existing manipulatives, together with work of other researchers have brought to light the hindrances to benefiting from manipulatives. Not only pedagogy, but also day-to-day practicality plays an important role in the success of manipulatives utilisation. These findings provide implications for manipulatives design and development during the next phase of our research as well as for future studies, classroom practice, school management, and teacher education.

Session O 8

1 September 2017 17:30 - 19:00

Main Building A - A32

Single Paper

Teaching and Teacher Education

Teaching and Teaching Education

Keywords: Attitudes and beliefs, Educational Technology, Instructional design, Knowledge creation, Language (Foreign and second), Motivation and emotion, Pre-service teacher education, Qualitative methods, Secondary education, Student learning, Teacher Professional Development, Teaching approaches

Interest group: SIG 11 - Teaching and Teacher Education

Chairperson: Jeannine Turner, Florida State University, United States

Stories of resilience. Exploring resilience among part-time trainee teachers in the Netherlands

Keywords: Pre-service teacher education, Qualitative methods, Secondary education, Motivation and emotion

Presenting Author: Barbara Roosken, Fontys University of Applied Sciences, Netherlands

When describing how beginning teachers felt when they first started teaching trainees talk about sinking or swimming. This paper investigates what teaching experiences, strategies and factors impact on early career teachers' (ECTs') resilience in secondary colleges in the South of the Netherlands. Semi-structured interviews were conducted with twelve individual ECTs from three different cohorts. Data was collected over a 2-year period and included the following: 22 audio-taped interviews with ECTs, line drawings, relational maps, 7 ECTs' portfolios and the researcher's memos. The participants recalled their teaching experiences by means of analysing critical incidents that occurred in their classrooms. The research design was a multiple case study approach. A thematic data analysis was used to examine the ECTs' stories (Guest et al, 2012; Braun & Clarke, 2013) with the help of ATLAS.ti 7 software. The findings show that the ECTs were often expected to take on the full range of teaching tasks in isolation with little support to cope with all the demands of their new role. The ECTs found that personal factors such as self-efficacy and a sense of agency helped develop their resilience as well as contextual resources provided in schools. By identifying strategies that impact on resilience, this research has strengthened the guidelines on which induction programmes at Teacher Education Colleges can be made. It is suggested that ECTs are mentored around developing resilience strategies in order to increase their confidence to work and teach in a new school environment.

Language awareness from a teachers' perspective: Tensions between difficulties and possibilities

Keywords: Attitudes and beliefs, Language (Foreign and second), Secondary education, Teaching approaches

Presenting Author: Ellen van den Broek, Radboud University Nijmegen, Netherlands; **Co-Author:** Paulien Meijer, Radboud University, Graduate School of Education, Netherlands; **Co-Author:** Ans van Kemenade, Radboud University, Netherlands; **Co-Author:** Sharon Unsworth, Radboud University, Netherlands

In this paper we present the results of an exploratory, multiple-case study focusing on teachers' cognition about a language awareness (LA) approach to foreign language education. This approach could stimulate the development of higher-order thinking skills within the language subjects by using knowledge about language to reflect on the language skills. LA can be defined as 'the development of a conscious perception and sensitivity in language learning, language teaching, and language use' (Association for Language Awareness, 2012). As research on the topic of LA is still scarce in the Netherlands, ten secondary school teachers were interviewed and asked about their views on LA, whether they recognise examples of LA in their own teaching practices, and which possibilities and difficulties they foresee when it comes to implementing such an approach. Classroom observation served as the basis for the semi-structured interviews. The aim of this paper is to induce new understandings of LA in the context of Dutch upper-secondary foreign language education, gain insight into teacher's cognition about LA, and identify similarities and differences between teacher's cognitions. Findings reveal interesting variability across teachers, in their views on LA, as well as the possibilities and difficulties they foresee when implementing such an approach to foreign language education. Furthermore, findings reveal numerous tensions between professional, contextual and attitudinal factors. However, this variability can be used in order to facilitate the practical implementations of this approach.

Teaching computational thinking in preservice teacher education with scaffolded programming scripts

Keywords: Educational Technology, Instructional design, Pre-service teacher education, Teaching approaches

Presenting Author:Charoula Angeli-Valanides, University of Cyprus, Cyprus; **Co-Author:**Kamini Jaipal-Jamani, Brock University, Canada

Computational thinking is an essential skill for the 21st century. Teacher education departments, however, do not currently have the knowledge to promote computational thinking in their programs. The question, then, becomes how to include the teaching of computational thinking in teacher education courses. The present study directly addresses this issue. In particular, the study proposes the use of scaffolded programming scripts as one method for teaching computational thinking in preservice teacher education. In this study, scaffolded programming scripts were used in the context of educational robotics activities in a science education lesson about gears. The study reports significant effects on preservice teachers' computational thinking skills and discusses implications and future research directions.

Exploring general pedagogical knowledge in teacher education - a learning oriented approach

Keywords: Pre-service teacher education, Student learning, Teacher Professional Development, Knowledge creation

Presenting Author:Christian Kraler, Teacher Education and School Research, Austria; **Presenting Author:**Fiona MacKay-Falls, University of Innsbruck, Austria

The aim of this paper is to contribute to the question of general pedagogical knowledge (GPK) in teacher education (TE). Within the growing tensions between cost reduction (or avoiding overspending) and system development, improvement and optimisation, governments and international organisations tend to design and operationalize educational questions/challenges with an often hidden economic based structure and logic (indicators, standards, controlling based prognosis,...). The tension for researchers is therefore whether to conform to this (hidden) logic by designing research projects in an economically adequate way or do we have alternatives? Whereas Shulman provided one of the first comprehensive theoretical models on teacher knowledge, Voss and König's work sought to operationalize and measure general pedagogical knowledge (a specific aspect of Shulmans model). In doing so, their approaches have mirrored the primarily competence oriented operationalisations of GPK, for instance used by the OECD. In contrast, our current research project entitled pKiTE (pedagogical Knowledge in Teacher Education) suggests an alternative perspective on pedagogical knowledge in teacher education. It allows us to more adequately explore crucial questions of GPK in TE like gender, migration and aspects of diversity. We suggest a learning oriented epistemological model based on the knowledge concept of Mittelstraß (instrumental knowledge and orientation knowledge), an analytical definition of GPK, Bruner's concept (1960) of fundamental ideas as a framework for content and the dimension of learning-teaching orientation.

Session O 9

1 September 2017 17:30 - 19:00

Virta - 120

Single Paper

Learning and Social Interaction

Cooperative Learning and Social Interaction

Keywords: Cognitive development, Cooperative / collaborative learning, Educational Psychology, Informal learning, Knowledge creation, Out-of-school learning, Secondary education, Social aspects of learning and teaching, Social development, Social interaction, Student learning

Interest group: SIG 10 - Social Interaction in Learning and Instruction

Chairperson: Susan Goldman, University of Illinois at Chicago, United States

Academic help seeking: The case of French lower secondary students

Keywords: Educational Psychology, Secondary education, Social interaction, Student learning

Presenting Author:Minna Puustinen, INS HEA, France; **Co-Author:**Christine Berzin, University of Picardie Jules Verne, France

Student academic help seeking has been studied intensively since the publication of Nelson-Le Gall's (1981) eminent paper. However, most research has focused on elementary and university students. Our aim was to collect data on French lower secondary school students' help-seeking behavior. More specifically, our aims were to (1) identify the reasons that push lower secondary students to seek help (or not) for their schoolwork; (2) verify whether mathematics, which has been shown to be one of the disciplines that trigger the most help seeking in elementary classrooms, triggers the most help seeking at the lower secondary school level; and (3) investigate which distant communication devices lower secondary school students use for their academic help seeking outside the classroom. One hundred students attending two French rural lower secondary schools participated in this study. They completed a questionnaire tapping their academic help-seeking behavior both in and outside the classroom. The most frequently cited reasons for help seeking in the classroom included getting an explanation for something one has not understood and allowing one to make progress. The discipline that was cited the most often for help seeking in the classroom was mathematics; the second most cited discipline was French, and the third one was history-geography. The results further showed that most students declared using phone calls and SMS for help seeking outside the classroom; the other distant communication devices cited were Facebook, Skype, specialized sites, and email. Gender differences were observed. The implications of our results for future research are

discussed.

Transformative agency as warping: Expanding on Vygotsky's principle of double stimulation

Keywords: Cooperative / collaborative learning, Informal learning, Social aspects of learning and teaching, Knowledge creation

Presenting Author: Annalisa Sannino, University of Helsinki, Italy

Under pressures of the capitalist mode of production, learners' activities are faced with increasing difficulties and uncertainties. Drawing and expanding on Vygotsky's principle of double stimulation, this study develops a concept of transformative agency understood as a dynamic anchoring process similar to the navigation procedure called "warping." This is a process of step-by-step material grounding accomplished with the help of mediating tools and enabling actions which subsequently gain momentum and allow movement out of imprisoning and paralyzing developments in everyday activities. Examples from three different settings of empirical inquiries are used as illustrations of how transformative agency comes about in a warping manner. Warping is a special mode of anchoring consisting in throwing the anchor and, once it has settled on the ground, pulling it for moving the vessel toward the desired direction. Mediational means constructed and mobilized to face pressing conflicts of motives in the learners' activities in the three examples are similar to the warping anchors. Potentially they can activate knowledge and actions transcending troubled activities toward novel but at the same time grounded perspectives.

Controversy mapping: Navigating and mediating issues of concern

Keywords: Cognitive development, Cooperative / collaborative learning, Social development, Knowledge creation

Presenting Author: Anne Solli, University of Gothenburg, Sweden; **Presenting Author:** Asa Makitalo, University of Gothenburg, Sweden; **Co-Author:** Mark Elam, University of Gothenburg, Sweden

Controversy Mapping (CM) is a research and teaching method derived from the field of Science and Technology Studies. It is adopted to explore and represent current sociotechnical controversies such as hydraulic fracturing or vaccines (Venturini & Latour, 2010). As a teaching method it can be used to observe and explore such controversies, as they appear online in all their complexity. Through the extraction and analysis of digital data the methods provide means to display complex information in condensed and readable form. In this study, we followed how CM was introduced and used in two upper secondary classes working with socio-scientific controversies (Sadler, 2011). What we found was that the students were challenged in mapping as well as representing controversies. To be able to discuss and navigate the complexity, the controversy needs to be visually readable and comprehensible. The method offers algorithmic means which reduce complexity by visually suggesting how different sites online are related and how they can be sorted and ordered as having more or less influence. However, categorizing stakeholders also becomes an act of *re-presenting* the controversy – and hence needs to be justifiable. In line with Vygotsky (1978) the map *mediates action* and support students' agency as they account for and explain the controversy to their peers. In this manner the very methods and tools employed in the CM activity will be transformative in the sense that they reconfigure the students as well as the issues they are working on.

Temporal and spatial artifacts for formative agency and expansive learning in a food cooperative

Keywords: Cooperative / collaborative learning, Out-of-school learning, Social aspects of learning and teaching, Knowledge creation

Presenting Author: Yrjö Engeström, University of Helsinki, Finland; **Presenting Author:** Juhana Rantavuori, Center for Research on Activity, Development and Learning CRADLE, Finland

Although double stimulation is a foundational aspect of expansive learning, empirical studies of steps of double stimulation and analyses of expansive learning actions have thus far remained separate. The first task of this paper is to bring together these two lines of analysis. The second task is to examine the dynamics of temporal and spatial artifacts in double stimulation and expansive learning. The paper analyzes learning in the Herttoniemi Food Cooperative, facing the persistent problem of securing sufficient income to continue functioning. This conflict is seen as the first stimulus. We conducted an intervention in which two artifacts were offered as potential second stimuli for the board of the cooperative: an interactive electronic timeline (temporal artifact) and an interactive electronic map (spatial artifact). We analyzed the transcripts of the intervention and subsequent 13 meetings of the board. Before the intervention, the board members were paralyzed by their conflict of motives, repeatedly questioning their mode of activity (the first action of expansive learning). The introduction of the artifacts triggered a process in which expansive learning actions – modeling, examining, and implementing the model – occurred already in the intervention session. The artifacts were appropriated as second stimuli. However, after the intervention, reference to the artifacts was made only sporadically. It seems that double stimulation went only half way. However, a closer analysis is needed to determine whether the participants constructed their own second stimuli and carried forward the process relying on those rather than on the artifacts offered to them.

Session O 10

1 September 2017 17:30 - 19:00

Main Building D - D10B

Single Paper

Teaching and Teacher Education

Teaching and Teacher Education - N

Keywords: Achievement, Argumentation, Attitudes and beliefs, Case studies, Higher education, Knowledge creation, Learning approaches, Quantitative methods, Science education, Secondary education, Student learning, Teacher Professional Development, Teaching approaches

Interest group: SIG 11 - Teaching and Teacher Education

Chairperson: Teresa Limpo, University of Porto, Portugal

Knowledge work assignments in upper secondary school: results of 13 cases

Keywords: Case studies, Quantitative methods, Secondary education, Teaching approaches

Presenting Author: Liisa Ilomäki, University of Helsinki, Finland; **Co-Author:** Minna Lakkala, University of Helsinki, Finland;

Co-Author: Auli Toom, University of Helsinki, Finland

In today's world, schools should provide upper secondary students with relevant generic knowledge work competencies for further education and work life. These competencies refer to students' capability to act, study and work intentionally and effectively both individually and collaboratively in changing knowledge-intensive contexts. Complex knowledge work competences evolve only through extensive, repeated and long-term practicing and utilisation of multiple knowledge assignments, which should be applied in varying instructional contexts throughout the studies. The aim of this study was to investigate the existing knowledge work practices related to knowledge assignments in Finnish upper secondary schools. The versatile qualitative data including classroom observations, course plans and instructions, student and teacher questionnaires and teacher interviews utilised in the multiple case study were collected for the study. The analysis allowed defining four different levels of knowledge assignments in terms of their object-orientation, collaboration, reuse of knowledge objects, process-like emphasis, problem-based approach, authenticity, epistemic challenge, utilisation of various types of knowledge and digital technology. Most of the knowledge assignments were classified on levels two and three representing both traditional and innovative pedagogical elements. The results show that teachers seem to face challenges in building coherent knowledge assignments to support student learning of knowledge work competencies. The results suggest that knowledge assignments utilised in upper secondary school could be even more pedagogically aligned. They could provide even more epistemic and collaborative challenges as well as foster authentic and longitudinal working processes.

Exploring changes in student teachers' meaning-oriented learning during teacher education

Keywords: Attitudes and beliefs, Higher education, Learning approaches, Student learning

Presenting Author: Stella van der Wal-Maris, Eindhoven University of Technology / Marnix Academy for Teacher Education, Netherlands; **Co-Author:** Gonny Schellings, Eindhoven University of Technology, Netherlands; **Co-**

Author: Douwe Beijaard, Eindhoven University of Technology, Netherlands; **Co-Author:** Jeannette Geldens, University for Professional Teacher Education 'De Kempel', Netherlands

This study investigates to what extent 22 students in Dutch academic primary teacher education are meaning-oriented in their learning, which changes occur during their study, and the influence of their learning environment on being meaning-oriented. In the literature, a meaning-oriented learner is generally described as a learner who is capable to regulate his/her own learning, to understand a topic thoroughly, to form an own opinion about that topic, and to draw own conclusions. A meaning-oriented learner has knowledge construction as his/her main conception of learning.

The extent of being meaning-oriented was measured both at the start and at the end of students' study (study duration: three to four years) by using a questionnaire. Nine students were interviewed shortly after graduation about what enhanced their meaning-oriented learning during teacher education. Through combining the questionnaire data and the interview data, relations between the changes in the extent of being meaning-oriented and students' perceptions of what enhanced meaning-oriented learning were investigated.

For the total group of students, an increase in their use of deep processing strategies was measured. At the individual level, the questionnaire results revealed change in the extent of being a meaning-oriented learner varying from a slight decrease to a high increase. The combining of the questionnaire data and the interview data showed a relation between individual change in the extent of being a meaning-oriented learner and a student's perception of opportunities to fit the learning to personal interests and to regulate one's own learning.

Do good students become good teachers?

Keywords: Achievement, Higher education, Student learning, Teacher Professional Development

Presenting Author: Kristin Wolf, Goethe-Universität Frankfurt, Germany

Although school GPA is one of the most important criteria for enrolment onto teacher training in many European countries, there is very little research on its prognostic value for later professional success. We address this research gap by investigating the prognostic value of success in school for teachers' professional success and the mediating role of success in different phases of teacher training. In two longitudinal studies of teacher candidates ($N_A=290$, $N_B=670$) professional wellbeing and instructional quality were assessed as criteria for professional success. Overall the results suggest that teachers' success in school predicts success during teacher training, but it is not a good predictor for later professional success. In contrast, success in teacher training predicts later professional success significantly.

Strategies for Engaging Students in Rich Epistemic Discourse

Keywords: Argumentation, Science education, Teaching approaches, Knowledge creation

Presenting Author:Hillary Swanson, Northwestern University, United States; **Co-Author:**Allan Collins, Northwestern University, United States

It is widely acknowledged that rich epistemic discourse is critical to getting students to think scientifically. Yet it is difficult for teachers to engage students in such discourse. This study investigates the strategies used by one teacher to foster rich epistemic discourse in her science classroom. It examines her moves during a whole-class discussion in which 8th grade students became earnestly invested in authentic sense-making and knowledge-building, as they worked together to build a causal explanation for why a glass of cold milk warmed up “fast and then slow.” Through a grounded analysis of this discussion, six categories of teacher strategies were discovered. These categories contained strategies for 1. giving students perspective, 2. fostering equitable participation 3. framing students as agents of knowledge construction, 4. eliciting student ideas, 5. showcasing ideas for careful consideration, and 6. helping students make sense of each other’s ideas. These strategies provide teachers with demonstrably effective ways of engaging students in NGSS-aligned practices such as explanation and argumentation.

Session O 11

1 September 2017 17:30 - 19:00

Pinni A - A1081

Single Paper

Learning and Instructional Technology, Lifelong Learning, Motivational, Social and Affective Processes, Teaching and Teacher Education

Learning and Professional Development - C

Keywords: Collaborative Learning, Cooperative / collaborative learning, Distributed cognition, Educational Technology, Emotion and affect, Informal learning, Mixed-method research, Reflection, Social aspects of learning and teaching, Social interaction, Teacher Professional Development, Video analysis, Vocational education, Workplace learning

Interest group: SIG 14 - Learning and Professional Development

Chairperson: Astrid Wichmann, Ruhr University Bochum, Germany

A longitudinal perspective to the improvement of teachers' collaborative knowledge and skills

Keywords: Collaborative Learning, Cooperative / collaborative learning, Social aspects of learning and teaching, Teacher Professional Development

Presenting Author:Niina Impiö, University of Oulu, Finland; **Co-Author:**Pirkko Siklander, University of Lapland, Finland;

Co-Author:Sanna Järvelä, University of Oulu, Finland

This longitudinal study was aimed at increasing our understanding how teachers learn collaborative knowledge and skills. The research was conducted within two-year master's programme studies with two separately study group during the years 2009-2014. Teachers (N=25) from different fields participated in the study. The data consists of 67 interviews and 124 analytical self-reflections. A qualitative data-driven content analysis was aimed to investigate how teachers describe the improvement of their collaborative knowledge and skills during the master's programme studies and after the graduation in their work. Teachers' descriptions comprised five main categories, namely attitudes and beliefs towards collaborative learning, awareness of collaborative skills, theoretical and practical understanding about collaborative learning, thinking of students' learning and teaching practices, and thinking of one's own possibilities to promote collaborative practices in school communities. The results indicate that at the beginning of the learning process teachers' attitude and beliefs have been significant for their orientation to learn and work collaboratively. During the studies versatile experiences of collaborative learning situations and increasing theoretical understanding about collaborative learning are associated with the teachers' changing of attitudes and improvement of collaborative skills. Further, understanding about collaborative learning impacts on teachers thinking of learning and encourages them to use collaborative teaching methods in their daily work. The results contribute for teacher training and teachers' in-service training by providing new insight for supporting teachers' collaborative working practices.

Affective components of work team interaction: An empirical study on vocational teacher teams

Keywords: Emotion and affect, Mixed-method research, Social interaction, Vocational education

Presenting Author:Verena Watzek, University of Regensburg, Germany; **Co-Author:**Regina Mulder, University of Regensburg, Germany

Working and performing as a team is an economically important factor, also in the domain of education. More insight is required in team interaction processes to understand how affective processes contribute to team interaction in vocational teacher teams. The aims of our study are: First, to find out if there are differences in the teams' learning behaviour; Second, to explore through which affective components the differences can be explained; Third, to get insight in the role of emotions within work team interaction processes. The mixed methods approach consisted of a cross-sectional study with 117 interdisciplinary vocational teacher teams. Teaching professionals of different disciplines worked together on challenging tasks, such as education of refugees. Cluster analysis in SPSS and Mplus were carried out to investigate

differences in the teams' learning behaviour. In addition, for getting in depth understanding of the interaction processes in team meetings, six of these vocational teacher teams were 5 times observed, audio-, and videotaped. This dataset is analyzed to identify emotional communication processes. Three clusters were found, which significantly (p

Effects of video-annotation on tutors' feedbacks in perioperative nurse training: A case study

Keywords: Educational Technology, Video analysis, Vocational education, Workplace learning

Presenting Author:Alberto Cattaneo, Swiss Federal Institute for Vocational Education and Training, Switzerland; **Co-Author:**Elena Boldrini, Swiss Federal Institute for Vocational Education and Training (SFIVET), Switzerland; **Co-Author:**Francesco Lubinu, Centro Professionale Sociosanitario Medico Tecnico, Switzerland

Video-based analysis of practices is a powerful means to provide effective feedbacks. In particular, video annotation enables evidence-based, focused reflections. Scrub nurses training in Switzerland is based on the alternation between school- and work-based tracks. Within this latter, students experience different surgical operations and have *a posteriori* debriefing sessions with tutors. However, no use of video has been foreseen so far to support such sessions. Therefore, we conducted a pilot study to explore the affordances of video-based/video-annotated feedbacks on tutors' quality of feedbacks and tutee's reflectivity skills. One perioperative nurse student (tutee) and two couples of tutors have been involved in four debriefing sessions subsequent to four video-recorded surgical operations. The first couple of tutors worked in a video-based condition, the second further included video-annotations. The tutee progressed from not watching the video, watching it without annotation and finally annotating it herself. Content analysis of the debriefing sessions was conducted to assess the quality of feedbacks. Interviews with the participants investigated their acceptance and perceived usefulness. Results show that the use of video and moreover of video-annotation changed tutors' feedback contents and communicative style. Tutors shifted from mostly nonspecific and corrective feedbacks to more evidence-based supportive ones; from assertive tutor-centered debriefing session to a student-driven self-evaluation. The tutee's acceptance of feedbacks augmented, as did the capacity of proactively proposing self-regulated reflections. This contributed to shifting from reflection on action to reflection for future action. Given the encouraging results, a new study is planned with a larger sample.

Capturing the dynamics of VET teachers' workplace learning with diaries.

Keywords: Distributed cognition, Informal learning, Mixed-method research, Reflection

Presenting Author:Arnoud Oude Groote Beverborg, Johannes Gutenberg University of Mainz, Germany; **Co-Author:**Maarten Wijnants, Radboud University Nijmegen, Behavioural Science Institute, Netherlands; **Co-Author:**Jolien Geerlings, Social and Behavioural Sciences, Utrecht University, Netherlands; **Co-Author:**Tobias Feldhoff, Johannes Gutenberg University of Mainz, Germany; **Co-Author:**Klaas van Veen, University of Groningen, Netherlands; **Co-Author:**Peter Sleegers, BMC, Netherlands

To understand more about the emergence of learning experiences from engagement in professional (reflective) learning in the workplace, the aims of this article are to conceptualize professional learning as an ongoing process during a teacher's career, which is rooted in a teacher's choices for action, and to provide an example of how to measure that process situatedly, and how to analyse its temporal pattern. The starting point is the dynamic analysis technique Recurrence Quantification Analysis (RQA). We conducted a diary study, in which 18 VET teachers filled in daily and monthly logs over a period of 5 months. On the basis of these measurements, time-series of occasions of reflection-intensity and sumscores of learning experiences were generated, and these data were analysed with categorical RQA and correlations. The results indicate that teachers can further their development if they intend to do so, and that they require a certain amount of sensitization to their respective environments in order to pick up the information they need for their learning processes to progress. A basic requirement to formulate and sustain a certain intention, and also to spot challenging details in one's environment, would seem to make experiences explicit by being motivated to free some time for reflection. The study shows the utility of measuring densely, and it provides an example of how novel techniques can be adopted to tap into professional learning as a dynamic and situated process.

Session O 12

1 September 2017 17:30 - 19:00

Linna - K103

Single Paper

Motivational, Social and Affective Processes

Motivation and Educational Psychology - B

Keywords: Educational Psychology, Emotion and affect, Goal orientation, Metacognition, Motivation and emotion, Multimedia learning, Social interaction

Interest group: SIG 08 - Motivation and Emotion

Chairperson: Michael Goller, University of Paderborn, Germany

Physiological Indicators of Affective Processes during Multimedia Learning with a Virtual Human

Keywords: Emotion and affect, Metacognition, Motivation and emotion, Multimedia learning

Presenting Author:Nicholas Mudrick, North Carolina State University, United States; **Co-Author:**Roger Azevedo, North

Carolina State University, United States; **Co-Author:**Michelle Taub, North Carolina State University, United States; **Co-Author:**Garrett Millar, North Carolina State University, United States; **Co-Author:**Megan Price, North Carolina State University, United States; **Co-Author:**Amanda Bradburry, North Carolina State University, United States; **Co-Author:**Joseph Grafsgaard, North Carolina State University, United States

Regulating cognitive, affective, metacognitive, and motivational (CAMP) self-regulated learning (SRL) processes during multimedia learning can be extremely challenging for students. There is a recent trend in using physiological measures to measure aspects of CAMP during learning with advanced learning technologies such as multimedia environments to identify instances of effective and ineffective regulation and determine the nature of the physiological arousal (e.g., dealing with complexity of multimedia content, monitoring relevance of multimedia content, attempts at emotion regulation). We examined skin conductance responses (SCR) derived from EDA from 13 college students during multimedia science learning with an intelligent virtual human (IVH). Results indicate a higher rate of SCRs occurred during instances requiring more and accurate regulation of students' CAMP SRL processes. Specifically, higher arousal was found for when students had to provide a justification for their response compared to other learning activities (e.g., reading content, answering multiple choice questions). The results of this study advance models of SRL, multimedia learning, and have implications for the design of future multimedia environments.

Structure of emotions revisited: A co-occurrence network analysis of positive and negative emotions

Keywords: Educational Psychology, Goal orientation, Social interaction, Motivation and emotion

Presenting Author:Julia Moeller, Yale University, United States; **Co-Author:**Zorana Ivcevic, Yale University, United States; **Co-Author:**Marc Brackett, Yale University, United States; **Co-Author:**Arielle White, Yale University, United States

This study revisits the structure of emotions by employing a co-occurrence network analysis. While previous studies have examined the structure of emotions primarily through *inter-individual* correlations, we investigated how often and which specific positive and negative emotions occur together *within individuals*. Our sample comprised 21,678 high US school students who reported how they feel at school using open-ended questions and 28 rated emotion items. As in previous studies, positive and negative emotion ratings were negatively correlated across individuals, and this negative correlation became stronger when measurement error was controlled. Nevertheless, network analyses of both the open-ended responses and of emotion rating scales found frequent co-occurrences between both positive and negative emotions within individuals. In the network of recalled emotions, the most frequent pairs of co-occurring positive and negative emotions were happy-tired, happy-stressed, and happy-bored. In the network of highly rated emotion items, the most frequent pairs of positive and negative emotions were accepted-stressed, interested-stressed, and happy-stressed. The network analyses presented in this article open new directions to the long-lasting debate about the structure of emotions by revealing co-occurrences that inter-individual correlations would not show. **Keywords:** positive and negative emotions, structure of emotions, co-occurrence network analysis, intra-individual variation, mixed methods, PANAS

What do teachers think about their students' inclusion? Consistency of self- and teacher reports

Keywords: Educational Psychology, Goal orientation, Social interaction, Motivation and emotion

Presenting Author:Martin Venetz, University of Applied Sciences of Special Needs Education, Switzerland; **Presenting Author:**Carmen Zurbriggen, University of Fribourg, Switzerland; **Co-Author:**Susanne Schwab, University of Wuppertal, Germany

Social inclusion, school well-being and academic self-concept can be used as indicators to evaluate the success of inclusive education. Much research has been carried out regarding these three topics, and an at-risk-situation has been identified for students with special educational needs (SEN) in inclusive education. The aim of this study is to investigate students' and teachers' perspectives of these variables and to evaluate the teacher version of the German Perceptions of Inclusion Questionnaire (PIQ; Venetz, Zurbriggen, Eckhart, Schwab & Hessels, 2015). Therefore, the PIQ was administered to 20 eighth grade secondary school classes in Austria. Self- and teacher reports of 329 students (M age = 14.5, SD = 0.5) of whom 10% had SEN were analyzed. Confirmatory factor analysis confirms the factorial structure of the PIQ teacher version and high reliability was shown. Further, results of the multiple-indicator correlated trait-correlated method model with one method factor less than methods (CT-C[M-1] model) indicate that the consistency of self- and teacher reports differs with regard to the three dimensions. Finally, results of structural equation modeling indicate that the student specific variables (SEN, sex, age) have different effects on the self- and teacher-reports. Implications for both further research and practice will be discussed. **Keywords:** inclusion, self-report, teacher rating, consistency, CT-C(M-1) model

Young adults' career goal effort and stress trajectories in academic and non-academic tracks

Keywords: Educational Psychology, Goal orientation, Social interaction, Motivation and emotion

Presenting Author:Mette Ranta, University of Jyväskylä, Finland; **Co-Author:**Elina Marttinen, University of Jyväskylä, Finland; **Co-Author:**Julia Dietrich, Friedrich Schiller University of Jena, Germany; **Co-Author:**Katariina Salmela-Aro, Helsinki Collegium for Advanced Studies, Finland

The aim of this long-term longitudinal study was to investigate the developmental trajectories of career goal effort and career goal stress among individuals either in the educational academic track or non-academic track. Little is known about the developmental changes of career goal appraisal and the extent to which it is sensitive to the educational macro-context.

Finnish adolescents (N = 699; 47.5 % female) appraised their career goal related effort and stress five times between age 16 and 23. While in secondary education, 56.0 % of the participants were in high school (academic track) and 43.0 % were in vocational school or not studying at all (non-academic track). After secondary education, the participants transitioned to either tertiary education, work or somewhere else. Latent growth modelling was conducted to examine the changes in the career goal related effort and stress. The results showed that among individuals in the academic track, goal effort and goal stress increased from age 16 to 23. Among individuals in the non-academic track, effort was found to fluctuate: first rising, then being stable during secondary education, then declining during the second transition, and finally starting to increase again. With respect to career goal stress in the non-academic track, the results showed also fluctuation especially during the transition from secondary education. These results indicate that the longitudinal changes in career goal appraisals are bound to a student's educational track and related transitions indicating that educational structures channel the effort invested in pursuing career goals and the stress this imposes.

Session O 13

1 September 2017 17:30 - 19:00

Main Building A - A2B

Single Paper

Assessment and Evaluation, Developmental Aspects of Instruction, Learning and Instructional Technology, Teaching and Teacher Education

Learning and Professional Development - E

Keywords: Assessment methods and tools, Competencies, Computer-assisted learning, Developmental processes, Early childhood education, Higher education, In-service teacher education, Learning approaches, Mathematics, Professions and applied sciences, School effectiveness, Student learning, Teacher Professional Development, Vocational education, Workplace learning

Interest group: SIG 14 - Learning and Professional Development

Chairperson: Tiina Anspal, University of Tartu, Estonia

Instructional Sensitivity: Impacts and perspectives for vocational assessments (and education)

Keywords: Assessment methods and tools, Developmental processes, Vocational education, Workplace learning

Presenting Author: Viola Klotz, University of Mannheim, Germany; **Co-Author:** Esther Winther, German Institute for Adult Education Leibniz Centre for Lifelong Learning (DIE), Germany; **Co-Author:** Julia Sangmeister, German Institute for Adult Education Leibniz Centre for Lifelong Learning (DIE), Germany

Apprentices' performance after vocational educational training (VET) is commonly attributed to the effectiveness of the training. This implies the assumption that learners' development of competence is significantly affected by vocational instruction. However, the few analyses of instructional sensitivity within the general school-based educational system have in most cases shown little or no effect of instruction (time in school) on performance in assessments. The question as to whether, and to what extent, VET in adult education is effective (in the sense that it fosters competence development), as well as the related question – whether we are able to track the resulting learning progress with adequate measures (assessments) – has hardly been investigated. In the present study, we propose the modeling of instructional sensitivity via differential item functioning (DIF), and apply this method to a sample of n = 534 apprentices. It was found that during vocational instruction, apprentices significantly improved their performance in competence-based assessments and that we were able to track these changes in the quality of their competence over the span of a three year initial VET. Moreover, with the proposed method, it is possible to identify items that are particularly sensitive to instruction and that therefore appear to be amenable to the future development of competence assessments.

Professional vision and scaffolding in promoting SFON

Keywords: Early childhood education, In-service teacher education, Mathematics, Teacher Professional Development

Presenting Author: Maikki Jaatinen, University of Turku, Finland; **Co-Author:** Aino Mattinen, University of Turku, Finland;

Co-Author: Minna M Hannula-Sormunen, University of Turku, Finland

This research aims to investigate how daycare professionals' attitudes, mathematical pedagogical awareness, professional vision and scaffolding skills develop during intensive 23-week long PD program aimed at developing early educator's skills to trigger and scaffold 2,5–3,5 –year-old children's spontaneous focusing on numerosity (SFON) and cardinality recognition skills. 23 daycare professionals from seven daycare centers took part in the PD program. Data in pre-, intermediate and – post-tests was collected with mathematical pedagogical awareness and attitudes questionnaire, video-based semi-structured interviews for analyzing professional vision and with 10-minute long video recorded SFON small group play situations for analyzing professionals' scaffolding. Results of this study indicated that daycare professionals considered supporting early math skills as part of daycare activities and increased their support of children's SFON tendencies during the intervention. Professionals' mathematical pedagogical awareness also developed during the intervention. Daycare professionals have individual differences in their professional vision learning trajectories and these differences also affected their scaffolding skills. Supporting early educators' professional vision and scaffolding related to SFON and early numeracy skills is a promising new avenue for improving early education.

Becoming a nurse: student and teacher perceptions of professionalization

Keywords: Competencies, Higher education, Learning approaches, Professions and applied sciences

Presenting Author:Marilou Bélisle, Université de Sherbrooke, Canada; **Co-Author:**Johanne Goudreau, University of Montreal, Canada; **Co-Author:**Louise Boyer, University of Montreal, Canada; **Co-Author:**Paola Bastides, University of Sherbrooke, Canada

Criticisms and recommendations about the lack of student preparation for the workplace have led to renewals or complete renewals of university programs around the world. In Quebec, these reforms are especially present in university programs that intend to prepare students for a given profession. The competency-based approach (CBA) is frequently adopted to increase the quality of training and to develop a high level of skills among future graduates. As it is the case in the baccalaureate program in nursing at the University of Montreal which includes educational methods that actively engage students in authentic learning situations. Focusing on the situation of nursing education, this research enables us to consolidate our conceptual framework on student professionalization (Bélisle, 2011), which entails the development of competencies, the appropriation of the professional culture, and the construction of a professional identity. Our research goals were: (1) to describe student and teacher perceptions of student professionalization in nursing, particularly in view of their competency development, cultural appropriation and identity construction; (2) to identify educational practices that were perceived as contributing to student professionalization. Using a qualitative/interpretative approach, we conducted group discussions (Krueger & Casey, 2000) with students and teachers in nursing. In this communication, student and teacher perceptions of student development as nurse clinicians will be compared and results will be discussed through the lens of our conceptual framework on student professionalization. This qualitative research will shed light on pedagogical conditions contributing to student professional development throughout their learning trajectory in a competency-based program.

A system-wide implementation to promote STEM learning using robotics

Keywords: Computer-assisted learning, School effectiveness, Student learning, Teacher Professional Development

Presenting Author:Erhan Sinay, Toronto District School Board, Canada; **Presenting Author:**Roula Anastasakos, Toronto District School Board, Canada; **Presenting Author:**Antonio Santos, Toronto District School Board, Canada

The implementation of robotics in elementary schools is not widespread in Canadian schools. Many barriers such as lack of knowledge and confidence among teachers hinders the integration of robotics at schools. This study examined the effect of a system-wide, robotics professional learning initiative, implemented by a large school board, on teachers' self-efficacy, knowledge, and teaching practices for teaching STEM with robotics. Participants were 91 elementary teachers from grades k-8 and over 1600 students in 66 schools. A mixed methods design was used and data were collected through surveys and interviews. Results indicate that a system-wide effort did result in: 1) improved TPACK and confidence to teach with robotics among teachers, 2) the use of higher levels of the SAMR model, and 3) increased student engagement.

Session O 14

1 September 2017 17:30 - 19:00

Pinni B - B0039

Symposium

Cognitive Science

Adaptive expertise in elementary arithmetic

Keywords: Cognitive skills, Educational Psychology, Mathematics, Primary education

Interest group: SIG 03 - Conceptual Change

Chairperson: Sanne Rathé, KU LEUVEN, Belgium

Discussant: Marian Hickendorff, Leiden University, Netherlands

During the past decades, the acquisition of adaptive expertise in the domain of elementary arithmetic attracted the attention of researchers and practitioners. As originally defined by Hatano (2003), adaptive expertise refers to children's ability to efficiently and flexibly apply various strategies on arithmetic tasks, relying on their conceptual understanding of the number system and their procedural fluency in the arithmetic domain. Unfortunately, we are currently confronted with many unanswered questions related to the various strategies children from different countries apply on different tasks, the contribution of children's conceptual understanding and procedural fluency to their strategy flexibility, and the efficiency of different strategies on different tasks. This symposium aims to answer these important questions by integrating four empirical studies on the acquisition of adaptive expertise in children from different countries in different arithmetic domains. Using both quantitative and qualitative research techniques, the different contributions empirically evidence children's strategy variety, efficiency, and flexibility in elementary arithmetic tasks, and the association of these strategy characteristics with children's understanding of the number system and procedural fluency. The presented findings complement our theoretical understanding of the acquisition of adaptive expertise across elementary school in different arithmetic domains, and provide building blocks to refine current theoretical models in view of task, individual, and context variables. Moreover, they provide concrete suggestions to optimize current mathematics instruction. The critical discussion of Marian Hickendorff, expert on adaptive expertise in elementary arithmetic, will further help to pinpoint the theoretical, methodological, and educational relevance of the findings.

Flexibility in Mental Arithmetic and Reasoning Patterns

Presenting Author: Elisabeth Rathgeb-Schnierer, University of Kassel, Germany; **Co-Author:** Michael Green, University of North Carolina Charlotte, United States

This study focuses on flexibility in mental arithmetic in second and fourth grade students from USA (North Carolina) and Germany (Baden-Württemberg). It bases on a theoretical interpretation of flexibility in mental addition and subtraction that emphasizes the recognition of problem characteristics, number patterns and numerical relations as crucial prerequisite. Therefore, we are interested in students' reasoning patterns when sorting addition and subtraction problems. To reveal these patterns a problem orientated, guideline-based interview incorporating 12 two-digit addition and subtraction problems was conducted with 69 students. All interviews were transcribed in their original language and coded by a system that was developed based on theory and student data. The coded data was analyzed qualitatively and quantitatively. Qualitative analyzes aimed to reveal patterns in sorting and reasoning as well as varieties and profiles. Quantitative analyzes intended comparisons between classrooms and countries. The presentation gives an introduction in the theoretical background and the design of the study. Furthermore, qualitative and quantitative results are described and discussed.

Efficient and flexible use of subtraction by addition in multi-digit subtraction

Presenting Author: Joke Torbeyns, KU Leuven, Belgium; **Co-Author:** Bert De Smedt, KU Leuven - University of Leuven, Belgium; **Co-Author:** Pol Ghesquiere, KU LEUVEN, Belgium; **Co-Author:** Lieven Verschaffel, KU LEUVEN, Belgium

We investigated 4th- and 6th-graders' use of direct subtraction (DS) versus subtraction by addition (SBA) when mentally solving subtractions up to 1000, in terms of the four parameters of the model of strategy change (Lemaire & Siegler, 1995) and relying on the choice/no-choice method (Siegler & Lemaire, 1997). Participants were 32 4th- and 33 6th-graders who had received extensive instruction in the mastery of DS, but no instruction in SBA, for mentally solving multi-digit subtractions. All participants solved multi-digit subtractions up to 1000 in one choice condition (choice between DS or SBA on each item) and two no-choice conditions (obligatory use of either DS or SBA on all items). We distinguished between two types of subtractions, i.e., subtractions with a very small (e.g., $504-476=$ __) versus very large difference (e.g., $616-28=$ __) between the minuend and the subtrahend. Although mathematics instruction focused on the mastery of only DS, most 4th- and 6th-graders reported SBA to solve the items in the choice condition. In both grades, SBA use was more accurate and faster in the no-choice conditions than DS, particularly on small-difference problems. Furthermore, 4th- and 6th-graders flexibly fitted their strategy choices to both numerical item characteristics and individual strategy efficiency characteristics. These findings add to our theoretical understanding of children's acquisition of explicitly taught versus self-invented mental computation strategies in view of developing adaptive expertise and challenge current mathematics instruction practices focusing heavily on DS.

Two different subtraction algorithms: conceptual understanding and error rates

Presenting Author: Hedwig Gasteiger, Osnabrück University, Germany

Written subtraction can be carried out in different ways: The difference between minuend and subtrahend can be determined by subtracting or by indirectly adding, and crossing the tens boundary can be done by regrouping or by equal addition of 10 ones at the ones place of the minuend and one ten at the tens place of the subtrahend. In Germany, teaching indirect addition was compulsory for many decades. Now, teachers are allowed to decide which algorithm they teach. In mathematics education, there is a broad discussion to deliberate out which algorithm offers more advantages, and subtracting with regrouping is often preferred. It is assumed that students gain a better conceptual understanding for this algorithm. By now, there is little evidence on which subtraction algorithm is most comprehensible and most effective, and if the type of algorithm influences children's adaptive expertise – in terms of choosing the best way to solve a task. There are studies which investigated the effectiveness of different written subtraction algorithms in consideration of conceptual understanding. But these studies are up to 70 years old. It has to be discussed critically, if these results can be transferred to today's mathematical lessons. In an explorative, comparative study we examined fourth-graders' conceptual understanding and additionally types and frequency of errors relating to the two in Germany most common written subtraction algorithms. Results provide initial indications that both algorithms provoke different kinds of errors and that students who used subtracting with regrouping have a better understanding of the algorithm.

The Development of Number Line Estimation Strategies

Presenting Author: Koen Luwel, KU Leuven, Belgium; **Co-Author:** Dominique Peeters, KU LEUVEN, Belgium; **Co-Author:** Lieven Verschaffel, KU LEUVEN, Belgium

The present study investigated whether the provision of benchmarks would affect children's strategy use when making number line estimations (NLE) and whether this would differ as a function of children's familiarity with a particular number range. Third and fifth graders had to position numbers on a 0-1000 number line in one of three conditions: (a) a *control* condition involving a 'classical' empty number line, (b) a *midpoint* condition with a benchmark at 50% of the number line, and (c) a *quartile* condition with benchmarks at 25%, 50%, and 75% of the number line. Trial-by-trial verbal strategy reports were gathered. Results showed that the provision of benchmarks had an effect on children's strategy variability, their

frequency of using benchmark-based strategies, and their overall NLE performance. Moreover, both grades both grades showed a remarkable flexibility in their strategy choices. The effect of the benchmarks was in general larger in fifth than in third graders. Presumably, this was due to fifth graders' greater familiarity with the 0-1000 range and their more developed mathematical knowledge and skills (e.g., proportional reasoning, addition and subtraction skills) necessary to benefit maximally from these benchmarks. The present study extends previous findings by showing that children's NLE strategy use develops from creating a benchmark at the midpoint towards generating benchmarks at the quartiles of the number line and that the provision of additional support can accelerate this development by affecting different parameters of children's strategy use.

Session O 15

1 September 2017 17:30 - 19:00

Main Building A - A4

Symposium

Teaching and Teacher Education

Professional teacher agency

Keywords: Doctoral education, Mixed-method research, Pre-service teacher education, Primary education, Quantitative methods, Secondary education, Student learning, Survey Research, Teacher Professional Development

Interest group: SIG 14 - Learning and Professional Development

Chairperson: Douwe Beijaard, Eindhoven University of Technology, Netherlands

Discussant: Anneli Eteläpelto, University of Jyväskylä, Finland

Teachers play a key role in educational processes, practices and in processes of change. They use their 'professional agency' to develop their work, for their professional learning, and for renegotiating their professional identities. Teachers are increasingly required to act as change agents by using their professional agency (Priestley, Edwards, Priestly, & Miller, 2012). In general, agency is increasingly seen as an important characteristic of becoming and being a teacher. However, little research has been done on this professional issue. This symposium (with four presenters) addresses this issue as a professional (and personal) characteristic of (student) teachers in different educational contexts (primary education, teacher education and university). The first paper proposes a model to clarify the meaning of agency. The second paper argues that teachers differ in the way they see themselves as change agents in their own schools. The third paper reveals an understanding of academics' professional agency through three components. The fourth and last paper argues that differences exist in student teachers' sense of professional agency. This symposium intends to contribute to insight into and recommendations about the (student) teachers' role of professional agency in teaching and teacher education. It seems important to create supportive school contexts in which teachers can learn from and through their work both individually and in collaboration with others in their schools. An investment in teacher education and professional development seems necessary to enhance student teachers' professional agency, for example by redesigning teacher education programs, promoting student teacher learning and reflection in the classroom.

Exploring relational teacher agency for social justice

Presenting Author: Natasa Pantic, University of Edinburgh, United Kingdom

This paper presents an exploratory study of a specific form of relational teacher agency for social justice. Participatory methodology was used to involve teachers and other stakeholders in the development of a conceptual model and tools for mixed-method analysis of teacher agency. The model consists of teachers' 1) sense of purpose: beliefs about their role and social justice; 2) competence: in inclusive pedagogical approaches; 3) autonomy: context-embedded interactions with others; and 4) reflexivity: about practices and contexts. The model and tools including questionnaire, interviews, observation and reflective log have been trialed and adjusted with ten teachers in a primary school in Scotland. The data collected by the different tools was triangulated to establish aspects of teacher agency that can be meaningfully captured by the questionnaire, and those for which complementary qualitative data is needed to enable comprehensive cross-contexts analyses. Implications for teacher education and future research are discussed.

Perceptions of Teachers as Change agents in Primary Education

Presenting Author: Monique van der Heijden, De Kempel University Teacher Education College / Eindhoven University of Technology, Netherlands; **Co-Author:** Douwe Beijaard, Eindhoven University of Technology, Netherlands; **Co-Author:** Jeannette Geldens, University for Professional Teacher Education 'De Kempel', Netherlands; **Co-Author:** Herman Popeijus, University for Professional Teacher Education 'De Kempel', Netherlands

This study reports on a large-scale survey on Dutch primary school teachers' perceptions of being change agents and the extent to which these perceptions are related to personality and contextual factors. A principal component analysis and confirmatory factor analysis revealed nine characteristics of teachers as change agents. Personality and contextual factors positively affected teacher perceptions. Four teacher profiles were distinguished according to varying degrees of perceiving themselves to be far below or far above mean change agent characteristic levels. The teachers in one profile in particular were labeled as change agents. This study adds to further understanding of teachers as change agents, their characteristics and how these characteristics are related to personality and contextual factors.

Professional agency in the university context: Academic freedom of chains?

Presenting Author:Katja Vähäsantanen, University of Jyväskylä, Finland; **Co-Author:**Susanna Paloniemi, University of Jyväskylä, Finland; **Co-Author:**Eija Räikkönen, University of Jyväskylä, Finland; **Co-Author:**Päivi Hökkä, University of Jyväskylä, Finland

This study investigated the professional agency of academics (i.e. researchers and teachers) in a Finnish university context. We adopted the definition of professional agency as the notion that teachers influence, make decisions, and negotiate regarding their work and professional identity (including their professional goals and interests). Our research questions were as follows: (1) How is professional agency manifested among academics? (2) How do the manifestations of professional agency differ across academics with different backgrounds? We applied a mixed-method approach to collect the data utilising thematic interviews and quantitative questionnaire data. The data were analysed by means of statistical modelling and qualitative thematic analysis. The findings revealed the manifestation of academics' professional agency through three components: exerting an influence at work, developing work practices, and negotiating professional identity. Overall, these components were manifested rather similarly in the academics' work, but the participants mostly reported opportunities for negotiating professional identity. Furthermore, those academics who were in a superior position reported more possibilities of influencing their work than did the other academics. Otherwise, the academics with different backgrounds reported similarly the opportunities for manifesting their professional agency. The study provided a comprehensive understanding of professional agency via utilising its validated structure, including theoretical elaboration, and which can be used for investigating the topic internationally in other contexts. The findings can also be utilised in the context of enhancing academics' professional agency.

Trajectories of Subject Teacher Students' Professional Agency in the Classroom

Presenting Author:Kirsi Pyhältö, University of Oulu / University of Helsinki, Finland; **Presenting Author:**Auli Toom, University of Helsinki, Finland; **Co-Author:**Janne Pietarinen, University of Eastern Finland, Finland; **Co-Author:**Kaisa Haverinen, University of Eastern Finland, Finland; **Co-Author:**Tiina Soini, University of Tampere, Finland

Subject teacher students are expected to learn professional agency during teacher education in order to be able to facilitate pupil learning, use innovative teaching methods and promote school development when working as teachers. Intentional and active student teacher learning requires three complementary components simultaneously: student teacher's motivation to learn, efficacy beliefs about learning, and skills to learn that constitute professional agency. This study investigates the development of secondary student teachers' (N=546) professional agency during teacher education by exploring the subject teacher students' professional agency profiles and profile trajectories with longitudinal design. The analysis allowed defining two different professional agency profiles in terms of the measured components of professional agency as well as identifying changes occurring in the profiles. Among student teachers with *strong sense of professional agency profile*, statistically significant increase was detected in collaborative learning environment and in perceived competence. Among student teachers with *moderate sense of professional agency profile*, statistically significant decrease was detected in the reflection in the classroom over time. The results show that there exist differences in subject teacher students' professional agency profiles, and student teachers' sense of professional agency in the classroom changes during teacher education. The findings suggest that student teacher learning of professional agency is shaping continuously, and thus, could be regulated during teacher education to support meaningful learning for the profession.

Session O 16

1 September 2017 17:30 - 19:00

Main Building C - C8

Symposium

Lifelong Learning

Dealing with Health Information: Evaluation of Scientific Evidence and Expert Sources

Keywords: Argumentation, Content analysis, Cooperative / collaborative learning, E-learning / Online learning, Informal learning, Instructional design, Literacy, Reasoning, Science education

Interest group: SIG 26 - Argumentation, Dialogue and Reasoning

Chairperson: Friederike Hendriks, University of Münster, Germany

Chairperson: Ronald Rinehart, University of Northern Iowa, United States

Organiser: Friederike Hendriks, University of Münster, Germany

Organiser: Ronald Rinehart, University of Northern Iowa, United States

Discussant: Gavin Brown, University of Auckland, New Zealand

Dealing with health-related information is of high relevance to people's daily lives, but might be challenging. While science-based information is easily accessed online, it may contain conflicting claims, and the underlying science might be causally complex or uncertain. In consequence, laypeople's limited background knowledge and science understanding make evaluation of expert arguments and scientific evidence difficult (Bromme & Goldman, 2014). Hence, this symposium aims to identify what could be reliable strategies for evaluation of science-based information (e.g. from online or social media) to gain knowledge and understanding about health topics (Chinn, Rinehart, & Buckland, 2014). Papers 2, 3, and 4 scrutinize laypeople's and students' evaluations of health-related information, considering both quick inferences and effortful

reasoning about evidence. Papers 1 and 4 investigate the use of evidence in argumentation. The papers show that participants' reasoning and argumentation about health information rests on source evaluation (e.g. an expert's disciplinary pertinence and trustworthiness), and evaluation of domain specific evidence-to-model relations (e.g. strength and significance of evidence). Results from papers 1, 2 and 3 indicate that laypeople could possibly be misguided when trying to distinguish strong from weak evidence (e.g. by relying on superficial cues in their evaluations). Paper 4 shows an intervention with students that promotes sophisticated reasoning practices about evidence. The following educational implications are derived: Instruction in science education should provide opportunities to a) elaborate reliable strategies for evidence evaluation, reasoning and argumentation, and b) evolve scientific literacy. Both would benefit young citizens' abilities to deal with everyday science-based problems.

The Polio Vaccination Debate on Facebook: Debating Health Information to Engage with Science

Presenting Author:Aviv J. Sharon, Technion - Israel Institute of Technology, Israel; **Co-Author:**Daniela Orr, The Technion Israel Institute of Technology, Israel; **Co-Author:**Ayelet Baram-Tsabari, Technion, Israel

This study examines the Facebook debate on Polio vaccination as a case for laypeople's seeking and evaluation of health information. It is based on the Facebook group 'Parents talk about the Polio vaccination' during the 2013 Polio crisis in Israel. A quantitative content analysis was conducted on 1793 items (single post or comment) written by 321 different commentators randomly sampled from this group during its most intensive activity. The codebook was made up of six groups of variables: topic of discussion, socio-demographic variables, epistemological variables and scientific components (logos), narrative (pathos), credibility (ethos), and positions regarding Polio vaccinations and vaccinations in general. The findings show that although most of the topics discussed were scientific or medical, there was scant use of scientific components and empirical evidence (logos), even among educated commentators, and both among supporters and opponents of the vaccination. An analysis of the emotional (pathos) and trust-related (ethos) features of the debates demonstrates that even though science is essentially based on evidence (logos), public engagement with science is mostly value-driven. While laypeople seek scientific information, they base their evaluations on trust and emotions.

Trust Them Here? Trust Them There? Impact of Forum Type on Evaluation of Information Credibility

Presenting Author:Maria Zimmermann, University of Münster, Germany; **Co-Author:**Regina Jucks, WWU Münster, Germany

Patients and information seekers frequently use online resources for make decisions about health sciences topics. When consulting online resources, it is important, yet challenging, to identify reliable scientific information. When judging information online we assume that people evaluate not only in terms of content' and provider's characteristics but also in terms of online contexts. We investigated the impact of technical language use (high vs. low) in two different types of online forums (professional vs. advisory) on information credibility and expert's trustworthiness. Participants ($N = 98$) read expert's responses on nutrition myths and evaluated information credibility and expert's trustworthiness. Results show that people judged information to be more credible, when language use is appropriate regarding the concerned forum. The discussion focuses on the need for investigating and characterizing online contexts and its impact on people's willingness to rely on scientific information.

How Scientific Literacy Benefits Laypeople's Persuasiveness Judgments About Scientific Evidence

Presenting Author:Friederike Hendriks, University of Münster, Germany; **Co-Author:**Dorothe Kienhues, University of Münster, Germany; **Co-Author:**Rainer Bromme, University of Münster, Germany

Scientific literacy should encompass students' capabilities to deal with scientific information of everyday relevance (e.g. judging about science based health claims found in the Internet). We investigate plausibility judgments about scientific claims in an experimental study with $N = 231$ participants of all ages. It was varied, whether claims were justified a) by strong or weak statistical evidence (high or low numerical probability) or b) by strong or weak expert testimony (highly pertinent or rarely pertinent expert) (e.g. Hornikx, 2008). Furthermore, we ask if two components of scientific literacy impact on these plausibility judgments. Therefore, a test measuring knowledge of science (KOS; knowledge of general science facts) and knowledge about science (KAS; e.g. what makes a good experiment, how to derive conclusions from evidence) (OECD, 2006) was administered. Results showed that in general, plausibility of claims supported by expert testimony was rated higher in contrast to statistical evidence. Strong evidence led to higher ratings than weak evidence. An interaction indicates that participants made a larger distinction between strong and weak evidence in plausibility ratings regarding claims based on statistical evidence compared to those based on expert testimony. Results also indicate that KAS increased laypeople's ability to distinguish weak and strong evidence. Higher KOS was related to generally lower judgments of plausibility. In conclusion, our study shows that science literacy (both KOS and KAS) has some influence on evidence evaluation. Educational implications will be discussed.

The Body of Evidence: The Role of Evidence Evaluation in Science Classes

Presenting Author:Ronald Rinehart, University of Northern Iowa, United States; **Co-Author:**Clark Chinn, Rutgers University, United States; **Co-Author:**Ravit Golan Duncan, Rutgers University, United States

Promoting students' use of sophisticated epistemic practices has become a central feature of classroom-based interventions designed to scaffold students' reasoning about scientific phenomena in model-based inquiry environments. Prior research has focused on structural elements of the argumentative frame students use to motivate their claims or has examined how students use pieces of evidence in isolation from one another. Our research examines how students use,

evaluate, and re-evaluate evidence over time and how students' ideas about one piece of evidence impact their ideas about other evidence. We conducted a five month long intervention with middle school science students (age 12) designed to scaffold students' argumentative practices and epistemic cognition. We present the results of a three day model-based inquiry lesson where students investigated the possibility that some humans might be genetically resistant to Human Immunodeficiency Virus (HIV). Written work from students ($N=88$) was coded for evidence evaluation, evidence-to-model coordination, and model selections. Students significantly shifted their evaluations of multiple pieces of evidence over time as they encountered more evidence. Moreover, students engaged in the development of supra-evidence structures, a *body of evidence*, combining two or more pieces of evidence into a coherent whole that motivated their beliefs about different models. Existing frameworks for evaluating student reasoning do not include (1) evidence re-evaluation and (2) combining pieces of evidence to make a new body of evidence. We argue that normative accounts of good reasoning in science classes could be improved by taking both of these practices into account.

Session O 17

1 September 2017 17:30 - 19:00

Main Building D - D11

Symposium

Cognitive Science

The role of feedback and standards in the self-regulation of students' confidence and performance

Keywords: Assessment methods and tools, Cognitive development, Higher education, Metacognition, Primary education, Quantitative methods, Self-regulation

Interest group: SIG 16 - Metacognition

Chairperson: Daniel Dinsmore, University of North Florida, United States

Discussant: Stephanie Pieschl, University of Newcastle, Australia

Calibration has been well studied and the general consensus in the literature has been that students are generally overconfident relative to their performance (e.g., Dunlosky & Rawson, 2012). Recently, however, evidence has emerged that larger differences in the relative level of confidence to calibration may actually improve performance (e.g., Butler & Roediger, 2008) and help students make better study choices based on feedback (Metcalfe & Finn, 2008). This symposium examines the roles of corrective feedback and standard setting on students' calibration and metacognitive/self-regulatory activity. These four studies examine these issues in a wide range of developmental levels and use both quantitative and qualitative methods. Studies one and two address the issue of standard setting and the use of standards in a self-regulatory framework. Study one uses quantitative analyses to examine how students' confidence and standards judgments change over the course of a semester and how those judgments relate to performance, while study two uses qualitative analyses to examine the conditions these students consider to set and adjust standards throughout that semester. Studies three and four examine the issue of corrective feedback. Study three examines how high and low confidence errors influence students' subsequent metacognitive processes and performance, while study four examines how confidence error feedback influences students' standards and their restudy. Our exploration of different mechanisms that influence students' metacognitive/self-regulatory activity extends current conceptions of calibration by framing confidence and performance more broadly. Led by an internationally renowned discussant, we expect a robust discussion of these issues with the audience.

Have Measures of Relative Accuracy been Relative Enough? A Quantitative Analysis

Presenting Author: Daniel Dinsmore, University of North Florida, United States; **Co-Author:** Meghan Parkinson, Jacksonville Public Library, United States

Past research on calibration has indicated that students' confidence and performance are not highly related, with most students demonstrating an overconfidence-underperformance effect. However, prior research on calibration has not taken into account the role of standard setting during this process. This study examined the complex relation between confidence, standards, and performance by measuring these three constructs at four timepoints – prior to and after taking a midterm and final examination. Participants were 94 students from a large university in western Canada from a larger study on student performance. Students were asked their confidence in the exam and what grade (A, B, C, or D) they would need to earn to do well on the exam. Multivariate analyses indicated that students adjusted their confidence and standards over these four timepoints, and additionally, that standards were highly related to performance whereas confidence was not. This evidence calls into question whether students are “mis-calibrated”, and raises the question of *what* judgments they may be using to calibrate their performance (i.e., standards rather than confidence).

Standards in calibration: Students' perceptions of conditions for creating performance standards

Presenting Author: Allyson Hadwin, University of Victoria, Canada; **Co-Author:** Lindsay McCardle, University of Ottawa, Canada

Models of self-regulated learning suggest that learners base metacognitive evaluations on personal standards. Calibration research typically focuses on alignment between confidence judgments and performance. However, standards against which students make confidence judgments have largely been ignored. This study examined (a) self-reports of conditions learners used to set standards for performance for a midterm and final exam, and (b) changes in these conditions from

midterm to final. Participants ($n = 195$) completed a reflection after each exam in a course on self-regulated learning. They reported what they considered in determining a grade-standard of doing “well” on each exam. Responses were coded inductively drawing flexibly on a priori categories. Findings indicated three main type of conditions informing student standards: (a) personal standards, (b) time and effort preparing, and (c) both general and domain knowledge confidence. Conditions were more course-specific at the final than at the midterm. Findings suggest confidence and standards have a reciprocal relation and that learners update conditions based on past experiences.

Beyond Hypercorrection: Remembering Corrective Feedback for Low-Confidence Responses

Presenting Author: Lauren Griffiths, University of Southampton, United Kingdom; **Co-Author:** Philip Highham, University of Southampton, United Kingdom

Correcting errors based on corrective feedback is essential to successful learning. Previous studies have found that corrections to high-confidence errors are better remembered than low-confidence errors (the hypercorrection effect). The aim of this study was to investigate whether corrections to low-confidence errors can also be successfully retained in some cases. Participants completed an initial multiple-choice test consisting of control, trick, and easy general-knowledge questions, rated their confidence after answering each question, and then received immediate corrective feedback. After a short delay, they were given a cued-recall test consisting of the same questions. In two experiments, we found high-confidence errors to control questions were better corrected on the second test compared to low-confidence errors – the typical hypercorrection effect. However, low-confidence errors to trick questions were just as likely to be corrected as high-confidence errors. Most surprisingly, we found that memory for the feedback and original responses, not confidence or surprise, were significant predictors of error correction. We conclude that for some types of material, there is an effortful process of elaboration and problem solving prior to making low-confidence errors that facilitates memory of corrective feedback.

Feedback Supports Childrens' Ability to Accurately Self-Regulate Concept Learning

Presenting Author: Mariette van Loon, University of Bern, Switzerland; **Co-Author:** Claudia Roebers, University of Bern, Switzerland

Elementary school learners are typically highly confident for their incorrect (commission errors) and incomplete (partially correct) test responses, and do not allocate further study time to improve understanding of these items. Therefore, inaccurate self-evaluations are harmful for self-regulation and performance. Feedback has been shown to improve accuracy of adults' and adolescents' self-evaluations and self-regulation, however, little is known about whether feedback has beneficial effects on self-evaluations in elementary school. We investigated effects of fine-grained feedback standards, which showed the ideas that learners should have mentioned in their test response, on self-evaluations and restudy selections. Elementary school children (4th and 6th graders) studied difficult concepts, took an open-ended test, and then self-scored test responses and selected items for restudy first before, and then after receiving feedback standards. Results show that feedback standards strongly improved children's self-evaluations, both for the 4th and the 6th graders. However, although children seem to be well able to identify incorrect and incomplete responses with use of feedback, these items are most often not restudied. Although feedback improved restudy selections for the commission errors and partially correct responses, it was still unlikely that these would be corrected through future study. Findings imply that feedback standards are suitable for elementary school learners to support accurate self-scoring of their performance. Future research should investigate how children can be supported to more effectively regulate learning for commission errors and items that are only partially learned.

Session O 18

1 September 2017 17:30 - 19:00

Main Building C - C7

Symposium

Teaching and Teacher Education

Improving Teacher Selection Methods: Key Challenges and Steps Forward

Keywords: Assessment methods and tools, Educational Psychology, Pre-service teacher education, Teacher Effectiveness, Teacher Professional Development

Interest group: SIG 11 - Teaching and Teacher Education

Chairperson: Anna-Maija Poikkeus, University of Jyväskylä, Finland

Discussant: Friederike Zimmermann, University of Kiel, Germany

Teacher quality is one of the most important factors behind the success of education systems: the effect of improvement in teacher quality overruns the impact of any other educational investment in student achievement, including class size reductions (Goldhaber, 2009). Therefore, it is important that the best possible candidates are selected for both teacher employment positions and for initial teacher education programs. Successful selection of applicants with key competences is relevant for teacher quality and for ensuring the long-term commitment of the workforce in this challenging and complex work. Compared to some other professional fields (e.g., medical training), research on student selections in teacher training is scarce. This symposium consists of four studies conducted in United Kingdom, Oman, and Finland. The first

paper (Robert Klassen) is a meta-analysis that focuses on cognitive and non-cognitive selection methods and their predictive validity on teacher effectiveness. The second (Anna-Maija Poikkeus) and third paper (Waleed Al Hashmi) focus on the development and criterion validity of the Situational Judgment Test, a self-report questionnaire newly adapted to Finnish and Omani educational contexts to facilitate student selection into initial teacher education. The fourth paper (Riitta-Leena Metsäpelto) presents the designing and piloting of Multiple Mini Interview, a promising new tool for enhancing the reliability of admission interviews. Together, this symposium presents and discusses current methodology and findings that will enable us to move forward towards more valid and reliable selection practices.

Selection Methods for Teachers and Prospective Teachers: A Meta-Analysis

Presenting Author:Robert Klassen, University of York, United Kingdom; **Co-Author:**Lisa Kim, University of York, United Kingdom

The purpose of this study was to review selection methods for teacher employment and for entrance into initial teacher education (ITE) programs. We posed five questions about selection methods and subsequent teacher effectiveness. An exhaustive search of the literature resulted in 27 studies included in our meta-analysis, with 9063 total participants. Findings showed a small but significant relationship ($r = .12, p < .001$) between selection methods and measures of teacher effectiveness. Cognitive and non-cognitive selection measures were significantly associated with teacher effectiveness and selection methods were significant predictors both for employment and entry into ITE. There was no significant relationship between cost and predictive validity of selection methods. We conclude by proposing new directions for further development of teacher selection research and practice.

Developing Student Selection for Teacher Training: Piloting Situational Judgment Test in Finland

Presenting Author:Anna-Maija Poikkeus, University of Jyväskylä, Finland

This paper presents findings of a study piloting the SJT method in the context of initial teacher education selections in Finland. It is widely acknowledged that selection approaches which focus exclusively on cognitive attributes do not optimally predict success in the complex, multifaceted job of teaching, and nor do traditional interviews and personality tests. More novel approaches in the form of the Situational Judgment Test (SJT) focusing on non-cognitive attributes related to effective teaching have recently been introduced as a promising alternative to the traditional teacher selections tools (Klassen et al., 2014), but more information is needed on their feasibility in different cultural and educational contexts. The participants of the present study were candidates seeking admission to initial primary teacher education at the University of Jyväskylä, Finland who volunteered to complete the SJT and criterion validity measures. The sample consisted of 118 participants (96 female, 22 male). In addition to the SJT the measures included a test of academic skills, a panel interview, and students' self-ratings of non-cognitive attributes such as empathy, personality characteristics and self-efficacy. The findings failed to show associations between the SJT score and the self-rated non-cognitive measures, but the SJT was found to have statistically significant associations with applicants' academic test score and the panel interview. These findings provided validity information for the SJT by showing its associations with the applicants' ability for reasoning and knowledge application and the ability to elaborate on one's motivation and manifest critical thinking and communication skills.

To What Extent Can SJT Measure the NonCognitive Attributes of Prospective Teachers in Oman?

Presenting Author:Waleed Al Hashmi, University of York, United Kingdom

This study responds to the concerns about the quality of new teachers in Oman by focusing on the current admission process for initial teacher education programs (ITEPs) inside the country. The main aim is to develop and explore the ability of using situational judgment tests (SJTs) to measure the non-cognitive attributes of new applicants, by testing its' reliability, validity and applicants' reactions. The research design consists of four complementary phases. Results from phase one have identified five non-cognitive attributes of effective teacher in Oman, namely: communication skills, organisation and planning, resilience and adaptability, enthusiasm and motivation, and professional ethics. The five attributes were used in phase two for building the SJTs (stems, responses and answer key), supported by focus groups of working teachers ($N = 62$). The resulting SJT consisted of 38 items and was tested in a pilot study in phase three. The participants were a sample of first year university students ($N = 171$, 53.4% female). Results indicate near-normal distribution for the sample, internal reliability of $\alpha = .81$; however, scores were significantly higher for females than for males, $p < .05$. The validity of SJT will be tested in phase four through inclusion of criterion measures (i.e. interview scores, personality test scores).

Piloting Multiple Mini Interview in Teacher Education Selections: Applicant Reactions and Feasibility

Presenting Author:Riitta-Leena Metsäpelto, University of Jyväskylä, Finland

This paper examines applicant responses and feasibility of two interview tools applied in student selection to initial teacher education. Traditional panel interview (TPI) is a commonly used selection tool for assessing candidate's interpersonal skills, personality traits and motivation, i.e., the non-cognitive skills. Because little evidence supports the psychometric properties of TPI, there is a need for alternative approaches. In new promising approach, the Multiple Mini-Interview (MMI), candidates move through a number of stations responding to questions and discussing scenarios while being rated by one examiner using standardized scoring scheme. Strong psychometric properties of MMI give impetus to apply it in the field of education. This paper investigates feasibility of the MMI in teacher trainee selections; analyzes TPI and MMI scores in relation to relevant criterion variables; and examines applicant reactions to TPI and MMI. Participants of the study

comprised of two samples of candidates seeking entry to primary teacher education at University of Jyväskylä (Finland). Study I ($n=240$) showed that TPI was generally well-received by candidates, but the scores in TPI were not related to any of the criterion variables (empathy, interpersonal functioning, VAKAVA exam score). Study II supported the feasibility of MMI, for instance, the design required no more resources with respect to time or number of examiners than TPI. Since the final stage of the MMI ($n=50$) will be implemented in November 2016, the findings concerning applicant reactions and the associations between MMI scores and criterion variables will be presented and discussed in the symposium.

Session O 19

1 September 2017 17:30 - 19:00

Main Building A - A2A

Symposium

Motivational, Social and Affective Processes

Interest and competence co-development : Spiraling growth that we need to harness.

Keywords: Achievement, Competencies, Educational Psychology, Higher education, Informal learning, Instructional design, Motivation, Motivation and emotion, Problem-based learning, Science education, Secondary education, Self-efficacy

Interest group: SIG 08 - Motivation and Emotion

Chairperson: Quint Oga-Baldwin, Waseda University, Japan

Organiser: Luke K. Fryer, The University of Hong Kong, Hong Kong

Organiser: Maximilian Knogler, Germany

Discussant: Amanda Durik, Northern Illinois University, United States

Harnessing the co-development of domain interest and competence stands at the heart of educational good practice. Yet, this essential reciprocal connection is often taken for granted. Despite considerable attention from researchers, our understanding of the intricate and often spiraling connections between essential affective and competency related individual differences and the learning environment remain theoretical outlines at best (e.g., Hidi & Ainley, 2008). It is into this gap that the current symposium steps. This symposium's papers undertook short and long interventions seeking to examine the role of different learning environments on students' interest and competency development. Longitudinal examinations of interest and competence's reciprocal development in language (Finnish/English) learning courses extend our understanding of the complex interactions at the heart of our shared question. Paper-1 investigated the role of ill-structured, complex problems and their potential to repeatedly stimulate interest and engage learners. During a PBL intervention the underlying mechanisms that can be harnessed for supporting situational interest were explored. Paper-2 tested (latent change score modeling) the predictive relationship between prior achievement and value beliefs predict the change in students' interest and self-efficacy during a secondary school language course. Paper-3 examined the effect of two museum contexts on two dimensions of interest (SI-Catch/SI-Hold) and their role within students' resulting scientific literacy. Paper-4 tested the longitudinal reciprocal connections between related, but conceptually separate individual differences (i.e., prior-knowledge, self-efficacy, self-concept, utility-value and interest) through variable-/person-centred modelling. Our distinguished discussant will review/critique the theoretical and empirical issues raised and discussion.

Explaining situational interest during complex problem solving

Presenting Author: Maximilian Knogler, Technical University of Munich (TUM), Germany; **Co-Author:** Alexander Groeschner, Friedrich Schiller University Jena, Germany; **Co-Author:** Doris Lewalter, Technical University of Munich (TUM), Germany

Although problem-based learning (PBL) has become a major alternative to direct instruction, knowledge about students' motivational development during PBL activities is still quite limited (Bellant, Kim & Hannafin, 2013). Recent research on situational interest (SI) during PBL has shown that well-structured problems have the potential to temporarily stimulate interest (Rotgans & Schmidt, 2014). The current study extends this focus by investigating ill-structured, complex problems with the assumption that these problems have the potential to repeatedly stimulate interest and thus to continuously engage learners. This assumption rests on the evolving nature of complex problems which repeatedly challenge learners by offering new and previously unresolved problem aspects. The current study explores underlying mechanisms that can be harnessed for supporting SI during PBL such as students' experience of competence, autonomy and relatedness (Krapp, 2005). Participants were 327 high school students, who took part in a 15 lessons PBL classroom intervention based on an ill-structured problem on the topic of energy supply. Results demonstrate that complex problems have the capacity to stimulate SI repeatedly as significant and substantial increases in SI were observed several times during the intervention. Analysis of both quantitative survey data and qualitative interview data showed that high levels of situational interest were related to students' experience of competence, autonomy and relatedness over time. Implications for further research and the design of motivational scaffolding for PBL instruction are discussed.

The predictors and outcomes of the changes in students' course-specific interest and self-efficacy

Presenting Author: Anna Tapola, University of Helsinki, Finland; **Co-Author:** Heta Tuominen, University of Helsinki, Finland; **Co-Author:** Markku Niemivirta, University of Oslo, Norway

Actual competence and value beliefs (utility, attainment and intrinsic value) are considered as important factors in the

development of students' interest and self-efficacy appraisals in a domain. However, we still know relatively little about the developmental interplay of these constructs. In this study, we examined how prior achievement and value beliefs predict the change in upper secondary school students' ($N = 172$) interest and self-efficacy in Finnish language across one school year, and how those changes influence students' subsequent value beliefs and overall achievement at the end of the semester. Results from a series of multivariate latent difference score models revealed two patterns of predictions for value beliefs and course interest on the one hand, and for achievement measures and self-efficacy on the other hand. While we found no effects from prior achievement on course interest, value beliefs predicted its initial level. Further, although the changes in course interest and self-efficacy were correlated, they played a different role in terms of outcomes: later intrinsic value was predicted by the changes in interest, and achievement by changes in self-efficacy. Our results extend the previous research on the developmental dynamics of achievement, value beliefs, interest and self-efficacy.

THE EFFECT OF SITUATIONAL INTEREST ON KNOWLEDGE ACQUISITION DURING SCHOOL MUSEUM VISITS

Presenting Author:Doris Lewalter, Technical University of Munich (TUM), Germany; **Co-Author:**Katrin Neubauer, TUM School of Education, Germany

It is generally assumed that learning and competence development and knowledge acquisition benefit from the presence of interest. Nevertheless, there are a lot of open questions regarding this relationship. These questions are related to the impact of learning environment features or the kind of learning outcome, for example. Thus, the present paper aims to investigate the predictive power of both phases of situational interest (catch and hold) on knowledge acquisition in different subject areas of nanotechnology (contents, research processes, societal relevance) as a function of different museum formats (exhibition vs. open science lab). The presented study was conducted with 273 students from 15 different German secondary schools, randomly assigned to two groups (exhibition visit vs. open science lab visit on the topic of nanotechnology). Students' situational interest was measured with a two-dimensional (SI-Catch & SI-Hold) scale. Learning outcome was operationalized based on Miller's tripartite definition of 'scientific literacy' as contents, research processes and societal relevance of nanotechnology. Results of multiple regression analyses indicate that the phases of situational interest each had a different predictive power for knowledge gain in the three knowledge areas. In addition their predictive function was related to the museum format. The results reveal, at least for the museum context, the necessity to take the learning environment's impact into account as its unique situational conditions were shown to influence the positive relationship between situational interest and learning outcome. The implications of these and further findings for theory, research and educational practice will be discussed in this contribution.

Spiraling developmental (reciprocal) links: Getting Interested and Competent ?

Presenting Author:Luke K. Fryer, The University of Hong Kong, Hong Kong; **Co-Author:**Mary Ainley, University of Melbourne, Australia

Across (in)formal education implicit links between competency and interest development are clear. Yet, despite considerable theory outlining these co-developmental connections and pointing towards the important contributing role of other important individual differences, empirical research has often focused on small portions of the overall picture. Past research has generally failed to estimate the direct and mediated contributions of related, but conceptually separate individual differences (i.e., prior-knowledge, self-efficacy, self-concept, utility-value and interest). This study aimed to address this empirical gap with variable- and person-centred tests. Second-year students from six faculties in a Japanese university ($n=614$; Female=129), self-reported their motivation for studying in their English language course. Self-reports were collected at eight time-points. Pre/post competency was measured using standardised tests of students' language skills. The cross-lagged latent modelling of domain competency, utility-value, interest, self-concept, and self-efficacy was undertaken with a specific focus on 1) how domain interest predicted enhanced self-competency and 2) interest/competency as outcomes. Latent Profile Transition Analysis (LPTA) identified three stable subgroups and tested a mover-stayer model (semester-1 and -2). Correlational results presented increasing links between utility-value and interest over time. Cross-lagged findings suggested that utility-value, interest and self-efficacy (in that order) are important predictors of future domain interest. LPTA results indicated substantial sub-group stability with a pattern of movement toward membership in subgroups exhibiting more motivation for studying. Accounting for prior-interest and ability, utility-value and self-efficacy are essential for future interest. Longitudinal person-centred results supported the unique role of utility-value and self-efficacy, signalling movement to more adaptive subgroups.

Session O 20

1 September 2017 17:30 - 19:00

Main Building A - A05

Symposium

Instructional Design

Current issues in navigating self-regulated learning environments

Keywords: Instructional design, Learning Technologies, Metacognition, Self-regulation

Interest group: SIG 07 - Learning and Instruction with Computers

Chairperson: Jeroen Van Merriënboer, Maastricht University, Netherlands

Discussant: Tina Seufert, University of Ulm, Germany

Discussant: Philip Winne, Simon Fraser University, Canada

Self-regulated learning (SRL) environments are meant for students to acquire domain-specific knowledge or skills on their own pace and fitted to their own knowledge level. However, in order to regulate your learning in a such a complex learning environment you need metacognitive skills and knowledge. This symposium will discuss factors involved in navigating complex SRL environments and ways of improving SRL behaviors in the learning environments. The first contribution addresses the link between epistemological beliefs and metacognitive regulation strategies. Subsequently, three contributions will discuss the effectiveness of three types of instruction around SRL: video modeling examples, tutor guidance, and checklists. Finally, two discussants will shed their light on the findings of the four studies.

Epistemological Beliefs and Metacognition in Self-Regulated Learning Environments

Presenting Author:Marco Fromm, University of Ulm, Germany; **Co-Author:**Tina Seufert, University of Ulm, Germany

What do you think about learning and about your knowledge? Learners' epistemological beliefs are a relevant factor in SRL environments. Their epistemological beliefs influence how learners calibrate their learning process to the task conditions. Furthermore, this affects their metacognitive awareness and metacognitive strategy use. This impact of the way learners think about their knowledge is extremely important while learning in discovery-based learning settings. Thus, this study was settled in a discovery-based simulation with the topic of "Buoyancy and density in fluids". Learners' ($N = 72$) had to decide if they will explore new information or will integrate the already explored information in their cognitive system. This process demonstrates the role of epistemological beliefs, metacognitive awareness and regulation for learning success. This study shows that epistemological beliefs' dimensions "complexity of knowledge" ($r = .36, p = .007$) and "justification of knowledge" ($r = .26, p = .029$) are linked to learning success. Furthermore, cognitive trust is a moderator of the relation between complexity of knowledge and learning success. However, we could not find the expected relation between metacognitive strategies and epistemological beliefs and also miss the relation between metacognitive strategies and learning success.

Training Self-Regulated Learning Skills with Video-based Modeling Examples

Presenting Author:Steven Raaijmakers, Utrecht University, Netherlands; **Co-Author:**Martine Baars, Erasmus University Rotterdam, Netherlands; **Co-Author:**Lydia Schaap, Erasmus University Rotterdam, Netherlands; **Co-Author:**Fred Paas, Erasmus University Rotterdam/University of Wollongong, Netherlands; **Co-Author:**Jeroen Van Merriënboer, Maastricht University, Netherlands; **Co-Author:**Tamara Van Gog, Utrecht University / Erasmus University Rotterdam, Netherlands

An effective strategy for students engaging in self-regulated learning in a computer-based learning environment, is to choose tasks adapted to their current level of knowledge. Accurate metacognitive judgments about one's performance (self-assessment) and about what a suitable next task would be (task-selection) are imperative for such a strategy to be effective. In general, however, students' metacognitive judgments are inaccurate. Training consisting of video examples in which human models assessed their own performance and selected new tasks based on a performance/effort algorithm, has been found to improve performance after a self-regulated learning phase. This study aimed to replicate and extend these findings, by including a condition in which task selection was trained by the model applying a more general heuristic. Both the specific algorithm condition ($n=42$) and the general heuristic condition ($n=37$) were hypothesized to show improved task performance after self-regulated learning compared to a control condition ($n=43$). Additionally, the heuristic condition was hypothesized to improve transfer of task-selection skills when selecting tasks for a peer in another domain. Our results indicated that both types of training indeed led to an improvement of task performance after self-regulated learning. However, our hypothesis concerning transfer of task selection could not be confirmed. Both types of training showed improved transfer of task-selection skills. Currently, we are following up these results with an experiment where learners engage in self-regulated learning in another domain after training with video-based modeling examples and these data will also be presented at EARLI.

Effects of Task-selection Guidance on Task Selections and Development of Domain-Specific Skills

Presenting Author:Halszka Maria Jarodzka, Open University of the Netherlands, Netherlands; **Co-Author:**Michelle Nugteren, Utrecht University, Netherlands; **Co-Author:**Liesbeth Kester, Utrecht University, Netherlands; **Co-Author:**Jeroen Van Merriënboer, Maastricht University, Netherlands

Selecting own learning tasks is an important skill for students, for instance when doing homework and no teacher is present to select tasks for them. However, studies on task-selection guidance thus far provided mixed results, which might have been caused by the different types of guidance used in different studies, and different levels of motivation in students. This research project investigated the different effects of procedural and strategic guidance on actual task selections and the development of domain-specific skills, compared to a control group with no guidance. Procedural guidance provides specific rules for selecting tasks. However, students do not elaborate on these rules, but seem to follow them blindly. Strategic guidance provides similar, but less concrete rules that stimulate students to think about them. Furthermore, we investigated the effect of differences in students' motivation levels on the effects of guidance on task selections and domain-specific skill development. The results from three experiments suggest that procedural guidance is actually more detrimental than beneficial, that strategic guidance does affect task selections but not the development of domain-specific skills, and that motivation affects conformity to the advice. A fifth experiment will be added to further investigate the effects of motivation.

Task Selection and Learning a Problem-Solving Procedure

Presenting Author:Jeroen Van Merriënboer, Maastricht University, Netherlands; **Co-Author:**Jimmie Leppink, Maastricht

University, Netherlands; **Co-Author:**Tamara Van Gog, Utrecht University / Erasmus University Rotterdam, Netherlands; **Co-Author:**Liesbeth Kester, Utrecht University, Netherlands; **Co-Author:**Fred Paas, Erasmus University Rotterdam/University of Wollongong, Netherlands

Self-assessment and learning-task selection are key SRL skills. However, using these skills appears to be difficult for high school students, even more so when these students are novices in the content to be learned. We investigated in a randomized controlled experiment with $N = 95$ high school students whether asking students (1) to indicate in how many steps (0-4) they had to think hard in a learning task just completed (task difficulty question: yes/no) and/or (2) to indicate the desired level of complexity ("more", "same" or "less") and level of instructional support ("more", "same" or "less") influences the complexity of and/or instructional support in a learning task selected next (task selection) and/or learning of a problem-solving procedure (posttest performance). With regard to the complexity of a subsequently selected task, we found a medium size two-way interaction, $F(1, 88) = 3.451, p = 0.019, \eta_p^2 = 0.061$: students who were asked about task difficulty but not about the desired complexity of and instructional support in a subsequent learning task on average chose significantly more complex tasks than students who were asked about the desired complexity of and instructional support in a subsequent learning task but not about task difficulty. With regard to posttest performance, we found no statistically significant differences between conditions.

Session O 21

1 September 2017 17:30 - 19:00

Pinni A - Paavo Koli

Symposium

Cognitive development from late childhood to adolescence: Challenges for education

Keywords: Achievement, Cognitive development, Cognitive skills, Developmental processes

Interest group:

Chairperson: Elsbeth Stern, ETH Zurich, Switzerland

Discussant: Mutsumi Imai, Keio University, Japan

The period from late childhood to adolescence is one of great changes, not only regarding executive control and emotional regulation, but also with respect to cognitive competencies. Broadly applicable competencies, such as proportional reasoning, the use of learning strategies, deductive reasoning, and the control of variable strategy are expected to emerge from interactions between brain maturation and learning opportunities provided at school. There are, however, huge individual differences in the ease with which children acquire these competencies. Many students acquire broadly applicable competencies spontaneously even without direct instruction and do master them in late childhood. There is, however, still a considerable amount of adolescents who lack these competencies, and this severely hampers their learning progress in core subjects of secondary school. The individual differences can be traced back to personal characteristics like intelligence as well as to learning opportunities. To what extent specific trainings applied in late childhood or early adolescence can improve the four mentioned competencies, is in the focus of this symposium. Four controlled intervention studies on improving proportional reasoning, the use of learning strategies, deductive reasoning, and the control of variable strategy will be presented. Questions of long-term effects, transfer and the impact of intelligence on learning will be discussed.

Who makes use of prior knowledge in a curriculum on proportional reasoning?

Presenting Author:Daniela Nussbaumer, University of Applied Sciences of Special Needs Education, Switzerland; **Co-Author:**Ralph Schumacher, ETH Zurich, Switzerland; **Co-Author:**Elsbeth Stern, ETH Zurich, Switzerland

Understanding proportions is a time intensive process that does not come cheap during late childhood and early adolescence. It is fostered by earning experiences in which students have opportunities to explore, discuss and experiment with situations involving proportions (van Hof et al., 2015). Children have to undergo many informal learning opportunities before they can gain from direct instruction on proportional reasoning. In this study, we want to find out whether physics curricula dealing with the concept of density will prepare for learning from a curriculum on proportional reasoning. A 2x2 design with the factors "Physics curricula" (with, without) and "Concept used to introduce proportional reasoning" (speed, density) was applied to altogether 253 children coming from 12 classrooms at the beginning of grade 5. We expected the group "density, with physics curriculum" to outperform the other three groups. It turned out, however, that only the students who scored on the highest quartile of an intelligence measure gained from the prior knowledge acquired in the physics curricula. The results show that curricula on proportional reasoning are worthwhile for all students in early adolescence. However, more capable students can boost their proportional reasoning if they had gotten the chance to acquire prior knowledge in a physics curriculum.

Mapping and changing general intelligence: A theory and an intervention program

Presenting Author:Andreas Demetriou, University of Nicosia, Cyprus

A model of human intelligence and its development and its implications for learning and education are first outlined. Two relevant empirical studies are then summarized. The first investigated if learning relational reasoning in mathematics and related awareness generalizes to other domains and general intelligence, including attention control, and working memory.

A total of 118 10-year olds were involved, allocated to an experimental and a control group. We found significant but not fully sustainable learning gains in mathematics. However, learning transferred to similar processes in other domains of reasoning and also to attention control and working memory. The second study trained 180 8- and 11-year old children to master conditional reasoning. Experimental groups learned principles of conditional reasoning at various levels. Reasoning improved proportionally to training. Changes in reasoning and awareness changes were related to attention control and fluid intelligence. Awareness mediated the influence of training on reasoning but not vice-versa, suggesting that awareness is necessary for mastering conditional reasoning. Implications for psychometric and developmental theories of intelligence and for education are discussed. We suggest that learning programs must be tailored to the needs of developmental phase and the individual and must recycle appropriately, following the composition and needs of each developmental phase.

Growth and changes in mathematical and formal thinking in Finland: A nine-year follow-up.

Presenting Author:Jarkko Hautamaki, University of Helsinki, Finland; **Co-Author:**Mari-Paullina Vainikainen, University of Helsinki, Finland; **Co-Author:**Satu Koivuhovi, University of Helsinki, Finland

The Finnish framework defines learning-to-learn as cognitive competencies and learning- and self-related beliefs that are both related to school achievement. To monitor the development and the structuration of them, a nine-year longitudinal study was launched in 2007 in a major Finnish city. This paper focusses on the growth and changes in mathematical and formal thinking of about 600 pupils as measured in several assessment cycles during the nine-year follow-up. The results show that whereas Piagetian formal thinking skills gradually improve, in the arithmetical operations task measuring mathematical thinking the development is even negative. The results indicate that the way to abstract generalisation is hard and it needs to be supported by educational means. More research is also needed on the impact of learning-related beliefs and school/class composition effects on this development.

Assessment and training of experimentation skills in primary school children

Presenting Author:Sonja Peteranderl, ETH Zurich, Switzerland; **Co-Author:**Anne Deiglmayr, ETH Zurich, Switzerland

Scientific reasoning is defined as the competence of understanding, coordinating and evaluating scientific evidence and claims. A core component of scientific reasoning is the ability to design conclusive, un-confounded experiments, and to interpret and evaluate the obtained data, summarized as experimentation skills. This research focuses on the assessment and training of experimentation skills in primary school students. Our focus is on the “control of variables” strategy (CVS), a core skill in planning, conducting, and evaluating scientific experiments for testing causal hypotheses. An experimentation skills training for primary school children was developed with the aim to foster children’s understanding and application of CVS. In addition, a paper-based test for assessing the experimentation skills of children in primary school has been developed, focussing on several subskills of CVS, and addressing prevalent misconceptions. Both, the test and the training were evaluated in ten 6th grade classes. In this paper, first results will be reported.

Session O 22

1 September 2017 17:30 - 19:00

Virta - 114

Symposium

Teaching and Teacher Education

Language Teachers’ Professional Knowledge: Conceptualization, Assessment, Development

Keywords: Cognitive skills, Competencies, In-service teacher education, Language (Foreign and second), Language (L1/Standard Language), Pre-service teacher education, Qualitative methods, Secondary education, Teacher Professional Development

Interest group: SIG 11 - Teaching and Teacher Education

Chairperson: Fien Depaepe, KU LEUVEN, Belgium

Chairperson: Johannes König, University of Cologne, Germany

Organiser: Johannes König, University of Cologne, Germany

Discussant: Horst Biedermann, University of Teacher Education St.Gallen, Switzerland

Aims: This symposium aims at bringing together research focusing on an advancement of the language teacher knowledge research field both in the context of first and foreign language learning. The presentations will present new empirical evidence using different instruments and research approaches and provide frameworks for understanding the theoretical and methodological challenges associated with conceptualizing, assessing, and developing language teacher knowledge. **Scientific and educational relevance:** Over the past decades, research on teacher knowledge has been growing. Empirical investigations have remarkably put forward the state of research into mathematics and natural sciences, but empirical evidence on language teacher knowledge is comparatively scarce. Accounting for languages as core subjects world wide – either as mother tongue or as second or foreign languages – there is the need to profile that specific empirical research area with regards to how language teachers’ professional knowledge is conceptualized, how it can be assessed, and which factors impact its development. Investigations into language teachers’ professional knowledge would serve various purposes, such as to gain insight into the nature of teacher knowledge and expertise, to identify knowledge areas relevant for effective teaching, to symbol of what it takes to teach and thus to attract teacher quality, or to improve preparation

programs and teacher professional development. The coherence of the symposium is assured by taking into account different language domains (mother tongue, different foreign languages) from three different educational contexts in Europe (Belgium, Germany, the Netherlands).

Teachers' professional competence for teaching English as a foreign language

Presenting Author:Sarah Strauß, University of Cologne, Germany; **Co-Author:**Sandra Lammerding, University of Cologne, Germany; **Co-Author:**Günter Nold, Technical University of Dortmund, Germany; **Co-Author:**Andreas Rohde, University of Cologne, Germany; **Co-Author:**Sarantis Tachtsoglou, University of Cologne, Greece

Teachers' professional competence has been considered a multi-dimensional construct. Besides the central teacher knowledge categories (content knowledge, CK; pedagogical content knowledge, PCK; general pedagogical knowledge, GPK), also affective-motivational dispositions are increasingly focused on. However, relationships between cognitive and affective-motivational teacher variables have mainly been analyzed for the domain of mathematics. This presentation therefore reports about a study conducted in Germany with 444 pre-service teachers of English as a foreign language (EFL). Their CK, PCK, and GPK was assessed using paper-pencil tests, together with a measure of their language proficiency. Moreover, their teacher self-efficacy, enthusiasm for teaching EFL, and beliefs about teaching were measured. We will present findings to answer two major research questions that are related to (1) the relationships of the central teacher knowledge categories and (2) the relationship between affective-motivational dispositions and pre-service teachers' PCK as the core category of teacher knowledge.

Impact of opportunities to learn in teacher education on teacher professional knowledge in French

Presenting Author:Marie Evens, KU Leuven, Belgium; **Co-Author:**Jan Elen, KU LEUVEN, Belgium; **Co-Author:**Fien Depaepe, KU Leuven, Belgium

As teacher professional knowledge (PCK, PK and CK) has been shown to positively impact educational quality, an important goal of teacher education (TE) is to improve pre-service teachers' PCK, PK and CK. Some attempts to study the effect of TE on teacher professional knowledge development, mainly in the domain of mathematics, have shown positive effects of TE. It is however not always clear what kind of courses exactly contributed to the development of teacher knowledge. Furthermore, notwithstanding Shulman's (1986) claim that PCK is an amalgam of both PK and CK, most studies have only focused on the effects of TE on PCK and CK, and not on PK. The present study is situated in the domain of French as a foreign language, and aims to examine the effects of several opportunities to learn (OTL) in TE (courses on PCK, PK and CK, and experiences in practice) on pre-service teachers' development of PCK, PK and CK. The participants are 360 pre-service elementary teachers, recruited from all three years of study that are part of Flemish TE. Quantitative test instruments are developed to measure PCK, PK and CK. After controlling for prior education, positive effects of OTL related to PCK on PCK and PK scores are found, as well as positive effects OTL related to CK on CK scores. OTL on PK and experiences in educational practice did not significantly impact participants' professional knowledge.

Feedback in foreign language writing: Exploring teachers' pedagogical content knowledge

Presenting Author:Helma Oolbekink-Marchand, Radboud University Nijmegen, Netherlands; **Co-Author:**Astrid Eelkema, Radboud University Nijmegen, Netherlands

The study of teacher's pedagogical content knowledge in the FL writing domain is an under-researched area, and although studies in teaching FL writing have steadily grown in the last few years, most of these focused on English-as-a-foreign-language context. In this study we address this gap by studying the pedagogical content knowledge (PCK) of five foreign language (FL) teachers of French in the Netherlands on writing instruction in the upper secondary classroom. PCK was elicited by concept mapping followed by a semi-structured interview and a stimulated recall interview after classroom observation. Results revealed that writing was mainly seen as a means by which to learn the language, with day-to-day language teaching as preparation for writing. Discrepancies were found in all five teachers' PCK, showing non-alignment between learning objectives corresponding to various approaches to writing, and assessment focusing exclusively on accuracy. We identified institutional and pedagogical factors hindering enactment of teachers' knowledge and beliefs, which might inform the design of future interventions for professional development and the implementation of educational innovation.

German language teacher knowledge and its effects on instructional quality

Presenting Author:Sandra Lammerding, University of Cologne, Germany; **Co-Author:**Sarah Strauß, University of Cologne, Germany; **Co-Author:**Albert Bremerich-Vos, University of Duisburg-Essen, Germany; **Co-Author:**Christiane Buchholtz, Technical University Berlin, Germany; **Co-Author:**Johannes König, University of Cologne, Germany

Teacher knowledge research has increased over the past decade. Especially for the domain of mathematics, researchers have remarkably put forward the state of research. However, relevant language teacher studies with an intensive scholarly focus making teacher knowledge accessible through tests and assessments are still scarce. This presentation will outline the framework of a study conducted in Germany where pre-service teacher knowledge in the domain of German as a mother tongue was conceptualized and assessed using paper-pencil test instruments. Measures for their content knowledge (CK) and pedagogical content knowledge (PCK) were developed, whereas their general pedagogical knowledge (GPK) was measured using the existing test instrument from TEDS-M. Test data from a representative sample of 290 pre-service teachers in Germany's region of Northrhine-Westphalia who graduated in 2016 from university and who had entered their induction phase is used to analyze two research questions: First, we ask for construct validity of the three

teacher knowledge measures, that is how they are related to each other at the time point when pre-service teachers enter induction. Second, we ask for predictive validity of the teacher knowledge measures by analyzing its effects on instructional quality the pre-service teachers provide when teaching German during induction.

Session O 23

1 September 2017 17:30 - 19:00

Main Building E - E222

Symposium

Learning and Social Interaction

Using video-data to capture motivational, regulative and cognitive processes during collaboration

Keywords: Collaborative Learning, Goal orientation, Motivation and emotion, Peer interaction, Primary education, Self-regulation, Video analysis, Workplace learning

Interest group: SIG 08 - Motivation and Emotion, SIG 10 - Social Interaction in Learning and Instruction, SIG 14 - Learning and Professional Development, SIG 27 - Online Measures of Learning Processes

Chairperson: Maaïke Endedijk, University of Twente, Netherlands

Organiser: Maaïke Endedijk, University of Twente, Netherlands

Discussant: Simone Volet, Murdoch University, Australia

Teamwork has become the standard work situation for 21st century workers in the knowledge economy. Therefore, one of the key tasks of education is to prepare our pupils and students for their future work by developing their collaborative skills. Successful collaboration requires setting common goals, maintaining a shared conception of the task and negotiating multiple perspectives. In order to support collaborative learning, we need better insights in how motivational, regulative and cognitive processes take place in social interaction. To capture these processes, retrospective self-report data will not suffice, but real-time observation is necessary. This symposium addresses the multiple perspectives that video-data enable to have for studying collaborative learning as a process in real time. The symposium comprises four presentations; each implementing a process oriented analysis but raising different key aspects of the groups' interactions, followed by the discussant's concluding remarks of the complexity of the overall topic. Altogether, the four presentations use different lenses to study these interaction processes, together combining motivational, regulative and cognitive perspectives. Furthermore, we bring together papers focusing on collaborative learning at different ages (primary school children, students and employees), enabling an integrative perspective on the role of these processes in collaborative learning throughout the lifespan. The symposium will give both insights in how to use video-data to capture these motivational, regulative and cognitive processes in group interactions, and add to further theoretical insights in how and why various collaborative learning processes evolve in group interactions.

Social Regulation at the Workplace: Understanding Social Regulation of Learning in ICT Teams

Presenting Author: Marijn Wijga, University of Twente, Netherlands; **Presenting Author:** Maaïke Endedijk, University of Twente, Netherlands

Group work and collaboration are key elements of organizational life, which makes learning at the workplace particularly depending? on interaction and dialogue. Social regulation, dealing with how individuals reciprocally regulate each other's metacognitive processes, is a powerful concept in explaining the interactive character of teamwork. However, the field of social regulation research is still emerging, and these processes are fairly left unexplored in a workplace setting. The present study explored the different types of social regulatory processes that take place during team meetings. Video-observations of team meetings were used to analyze the types and quality of socially regulated learning of team members in the context of agile ICT organizations. Results are an adequate and valid analysis tool with which the performance of teams can be explained based on the occurrence of different types and combinations of regulation processes during team meetings. Notable results were that in the far majority of the regulation interactions, team members reciprocally regulated each other's metacognitive processes. In addition, all regulation utterances, planning occurred the most, followed by monitoring, whereas evaluation hardly took place. As evaluation is essential to complete the full cycle of regulation and to learn from previous activities, further research could focus on interventions to increase evaluation in team learning.

Exploring the fluctuation of motivation, emotion and cognitive regulation in collaborative groups

Presenting Author: Hanna Jarvenoja, University of Oulu, Finland; **Co-Author:** Jonna Malmberg, University of Oulu, Finland; **Co-Author:** Sanna Järvelä, University of Oulu, Finland

Up until now, the majority of the studies concerning regulation processes within collaborative groups have focused on a particular aspect of regulation processes, such as co- and socially shared regulation of cognition or, alternatively, motivational and affective processes. However, in actual collaboration, these aspects together compose collaborative groups' regulated learning process. Hence, the aim of this study is to explore the sequential associations between co- and socially shared regulation of both cognitive as well as and motivation and emotion in collaborative group learning. The participants of the study were 16 teacher education students taking part in a mathematics course. During the course, the students completed an extensive collaborative assignment during several video-recorded group sessions. The video data analysis was performed to locate and categorise the visible regulation episodes from groups' interaction according to two different qualifiers; the type of regulation and the target of regulation. The type of regulation included co- and socially

shared regulation and the target of regulation referred to differentiation between cognitive and motivation regulation. The results show that the collaborative groups activate particularly cognitive co-regulation. Motivation and emotion regulation was scarcer, but when the groups engage motivation and emotion regulation, possibility to engage in socially shared regulation was higher than with cognitive regulation. To conclude, the results indicate that while cognitive regulation is needed to ensure collaborative learning activity within the group, the need for the regulation of motivation and emotion during the collaborative learning process is more situation-specific.

Negotiation of shared achievement goals during collaborative group interactions

Presenting Author:Toni Rogat, Purdue University, United States; **Co-Author:**Karlyn Adams-Wiggins, University of Texas – Tyler, United States; **Co-Author:**Temitope Adeoye, Purdue University, United States; **Co-Author:**Zhiping Zhang, Purdue University, United States

Understanding groups' productive collaboration requires cognitive, socioemotional, and motivational processes. However, research has relied primarily on cognitive frameworks. In this research, we explore the role of motivational processes using an achievement goal theory framework to enrich our understanding of collaborative processes. Motivational challenges can be raised by status differences and/or disagreement, which can provoke a competence threat and focus on social comparison. We draw on situative views to treat motivation as jointly negotiated motivational norms, shaped within social contexts. We present a case study that examines the joint negotiation of achievement goals during inquiry-based science curricular tasks focused on promoting reasoning and argumentation. Findings elucidated three means by which shared performance goals were negotiated as predominant in group interaction: (1) the exclusion of low status group members from shared activity, (2) the self-presentation of one's own ideas as most competent, and (3) errors as indicators of low competence and reason for shame.

How primary school students use ground rules for effective collaboration

Presenting Author:Hannie Gijlers, University of Twente, Netherlands; **Co-Author:**Tracey Olde Rikkert, Expertis Onderwijsadviseurs, Netherlands

Students in primary education do not always have a clear understanding of effective collaborative learning. They need to recognize that in order to successfully complete a joint project they need to listen to their peers, share important information and consider knowledge and ideas shared by their peers. Literature shows that knowledge sharing activities can be supported by providing pupils with instruction in ground rules for effective communication and collaboration. This study aims to investigate how primary school students implemented these rules during a group project. Stepwise analysis of video and audio recordings was used to see how students' use of the rules developed over the course of six lessons. Results revealed that students used the rules in their group interactions. Over the course of the lesson series students started selecting specific rules that were relevant in specific situations. Students' reflection on the visualized results of our analysis indicated that they recognized that specific rules like checking agreement and understanding maintained important in all occasions but that other rules were particularly important during a certain phase of the learning process.

Session O 24

1 September 2017 17:30 - 19:00

Pinni B - B3117

Symposium

Instructional Design

Promoting deep learning through generative learning activities

Keywords: Collaborative Learning, Comprehension of text and graphics, Computer-supported collaborative learning, Educational Psychology, Emotion and affect, Experimental studies, Instructional design, Knowledge creation, Metacognition, Primary education, Student learning

Interest group: SIG 02 - Comprehension of Text and Graphics

Chairperson: Susanne Narciss, TU Dresden, Germany

Organiser: Susanne Narciss, TU Dresden, Germany

Discussant: Erica de Vries, Université Grenoble Alpes, France

The papers of this symposium reflect a growing interest by researchers from various fields in examining the issue of how deep learning can be promoted through prompting or fostering the engagement in generative learning activities. Generative learning activities require students to make sense of to-be-learned information, and include for example learning activities such as drawing, concept-mapping, designing of learning tasks, (self-)explaining (e.g., Fiorella & Mayer, 2015).

The four papers of this symposium investigate this issue in different instructional scenarios (e.g., individual text-based learning, computer-supported collaborative learning, face-to-face collaborative learning; learning with an intelligent tutoring system), with different age groups (primary school children, fifthgraders, eighth- and ninegraders, undergraduate students), and across different domains (mathematics, and science). They examine either the effects of different generative learning activities or conditions under which students apply generative learning activities, and how the application of these activities affects deep learning. To do so, the authors use both process- and outcome data in order to investigate how generative learning activities influence learning processes in terms of students' cognitive and/or metacognitive activities, as well as their learning outcomes. The challenges and findings of the four studies will be discussed with regard to their implications

for generative learning theory, as well as for further instructional research and practice.

Why does generative drawing work so well? An eye tracking study to evaluate theoretical assumptions

Presenting Author:Johannes Hellenbrand, University of Duisburg-Essen, Germany; **Co-Author:**Maria Opfermann, Universiteit Utrecht / Hogeschool Utrecht, Netherlands; **Co-Author:**Annett Schmeck, Universität Duisburg Essen, Germany; **Co-Author:**Detlef Leutner, University of Duisburg-Essen, Germany

A popular statement in multimedia research is that “people learn more deeply from words and pictures than from words alone” (Mayer, 2009, p. 47). But just providing pictures in addition to text might not be enough. Enabling students to study for deep level understanding has been shown to work especially well when they are asked to draw their own pictures representing the main ideas of the text. One of the benefits of this so called generative drawing is the enhancement of self-regulatory processes, which are described in van Meter and Firetto’s (2013) *Cognitive Model of Drawing Construction*. The model predicts, that by using the drawing strategy, learners’ attention will be directed towards the key elements of the text and their relations and that learners engage in self-monitoring and self-regulation more frequently than learners who do not use this strategy. To shed more light on these assumptions, we conducted a study using mobile eye tracking technology to make self-regulation and self-monitoring processes observable. In a between-subjects design with two types of learning (text plus learner-generated drawings vs. text plus author-generated pictures), 52 eighth and ninth graders in higher track secondary schools learned with the same scientific text explaining the biological process of influenza. Results show that students in the drawing condition gained more knowledge, focused more deeply on the main aspects of the text and engaged in more self-monitoring processes than students in the control group, which supports the theoretical assumptions made in the CMDC.

Cognitive and Metacognitive Benefits of Generative Learning Strategies

Presenting Author:Logan Fiorella, University of Georgia, United States

A generative learning strategy is an activity initiated by the learner that is intended to support deep cognitive processing and promote understanding, such as explaining to-be-learned material to oneself or others, or creating a map or drawing to depict a text passage. This talk reviews a program of research demonstrating cognitive (comprehension, long-term learning) and metacognitive (self-regulation) benefits of engaging in generative learning strategies. Specifically, this research suggests that a) explaining material to others (learning by teaching) promotes long-term understanding of science concepts, b) writing explanations of math problems promotes self-regulation behavior in a cognitive tutor, and c) spontaneously engaging in spatial generative strategies (mapping or drawing) predicts learning from a scientific text. Implications for generative learning theory and educational practice will be discussed.

How can CSCL-scripts transfer individual into transactive knowledge generation for deep learning?

Presenting Author:Stephan Mende, TU Dresden, Germany; **Co-Author:**Antje Proske, Technische Universität Dresden, Germany; **Co-Author:**Susanne Narciss, TU Dresden, Germany

Generative learning-tasks require learners to infer new knowledge from to-be-learned information. The benefits of such tasks on deep comprehension have been mainly investigated in individual learning settings. Implementing them in computer-supported collaborative learning (CSCL) settings offers further opportunities for fostering deep comprehension because learners can share and mutually discuss their understanding with their co-learners and thereby generate new knowledge (transactive generative activities). However, CSCL-research reveals these potentials often not to be used without support (Fischer et al., 2013). Hence, in this study (N = 123 undergraduates) we compared three versions of a CSCL script regarding their effects on individual and collaborative generative activities and deep comprehension outcomes. In each script, learners individually read a text (Reading phase), individually answered a task in written form (externalization phase), read the co-learners’ task answer (awareness induction phase) and subsequently chatted on the text collaboratively (discussion phase). The script versions differed in the tasks applied in the externalization phases: Note-taking, organization or elaboration. Analyses of the individual task-responses (externalization-phases) revealed that compared with the note-taking-condition a) learners of the organization condition inferred more relations within to-be-learned information and b) learners of the elaboration condition inferred more relations between to-be-learned information and their prior knowledge. However, neither the organization nor the elaboration condition outperformed the note-taking condition in terms of transactive generative activities (discussion phases) or deep comprehension outcomes. Results are discussed in terms of possible over-scripting effects and the need to improve the alignment between individual externalization tasks and scaffolds for subsequent discussion phases.

Effects of an Emotion Regulation and Metacognitive Training on Knowledge Generation in Mathematics

Presenting Author:Tina Montreuil, McGill University, Canada

One major educational goal for today’s youth is developing 21st century skills that include critical thinking, problem solving, and self-regulated learning. Unfortunately, many emerging adults entering the workplace lack these skills, particularly in mathematics. Emotions were found to play an important role in complex learning with younger students (Muis et al., 2015). As Butler and Winne (1995) and Zimmerman and Martinez-Pons (1990) noted, younger students are not very good at self-regulating their learning, nor are they very successful at generating their own meaning. Furthermore, learners are required to make decisions about their learning process, yet do not possess the required skills to regulate their own learning process cognitively or metacognitively. As such, in the face of an impasse during complex problem solving, younger students who have not yet developed emotion regulation or metacognitive skills, do not adjust their strategies, redefine the problem, nor

implement deeper processing cognitive and metacognitive strategies to resolve conflict. Hence, in a study with one hundred grade 5 students from four classrooms we investigate the effects of an emotion regulation focused program on students' collaborative deeper knowledge generation in mathematics. At the end of the program, participants will complete the situational problem, Start Your Engines, which was drawn from the 2009 compulsory Quebec Provincial Exam in Mathematics. Results from this study will discuss how an emotion regulation and metacognitive training program promotes the development of deeper levels of knowledge generation by helping learners regulate their emotions and acquire metacognitive strategies.

Session O 25

1 September 2017 17:30 - 19:00

Pinni B - B1100

Invited Symposium

Instructional Design, Learning and Instructional Technology

Motivation, Affect, and Body in Instructional Design: Current Research

Keywords: Artificial intelligence, Comprehension of text and graphics, Computer-assisted learning, Educational Psychology, Educational Technology, Emotion and affect, Instructional design, Learning Technologies

Interest group: SIG 07 - Learning and Instruction with Computers

Chairperson: Vincent Hoogerheide, Utrecht University, Netherlands

Organiser: Anne Deiglmayr, ETH Zurich, Switzerland

Organiser: Steffi Zander, Bauhaus-Universität Weimar, Germany

Discussant: Paul Ginns, University of Sydney, Australia

The emerging availability of digital technologies and devices for tapping into cognitive and non-cognitive learner states allow novel forms of digital learning that are highly embodied, immersive and adaptive. One of the major points of interest is the registration of non-verbal data, such as gestures, movements, prosodic features of speech, or physiological parameters, which can be used for inferences on the emotional, motivational or cognitive state of the learner, and for tracking their motor engagement with physical learning materials. In turn, these data have the potential to support adaptive and embodied learning environments. In response to these current developments, instructional design models and theories are rethought and amplified by integrating embodied, affective and perceptual dimensions with the still predominant cognitive perspective on technology-enhanced learning. In turn, empirical research on educational technologies has now a stronger focus on investigating novel input devices and their potential to register multiple kinds of non-verbal data during the learning process and to subsequently create adaptive learning environments. In this symposium, which is thematically aligned with the symposium SIG 6 symposium "Motivation, affect, and body in Instructional Design: Current theoretical approaches", we present examples of how novel digital technologies, such as sensors originally developed for the gaming industry (e.g. Wii Board; Microsoft Kinect), can be used to assess cognitive and non-cognitive learner states and enable the design of more adaptive learning environments.

Assessment of Bodily Expression as an Indicator of Emotional Experience during Serious Gaming

Presenting Author:Valentin Riemer, University of Ulm, Germany; **Co-Author:**Julian Frommel, Ulm University, Germany;

Co-Author:Claudia Schrader, University of Ulm, Germany

A study is presented that investigates the predictive value of analyzing bodily expression to identify the experience of emotions during playing a serious game. Seventy undergraduates played a serious game on practical money skills. Their bodily expressions of the upper body and the head were recorded during gameplay using a Microsoft Kinect camera. Further, participants reported their experienced enjoyment, boredom, and frustration on five predefined occasions during the game. Using Generalized Estimated Equations, bodily expression features that significantly predicted the self-reported emotions could be identified. For enjoyment and frustration, position features pertaining to the posture of the head emerged as significant predictors. In addition, frustration was predicted by a position of the upper body closer to the screen. Conversely, an increased activity of the head appeared to indicate higher boredom experienced during the game. The findings can assist researchers and developers in their efforts to investigate and develop automatic emotion recognition systems for multimedia learning environments.

The role of speech technology in affective modelling and adaptive feedback

Presenting Author:Nikol Rummel, Ruhr University Bochum, Institute of Educational Research, Germany; **Co-**

Author:Manolis Mavrikis, University College London, United Kingdom; **Co-Author:**Beate Grawemeyer, Birkbeck College, United Kingdom

The italk2learn adaptive digital learning platform employs speech technology to provide input to affect modelling and adaptive feedback components. We summarise the design methodology that helped us develop a better understanding of, and take design decisions on, how to integrate speech technology from a pedagogical and human-computer interaction point of view. We also present results, part of a larger research study, focusing on the role of speech in contributing to the predictive accuracy of students' affective states. At the conference we will conclude with the theoretical and educational significance of this work and point to future research and challenges.

Does (Non-)Meaningful Sensori-motor Engagement Promote Learning with Animated Physical Systems?

Presenting Author:Gertjan Rop, Erasmus Univeristy Rotterdam, Netherlands; **Co-Author:**Charly Eielts, Erasmus University Rotterdam, Netherlands; **Co-Author:**Wim Pouw, Erasmus University Rotterdam, Netherlands; **Co-Author:**Tamara Van Gog, Utrecht University, Netherlands; **Co-Author:**Rolf Zwan, Erasmus University Rotterdam, Netherlands; **Co-Author:**Fred Paas, Erasmus University Rotterdam/University of Wollongong, Netherlands

Previous research indicates that sensorimotor experience with physical systems can have a positive effect on learning. However, it is not clear whether this effect is caused by mere bodily engagement or the intrinsically meaningful information that such interaction affords in performing the learning task. We investigated ($N = 74$), through the use of a Wii Balance Board, whether different forms of physical engagement that was either meaningfully, non-meaningfully or minimally related to the learning content would be beneficial (or detrimental) to learning about the workings of seesaws from instructional animations. The results were inconclusive, indicating that motoric competency on lever problem solving did not significantly differ between conditions, nor were response speed and transfer performance affected. These findings suggest that adult's implicit and explicit knowledge about physical systems is stable and not easily affected by (contradictory) sensori-motor experiences.

Strategies Used by Primary School Students During Physical Touch-Based Rotation

Presenting Author:Sven Bertel, Flensburg University of Applied Sciences, Germany; **Co-Author:**Stefanie Wetzel, Bauhaus-Universität Weimar, Germany; **Co-Author:**Steffi Zander, Bauhaus-Universität Weimar, Germany

Good spatial abilities are important for performance in many tasks. We present a novel method for deriving strategies that students employ when solving rotation tasks. Our work has implications not only for better understanding mental and physical rotation, but also lays grounds for the development of novel app-based diagnostic and adaptive training tools for spatial skills. Based on data gathered during a study on mental and physical rotation with primary school students between the ages of 8 and 11, process-based findings were derived through an analysis of how angular disparity between stimuli changed over time. Students used touch-based input on our iOS app *Rotate it!* to control physical rotation. Data on qualitative changes of angular disparity was used in the construction of Markov models for correctly and incorrectly solved tasks. The models were used to generate synthetic angular disparity time courses, based on which three distinct, dominant, successful rotation-based solution strategies could be identified.

Session O 26

1 September 2017 17:30 - 19:00

Linna - K110

Invited Symposium

Higher Education, Learning and Social Interaction

The unit of analysis in learning research: Approaches for imagining a transformative research agenda

Keywords: Cognitive skills, Communities of learners, Communities of practice, Cultural psychology, Higher education, Informal learning, Knowledge creation, Mixed-method research, Pre-service teacher education, Qualitative methods, Quantitative methods, Social interaction, Student learning, Synergies between learning - teaching and research, Technology, Video analysis

Interest group: SIG 17 - Methods in Learning Research

Chairperson: Crina Damsa, University of Oslo, Norway

Organiser: Alfredo Jornet Gil, University of Oslo, Norway

Organiser: Dominik E. Froehlich, University of Vienna, Austria

Organiser: Andreas Gegenfurtner, Germany

Discussant: Roger Säljö, University of Gothenburg, Sweden

In learning research, theoretical traditions often determine the way in which learning activities are being studied and analyzed, by posing different units of analysis. Whether outlined to depict learning as individual cognition, as dialogical action, or as transactional endeavor, the unit of analysis is expected to serve a rigorous examination and interpretation of the hybrid and complex nature of the learning processes and practices (Mason, 2008; Säljö, 2010). Most importantly, units of analysis do not just make possible particular ways of analyzing learning, but can also constrain our possibilities for imagining new ways to improve our learning and instruction practices. Such possibilities are particularly crucial in a time in which rapid changes in the knowledge contents and contexts demand critical innovations in the pedagogical practice. In this symposium, we are particularly interested in exploring how different units of analysis are framed and which functions they serve to depict and, possibly, re-conceptualize what constitutes learning in authentic settings. A position paper will set the baseline for how units of analysis can be approached from different conceptual perspectives, and which epistemological assumptions are underlying various approaches. The symposium contributions discuss the unit of analysis following particular contemporary formulations of learning that reflect on criteria based on which the unit of analysis is determined, and that offer empirical illustrations of how particular analytic procedures are performed.

Learning as construction of actionable concepts: A multimodal blending perspective

Presenting Author:Lina Markauskaite, University of Sydney, Australia; **Co-Author:**Peter Goodyear, The University of Sydney, Australia

In mainstream cognitive research, 'formal concepts' usually serve as the main unit of analysis for investigating students' conceptual learning. Accordingly, conceptual understanding is often seen as a capacity to take an already acquired formal concept and transfer it intact to a new situation, by recognising structural commonalities and using analogy. We use our research into how pre-service (student) teachers design lessons to show that their capacity to use concepts in real world professional work cannot be understood as a simple transfer of formal concepts to new situations. Rather, actionable conceptual understanding, or concepts that are used in action, involve a capacity to construct situated conceptualisations dynamically: by selecting, projecting, mapping and blending relevant conceptual features with material and symbolic affordances of the encountered situation into one emerging multimodal construct that becomes a part of an embodied action. Extending conceptual and material blending (Fauconnier & Turner, 1998; Hutchins, 2005), we show that construction of multimodal blends serves as a productive unit of analysis for investigating conceptual learning for professional action.

Integrating units of analysis: Applying mixed methods social network analysis

Presenting Author:Judith Schoonenboom, University of Vienna, Austria; **Co-Author:**Dominik E. Froehlich, University of Vienna, Austria

Learning from others (Eraut, 2007) is studied at several levels--for instance, learners' attributes (e.g., motivation), others' attributes (e.g., their competencies, accessibility), features of the relationships (e.g., reciprocity, frequency) or the broader context (e.g., cultural influences). The Multitheoretical, Multilevel (MTML) framework by Monge and Contractor (2003) suggests considering multiple units of analysis by using both psychometric and sociometric data and respective analytic research methods. We discuss three units of analysis at which a network of learning relationships may be studied: The micro level that concerns individual learners and their position in their learning network, the meso level that focuses on individuals' embeddedness in dyads and triads, and the macro level of broad-scale influences, such as properties of the learning network as a whole or cultural influences. We propose that these levels help explain under what circumstances a learning relationship between two persons is present and what quality that learning relationship has. These circumstances may be at various levels and may stem from network or non-network sources. Furthermore, we show how mixed methods social network analysis (MMSNA) allows researchers to take an integrative perspective on the multiple levels and units of analysis involved in learning from others. In the presentation, we demonstrate this by using a dataset of students' social learning activities within a university classroom, which has been collected specifically for this purpose.

Chronotope - researching contextual grounding of learning: Principles for the unit of analysis

Presenting Author:Giuseppe Ritella, University of Helsinki, Finland; **Co-Author:**Antti Rajala, University of Helsinki, Finland

The aim of this paper is to discuss principles for defining units of analysis from a sociocultural standpoint, in studies adopting the Bakhtinian concept of chronotope. Chronotope was initially devised by Bakhtin to analyse the space-time frames of literary text and has later been adopted by a growing number of researchers to study how space-time frames function as a ground for learning and education in different sites. Chronotopes are defined as socially emergent configurations of space-time, where both discursive and material aspects of space-time relations are considered. We argue that there is a wide range of units that can be defined according to the needs of each study. However, in order to define a unit that is consistent with the theoretical premises of the notion of chronotope we suggest that three principles should be met: (i) chronotopic analysis needs to address the dialogical and contextual nature of learning; (ii) the unit of chronotopic analysis needs to capture time and space in their interdependent unity; and (iii) the unit of analysis needs to be defined to address the specific analytic scale of the study. To illustrate our claims, we will use examples taken from empirical studies of secondary education teachers' and students' work. Overall, our presentation contributes to the creation of methodological foundations for using the emergent concept of chronotope to research the contextual grounding of learning.

Lived experience as a unit of analysis: towards a second-person approach for learning research

Presenting Author:Gilles Dieumegard, Université de Montpellier, France; **Co-Author:**Sandra Nogry, Université Montpellier, France; **Co-Author:**Magali Ollagnier-Beldame, Université Montpellier, France; **Co-Author:**Nicolas Perrin, Université Montpellier, France

In order to track individual learning processes in ecological situations, we developed a research framework within the theoretical perspective of enactivism. We adopt individual experience as a fundamental unit of analysis, defined as an ongoing process which is lived "from within". In this paper, we present methodological procedures matching this unit of analysis. Hence we look at the potential of a second-person approach, in which accounts of lived experience are relationally constituted.

In several studies, explicitation interviews and video self-confrontation were employed to collect verbal reports and to overcome the pitfalls of spontaneous reports; video records in-situ and written traces complete these verbal data. For analyzing these corpuses, we firstly performed a comprehensive analysis, which strived to keep close to the agent perspective; secondly, a comparative analysis which focused on categories related to the research questions.

Such an approach allows investigating the widespread, and yet disregarded, silent activity of learners. During lectures, this activity appears to be shaped by complex imbrications of different actions (e.g. listening, taking notes, etc.) regarding different dynamical perturbations (e.g. talks, slides, notes, etc); “backtracking” (retroactively thinking to what was previously expressed) is frequent. It also allows to examine the partial consensus that teacher and learners reach through a progressive overlapping of only certain knowledge elements they experience. Finally, choosing lived experience as unit of analysis, allows investigating some aspects of the collective level of learning situations by working “outwards”, from individual experience to collective activity.

Session O 27

1 September 2017 17:30 - 19:00

Pinni B - B3116

Invited Symposium

Learning and Social Interaction

Towards citizenship with deliberative argumentation and technologies for new political education

Keywords: Argumentation, Artificial intelligence, Citizenship education, Collaborative Learning, Educational Technology, Emotion and affect, History, Inquiry learning, Learning Technologies, Peer interaction, Social aspects of learning and teaching, Social interaction, Technology

Interest group: SIG 26 - Argumentation, Dialogue and Reasoning

Chairperson: Armin Weinberger, Saarland University, Germany

Organiser: Baruch Schwarz, Hebrew University of Jerusalem, Israel

Discussant: Armin Weinberger, Saarland University, Germany

Many see reasoning, collaboration and dialogue as tools for succeeding in life. Others see their promotion as educational goals which are worthy by themselves, along an ethical dimension. There are then definitely two camps that use the same terms but whose educational goals are different. We use the term ‘camps’ because there is a combat between these camps. What is at stake in this combat is the constitution of a new form of democracy. Schwarz and Baker (2016) have exemplified in several periods of Western history that the emergence or the abandonment of argumentative practices in educational institutions was concomitant with political upheavals. In this historical moment, deliberative discussions are seen by as a central tool for elaborating deliberative democracy as a new form of democracy (Gutmann & Thompson, 2004; Hess & McAvoy, 2014). Yet it is questioned whether the emphasis on deliberation captures the full extent of the educational project of political education (Biesta, 2013; Slakmon & Schwarz, in press).

Argumentation and Technology: Educational Tools or Civic Goals?

Presenting Author:Aviv Cohen, The Hebrew University of Jerusalem, Israel

Civic education continues to raise numerous questions and pose ongoing challenges in countries across the globe. A key attribute of this field, whose recognition may assist in navigating this convoluted reality, is the prominence of philosophical conceptions that gear practice. Reflecting this approach, throughout this mainly theoretical presentation, several models of civic education will be used in order to better understand the underlying educational and civic assumptions that influence the elements of argumentation and technologies as part of the civic education process. The main argument to be presented is that whereas these two elements may be seen as pedagogical tools, aimed toward larger educational ends, such an approach promotes a traditional conception of citizenship in which students are seen as passive consumers of knowledge. In contrast, when positioning political deliberation and critical media literacy as the goals of civic education, this process holds the potential to promote active and reflective conceptions of citizenship. This distinction sheds light on the question of content as part of this educational process. Thus, as will be discussed, these notions hold important pedagogical implications for teachers and practitioners.

Computer-Supported deliberation about hot issues in a multi-cultural context

Presenting Author:Baruch Schwarz, Hebrew University of Jerusalem, Israel; **Co-Author:**Benzi Slakmon, Ben Gurion University of the Negev, Israel

Formal educational frameworks have traditionally avoided involvement in strong emotions. The overt policy has always been to avoid the burst of emotions stirred by identities (ethnic, political, ideological) in learning tasks. We will show that the burst of emotions is gradually tolerated in educational frameworks moved by progressive pedagogies, mainly as a motivational instrument, as a way to engage students in learning activities and boost learning gains. We review new educational approaches that see emotional work in sensitive issues as part of their mission and propose a more radical approach to emotional use in discussions and contend that the gradual, deliberative triggering of hot discussions should become a suitable context for promoting education to cultural diversity. We describe a university course based on the implementation of consecutive hot discussions, and analyze some manifestations that combine the emotional and the ideational. Through the analysis of these manifestations, we both articulate some criteria for the promotion of education to cultural diversity, and evaluate the success of the university course. In particular, we stress that the expression of strong emotions while complying with rules for collective reasoning, deliberative argumentation or rules of exploratory talk realizes the promotion of cultural diversity.

Agent Based Support for Collaborative Discourse

Presenting Author:Carolyn Rose, Carnegie Mellon University, United States; **Co-Author:**Keith Maki, Carnegie Mellon University, United States; **Co-Author:**Michael Miller, Carnegie Mellon University, United States; **Co-Author:**Yohan Jo, Carnegie Mellon University, United States

Collaborative discourse needs support to be productive. This talk shows how automated dynamic support has the ability to model collaborative actions that occur in running discourse. Structured probabilistic models of text induce role based behavior profiles so that it is possible to identify how participants in discussions take up these roles, how these roles contribute to outcomes of the conversation, and where participants shift in their positioning with respect to these roles over time. With these insights, it is possible to view the collaborative process as it unfolds, identify more or less functional role taking patterns, and use this assessment to trigger support. The example of English Wikipedia pages on the Israeli-Palestinian conflict, a deeply entrenched conflict with multiple, complex perspectives is considered to exemplify the role of AI-techniques for automated dynamic support.

How to Change Minds through Scaffolding Argumentation in Social Media

Presenting Author:Armin Weinberger, Saarland University, Germany; **Co-Author:**Dimitra Tsovaltzi, Saarland University, Germany; **Co-Author:**Thomas Puhl, Saarland University, Germany; **Co-Author:**Raluca Judele, Saarland University, Germany

Social networking sites (SNS) such as Facebook allow for participation in debates on socially and politically relevant issues, but mainly seem to reinforce one's own (political and social) attitudes and beliefs. How can we facilitate deliberate argumentation in social media? This contribution provides an overview of the effects of Facebook-apps designed to orchestrate and scaffold the construction of arguments on online discourse and development of attitudes and beliefs in the context of a German-Israeli research program. The apps build on current instructional approaches, 1) scripting how participants classify their contributions as argument components, 2) making participants aware about how attitudes are distributed within their group and that participants' arguments will be evaluated by a group of peers, and 3) orchestrating individual and collaborative construction of arguments. Results show how argumentation scripts can facilitate discussion and development of attitudes and beliefs, awareness tools may have mixed effects, and individual preparation can have negative impact on transactive argumentation.

Session P 1

2 September 2017 08:45 - 10:15

Pinni B - B1097

Single Paper

Teaching and Teacher Education

Teacher Education and Teaching

Keywords: Attitudes and beliefs, Cognitive skills, Conceptual change, Educational Psychology, Higher education, Instructional design, Integrated learning, Meta-analysis, Misconceptions, Pre-service teacher education, Quantitative methods, Secondary education, Teaching / instruction

Interest group: SIG 11 - Teaching and Teacher Education

Chairperson: Janna Teltemann, University of Hildesheim, Germany

Student teachers' proactive strategies and learning environment for reducing study-related burnout

Keywords: Educational Psychology, Higher education, Pre-service teacher education, Quantitative methods

Presenting Author:Sanna Väisänen, University of Eastern Finland, Finland; **Co-Author:**Janne Pietarinen, University of Eastern Finland, Finland; **Co-Author:**Kirsi Pyhältö, University of Oulu / University of Helsinki, Finland; **Co-Author:**Auli Toom, University of Helsinki, Finland; **Co-Author:**Tiina Soini-Ikonen, University of Tampere, Finland

The study aims to gain better understanding of the interrelation and the development of student teachers' proactive coping strategies, perceived learning environment and study-related burnout. Longitudinal data with three annual measurements, from the beginning of the studies until the end of bachelor studies, were utilized in exploring the consistency and stability of the proactive strategies, i.e. self- and co-regulative strategy, perceived learning environment and experienced study-related burnout. Altogether, 270 primary school student teachers completed the survey. The data was analyzed by using SEM. Results showed that the self-regulative strategy adopted by student teachers promoted the use of co-regulative strategy, which in turn contributed the perceived fit between the student teacher and learning environment, and further, consistently reduced study-related burnout. Moreover, the self-regulative strategy directly buffered the study-related burnout. The results imply that the use of proactive strategies contributed not only the perceived fit between the student teachers and learning environment, but also reduce the study-related burnout, and further, enabled student teachers to cope with the challenges faced in entering to the working life.

Measuring teachers' attitudes toward teaching integrated STEM: instrument development and validation

Keywords: Attitudes and beliefs, Integrated learning, Secondary education, Teaching / instruction

Presenting Author:Lieve Thibaut, KU Leuven, Belgium; **Co-Author:**Heidi Knipprath, KU LEUVEN, Belgium; **Co-Author:**Wim Dehaene, KU LEUVEN, Belgium; **Co-Author:**Fien Depaepe, KU Leuven, Belgium

The shortage of graduates in Science, Technology, Engineering and Mathematics (STEM), has led to numerous attempts to increase students' interest in STEM by providing learning experiences called 'Integrated STEM'. This is an overarching term for all learning environments that involve teams of students in relevant, authentic problems that integrate content from multiple STEM disciplines. However, often teachers' instructional practices seem to not alter, due to a lack of change in their attitudes toward teaching integrated STEM. Therefore, a close examination of these attitudes is necessary. This paper attempts to contribute to this challenge by proposing a framework for the measurement of secondary teachers' attitudes toward teaching integrated STEM. To achieve this, the concepts of 'integrated STEM' and 'attitudes' were thoroughly operationalized and combined. Integrated STEM was defined by means of five STEM-principles: integration of STEM content, problem-centered learning, inquiry learning, design-based learning and cooperative learning. Moreover, the concept of attitude was divided in five subdimensions: Perceived Difficulty, Perceived Relevance, Anxiety, Enjoyment and Self-Efficacy. In order to find confirmation for this framework, a questionnaire was developed and validated in a pilot study with 130 secondary school teachers in Flanders. The results of this pilot study indicate that the questionnaire is a valid and reliable instrument and therefore confirm the proposed theoretical framework.

Pre-Requisite Knowledge for Learning-Strategy Judgement is Fragmentary and Misconceptual

Keywords: Cognitive skills, Conceptual change, Misconceptions, Pre-service teacher education

Presenting Author:Inga Glogger-Frey, University of Freiburg, Germany; **Co-Author:**Marcus Deutscher, University of Freiburg, Germany; **Co-Author:**Alexander Renkl, University of Freiburg, Germany

One student skill relevant for (life-long) learning refers to comprehension-oriented learning strategies. Teachers, however, seem to have deficits in instructing their students how to apply such strategies. A reason could be suboptimal knowledge about these strategies. Similarly as in the case of other kinds of teachers' pedagogical knowledge, we hypothesized that (student) teachers show intuitive knowledge about learning strategies in the form of "knowledge-in-pieces", that is, sub-optimally structured, fragmented knowledge. For example, a number of student teachers think of certain teaching strategies as being learning strategies. An important characteristic of knowledge-in-pieces is its context-sensitive activation. We therefore first investigated whether the activated learning-strategy knowledge of student teachers differed depending on the context provided. We secondly related knowledge measures to learning-strategy judgements referring to authentic student products. In a within-subjects experiment we varied whether a questions about learning-strategy application referred to a context that was (A) *student-* or (B) *teacher- focused*. While the context differed, the same strategies could be mentioned as a correct answer. All 47 participating student teachers answered all questions (design: ABABAB). Afterwards, all student teachers received a 60-minute computer-based training on learning-strategy judgement followed by six judgement tasks. We found large differences in the activated knowledge depending on contexts. Thus, student teachers showed knowledge-in-pieces in the domain of learning strategies. Accordingly, instructional methods adopted from the conceptual change literature are recommended for teacher training. In addition, we found significant relations between measures of knowledge and quality of learning-strategy judgement on the basis of student products.

Program Development in Teacher Education: A systematic, configurative literature review

Keywords: Higher education, Instructional design, Meta-analysis, Pre-service teacher education

Presenting Author:Hege Hermansen, University of Oslo, Norway

This paper presents the results of a systematic, configurative literature review of program development in teacher education. More specifically, the review focuses on empirical studies of program development that included teacher educators as informants. Teacher educators' role in program development has received relatively little attention from researchers, compared to studies that feature student teachers and/or samples of student work as the main data sources. The review describes the thematic and methodological characteristics of the research field, combined with a conceptual analysis of how 'program development' manifests itself in the literature. The review is based on an analysis of 125 peer reviewed articles retrieved through ERIC and Web of Knowledge. The paper concludes by discussing the implications for our potential as researchers to support and inform teacher education practice and policies. The role of systematic reviews in informing educational policy more broadly is also addressed.

Session P 2

2 September 2017 08:45 - 10:15

Virta - 120

Single Paper

Learning and Instructional Technology, Learning and Social Interaction

Learning with Computers

Keywords: Computer-supported collaborative learning, Cooperative / collaborative learning, Design based research, E-learning / Online learning, Educational Technology, Informal learning, Learning analytics, Learning Technologies, Multimedia learning, Peer interaction, Social interaction, Vocational education

Interest group: SIG 07 - Learning and Instruction with Computers

Chairperson: Eugenia Nanu, University of Turku, Finland

Evidence from multiple field experiments in VET with different hypervideo-based learning scenarios

Keywords: Design based research, Learning Technologies, Vocational education, Multimedia learning

Presenting Author:Alberto Cattaneo, Swiss Federal Institute for Vocational Education and Training, Switzerland; **Co-**

Author:Florinda Sauli, Swiss Federal Institute for Vocational Education and Training (SFIVET), Switzerland

In recent years hypervideo is more and more used for educational purposes and its role in fostering learning thanks to its interactive features is progressively more recognized. This holds particularly true for vocational education and training, where hypervideo can support both procedural and declarative knowledge. However, this strategy is often limited to individual settings, where students use hypervideo alone. Other uses of hypervideo for learning, as well as their implementation in authentic classrooms have been poorly investigated so far. This study aims to put together several studies (N=527 students) where hypervideo has been integrated in different instructional scenarios in vocational school contexts in order to measure learning acquisition, perceived usefulness, satisfaction, and motivation. Students from the sample represent different VET curricula and they have been randomly assigned to one out of five different conditions: hypervideo used in plenary lesson, used individually, used in couple, designed in groups, and no use of hypervideo (control group). Results show that concerning learning there is not an effect of the condition, and that there is mixed evidence concerning perceived usefulness, satisfaction, and motivation.

A Theoretical Framework for Student-Created Digital Conceptual Artefacts in CSCL

Keywords: Computer-supported collaborative learning, Cooperative / collaborative learning, Educational Technology, Learning analytics

Presenting Author:Heisawn Jeong, Hallym University, Korea, Republic of; **Co-Author:**Kris Lund, University of Lyon, France

In this contribution, we propose that student-created artefacts mediate three different knowledge construction processes in CSCL: (1) Artefacts mediate individual learning and they help individual learners to construct new knowledge, (2) they mediate co-construction as they help learners to co-create knowledge in small groups, and (3) they mediate collective knowledge construction in the communities. These roles emerge as a function of how artefacts are created (i.e., unit of contribution) and shared in groups and communities. An important future research topic for CSCL is to understand how various CSCL artefacts may mediate individual, collaborative, and collective knowledge construction processes. The details about how different artefacts mediate the knowledge construction processes is not well-understood yet, but we hope that the conceptual framework presented in this contribution can be used to guide future research efforts, including automated analyses of artefact-mediated learning processes.

„To be aware or not to be aware – that is the question.“ - Development of an Awareness Taxonomy

Keywords: Computer-supported collaborative learning, E-learning / Online learning, Peer interaction, Social interaction

Presenting Author:Anne Mock, University of Duisburg-Essen, Germany; **Co-Author:**Daniel Bodemer, University of Duisburg-Essen, Germany

Social media have become an integral part of formal learning settings. To some extent the possibilities of social media for opening (academic) classrooms are already used. Through this opening of learning environments new situation stimuli arise, e.g. social exchange. But what happens when more and more individuals can partake in the social exchange? Are these new exchange partners perceived? And implies "more exchange partners" greater learning success at the same time? To find answers to these questions, a theoretically derived awareness taxonomy was developed, which was tested in a first experimental setting. The results of the study provide evidence that learners in open learning settings perceive the new available exchange partners. The other dimensions of the taxonomy, perspective and group awareness, also contribute significantly to the findings. This article outlines the theoretical derivation of an awareness taxonomy, summarizes the key findings and provides impetus for further studies.

We need High Drop-out Rates in MOOCs: Evaluation and Personalization for Quality of Open Education

Keywords: E-learning / Online learning, Educational Technology, Informal learning, Learning Technologies

Presenting Author:Christian M. Stracke, Open University of the Netherlands, Netherlands

This paper presents the current status of open education and Massive Open Online Courses (MOOCs) and discusses their quality following the main question: How can we introduce new evaluation and personalization strategies to improve the learning quality of Open Education? Currently there is lack of evaluation instruments for MOOCs grounded on the long-term experiences, research and methods of quality development. The adaptation of the three generic dimensions of quality development to Open Education supports design improvements and personalization of MOOCs with focus on personal goals and evaluation methods. Based on a literature review and results from a pre-survey it is argued why we need to change the design and evaluation of MOOCs. The traditional assessment by the completion rate is not fitting as well as not considering the diversity of MOOC learners and their personal goals. The traditional drop-out rate for the MOOC evaluation has to be replaced by fulfillment of individual intentions. Finally the question is explored whether Open Education is the next revolution and how it contributes and impacts the whole society.

Session P 3

2 September 2017 08:45 - 10:15

Pinni B - B3111

Inquiry Learning

Keywords: Attitudes and beliefs, Cognitive skills, Experimental studies, Inquiry learning, Instructional design, Metacognition, Science education, Synergies between learning - teaching and research

Interest group:

Chairperson: Stuart Karabenick, University of Michigan, United States

Change of epistemological beliefs through authentic science experiences

Keywords: Attitudes and beliefs, Inquiry learning, Science education, Synergies between learning - teaching and research

Presenting Author:Joerg Zumbach, University of Salzburg, Austria; **Co-Author:**Stephanie Moser, Technical University of Munich, Germany; **Co-Author:**Teresa Stemeseder, University of Salzburg, Austria; **Co-Author:**Gabriele Gadermaier, University of Salzburg, Austria; **Co-Author:**Martin Himly, University of Salzburg, Austria

The present study examines the development of students' epistemological beliefs during a long-term research-based project called ALRAUNE (research on Allergies in Rural, Alpine and Urban Networks) that was partly conducted by students under guidance of scientists. The ALRAUNE project investigated the exposure to indoor allergens in different residential settings and its influence on the development of allergic symptoms in a geographically confined Austrian cohort. Participating students were actively engaged in the research process, e.g., development of a questionnaire assessing personal data, data collection and analysis, as well as publishing of results. Within the present study, we assessed students' epistemological beliefs (i.e. views about source, certainty, development and justification of knowledge), domain-specific and general academic self-concept as well as domain-specific knowledge about allergies and related research. 23 students who actively participated in the project (experimental group) were compared to 23 non-participating students from the same schools (control group). Results reveal that at the end of the project time the participating students reported more sophisticated epistemological beliefs (in particular about the source and certainty of knowledge), stronger domain-related self-concept and better knowledge about allergies and related research compared to the control group. These findings show the merit of science-based projects and provide a valuable basis for implementing research-based activities in (extra-)curricular programs aimed at fostering students' inquiry skills.

Using causal diagrams to foster systems thinking in geography education

Keywords: Cognitive skills, Experimental studies, Inquiry learning, Science education

Presenting Author:Marjolein Cox, KU Leuven, Belgium; **Co-Author:**An Steegen, KU Leuven, Belgium; **Co-Author:**Jan Elen, KU LEUVEN, Belgium

An increasing interconnectedness of people and goods enhances the complexity of many geographical problems. For students to understand geography, systems thinking is a promising approach. It helps to understand increasing complexity by looking at the entire system and at the interconnectedness between the elements in the system. Encouraging students to use tools to handle complexity may help them to understand that complexity. In this study students were induced to elaborate causal diagrams in view of better understanding original texts and graphs on complex geographical issues. Causal diagrams are expected to support the development of students' systems thinking ability. A quasi-experimental design is used in which the systems thinking ability of students working with causal diagrams is compared to a control group with students not working with causal diagrams. Teachers of the experimental group participated in the design process and in a learning community to evaluate the use of causal diagrams. Pre- and posttests were taken by 552 students in the experimental group and 195 students in the control group. Preliminary results indicate that students in the experimental (causal diagram) group outperform students in the no-causal diagram group.

Metacognitive Support in Simulation-Based Physics Instruction

Keywords: Inquiry learning, Instructional design, Metacognition, Science education

Presenting Author:Ines Deibl, University of Salzburg, Austria; **Co-Author:**Stephanie Moser, Technical University of Munich, Germany; **Co-Author:**Joerg Zumbach, University of Salzburg, Austria

Computer-based simulations are essential to effective physics teaching and learning. They allow learners to actively manipulate graphical visualizations of complex phenomena. However, research on interactive learning with simulations has shown that learners benefit from scaffolds for their activities. Thus, the overall aim of this study is to investigate whether direct or indirect metacognitive scaffolding (i.e. training and prompting, respectively), or a combination of both during simulation-based learning leads to better learning outcomes compared to simulation-based learning alone. Within a 2x2 factorial design, we explored the role of metacognitive training prior to the use of simulations and the role of metacognitive prompting on knowledge acquisition, metacognitive behavior, cognitive load, and mental effort. Results indicate no main effects for training and prompting, and no interaction effect. A closer look at the actual use of prompting, however, reveals a significant impact of the metacognitive strategies employed on students' cognitive load as well as an interaction effect between prior knowledge and the actual use of prompting. We found higher scores on cognitive load in the condition where appropriate prompting was used and students had high prior knowledge.

Model-based reasoning in science education, assigning causality in drawing-based modeling

Keywords: Experimental studies, Inquiry learning, Instructional design, Science education

Presenting Author:Wouter R. van Joolingen, Utrecht University, Netherlands

Scientific thinking involves the ability to construct and to reason with and about models (Giere, 2006). Drawing-based modeling is an approach in which students can create computational models of systems they investigate, such as evolutionary systems, planetary systems and traffic. In this paper we investigate the kinds of model-based reasoning that were observed in students who were creating models in two domains: evolution and action potential as part of signal transport in nerve cells. In the reasoning that students display about their models, it is sometimes visible that, even though they create the models themselves, they explain the modeling results, i.e. the way the resulting simulation behaves, in terms of factors outside the model. In the case of evolution this reasoning leads to the introduction of a kind of “magical” relations between components of the model. We find a relation between successful creation of causal explanations with the way the students build and specify the models. It appears that students need a minimum level of control of the model in order to build reasoning completely based on the model they created themselves.

Session P 4

2 September 2017 08:45 - 10:15

Pinni B - B4117

Single Paper

Assessment and Evaluation, Cognitive Science

Cognitive Skills

Keywords: Achievement, Biology, Cognitive skills, Early childhood education, Educational Psychology, Experimental studies, Interdisciplinary, Learning and developmental difficulties, Mathematics, Misconceptions, Primary education, Quantitative methods, Self-regulation, Writing / Literacy

Interest group: SIG 17 - Methods in Learning Research, SIG 22 - Neuroscience and Education

Chairperson: Sigal Eden, Bar-Ilan University, Israel

Prealgebraic Reasoning in the Primary Grades

Keywords: Achievement, Cognitive skills, Mathematics, Misconceptions

Presenting Author: Sarah Powell, University of Texas at Austin, United States

Children in the elementary grades are expected to solve equations to demonstrate pre-algebraic proficiency. Pre-algebraic differences may emerge based equation type (i.e., standard versus nonstandard), the operation shown or required for solution (i.e., addition or subtraction), and the position of the unknown. Pre-algebraic differences may also be influenced based on arithmetic proficiency. We evaluated the performance of 1,796 1st- and 2nd-grade children on a measure of standard and nonstandard equations to learn whether arithmetic fluency predicts pre-algebraic performance, which characteristics of pre-algebraic items determine item difficulty, and whether certain demographic variables contribute to pre-algebraic performance. Results indicate pre-algebraic differences by grade level and season (i.e., fall or spring) of administration. Arithmetic influences pre-algebraic performance, and nonstandard equations that require a relational understanding of the equal sign are most difficult for young children.

The power of writing hands: Logical memory performance after handwriting and typing tasks

Keywords: Experimental studies, Interdisciplinary, Quantitative methods, Writing / Literacy

Presenting Author: Satu-Maarit Frangou, University of Lapland, Finland

Information and communications technologies have generated a multilevel metamorphose not only of the educational field, but also of the usage of hands. The shift from handwriting to typing is bringing about a change in the ways people learn to recognize and recollect letters and words, read and write. This study investigates how different writing methods affect memory retrieval. The aim is to understand how the memory performances compare after handwriting and typing tasks, and how the factor of time or age affects recollection. The Wechsler Memory Scale Revised Edition (WMS-R) was used with experimental within-subjects research design to measure memory functions of 31 University of Lapland students in 2016. Participants wrote down a dictated story with a pencil, computer keyboard, and a touch screen keyboard. Consequently, the degree of recollection of each writing task was measured and analysed with repeated measures analysis of variance. Additionally, this thesis deliberates the embodied cognition theory, as learning and memorizing are not simply information processing in nothingness. Experiences, actions and senses all play part in learning, as well as in writing process with the harmonious co-operation of brain, mind and body. The results of this study indicate that writing modalities have statistically significant effect on recollection, handwriting receiving the highest scores. These results are of interest due to the constant increase of digitalization of learning environments. Moreover, these results can be reflected upon when evaluating the impending changes in the Finnish curriculum, from which cursive handwriting is removed in autumn 2016.

Cardiac vagal tone and inhibitory control predict pre-schoolers' listening comprehension

Keywords: Biology, Cognitive skills, Early childhood education, Self-regulation

Presenting Author: Sara Scrimin, University of Padova, Italy; **Co-Author:** Lucia Mason, University of Padova, Italy

This study investigated the role of inhibitory control and basal cardiac activity at the beginning of the school year in predicting oral text comprehension at the end of the year in pre-schoolers. Forty-four, 4-year-olds participated in the study. At the beginning of the school year children's electrocardiogram (EKG) at rest was registered followed by the assessment of inhibitory abilities as well as verbal working memory skills and verbal ability. At the end of the year all children were

administered a listening comprehension ability measure. Results showed a main effect of basal cardiac vagal tone, that is a physiological correlate of self-regulation, in predicting listening comprehension together with verbal working memory and verbal abilities. Furthermore, when considering the interaction between inhibitory control and cardiac vagal tone, both direct and interactive effects of main predictors emerged. These results are among the first to show the predictive role of basal cardiac vagal tone and inhibitory control in pre-schoolers' oral text comprehension, and offer new insight into the association between autonomic regulation of the heart, inhibitory control, and cognitive activity at a young age.

Exploring the relations between physical fitness, executive functioning and low academic achievement

Keywords: Cognitive skills, Educational Psychology, Learning and developmental difficulties, Primary education

Presenting Author: Anne de Bruijn, University of Groningen, Netherlands; **Co-Author:** Esther Hartman, University Medical Center Groningen / University of Groningen, Netherlands; **Co-Author:** Danny Kostons, University of Groningen, Netherlands; **Co-Author:** Chris Visscher, University Medical Center Groningen/ University of Groningen, Netherlands; **Co-Author:** Roel J. Bosker, Rijksuniversiteit Groningen, Dept of Education and GION, Netherlands

Physical fitness has been related to children's academic performance and executive functioning. It has been suggested that executive functioning mediates the relation between physical fitness and academic performance. This assumption is highly relevant when considering low academic achievers, a population at risk for hampered cognitive development and school drop-out. Improvements in physical fitness, by improving executive functioning, could be beneficial for their academic performance as well. The present study examined whether physical fitness and executive functioning were predictive of low achievement in mathematics and spelling, and whether the relation between physical fitness and low achievement was mediated by specific executive functions. Three-hundred-ninety-one primary school students were classified as low (< 25%) or average-to-high (> 75%) achievers in mathematics and spelling. Multi-level structural equation models were built with direct paths between physical fitness and academic achievement, and added indirect paths via categories of executive functioning: inhibition, verbal working memory, visuospatial working memory and shifting. Low achievement in mathematics was predicted by poorer verbal and visuospatial working memory and shifting. Physical fitness was directly and positively related to mathematics achievement, but also indirectly via verbal and visuospatial working memory. Low achievement in spelling was predicted by poorer verbal working memory and shifting. Physical fitness was only indirectly and positively related to spelling achievement via verbal working memory. The relation between physical fitness and academic achievement level seems to be mediated by specific executive functions, depending on the academic domain involved.

Session P 5

2 September 2017 08:45 - 10:15

Virta - 109

Single Paper

Cognitive Science, Developmental Aspects of Instruction, Teaching and Teacher Education

Educational Effectiveness and Learning with Computers

Keywords: Achievement, Cognitive development, Cognitive skills, Computer-assisted learning, Early childhood education, Educational Psychology, Educational Technology, Numeracy, Parental involvement in learning, Pre-service teacher education, Teacher Effectiveness, Teacher Professional Development, Technology, Video analysis

Interest group: SIG 07 - Learning and Instruction with Computers, SIG 18 - Educational Effectiveness

Chairperson: Annelies Kreis, Zurich University of Teacher Education, Switzerland

Emotion regulation during severe classroom disruptions

Keywords: Educational Psychology, Pre-service teacher education, Teacher Effectiveness, Video analysis

Presenting Author: Irina Rosa Kumschick, Freie Universität Berlin, Germany; **Co-Author:** Valentina Piwowar, Freie Universität Berlin, Germany; **Co-Author:** Felicitas Thiel, Freie Universität Berlin, Germany

Abstract. Currently, little is known about factors that influence teachers' emotion regulation in the context of teaching. Using an experimental design, we studied if a cognitive reappraisal of experienced emotions (Gross & John, 2003) in severely disrupted classroom situations could be induced by presenting the student perspective. We assume that teachers who are aware of the student perspective use *reappraisal* more often than teachers who do not take this perspective into account. In order to test this hypothesis, we presented several video cases that illustrated a disrupted and problematic classroom situation to preservice teachers. In addition, we presented a supplementary video to the experimental group, in which the student, who caused the disruption, reflected on his/her behavior by commenting on the teaching situation. In contrast, the video solely depicting the disruption was shown in the control group. Following a thorough stimulus evaluation check (both groups showed comparable emotional evaluation of the video cases), it could be demonstrated that the experimental group showed significantly more reappraisal than the control group.

The Effects of Nine-Week Summer Vacation on Austrian Students in Lower Secondary Education

Keywords: Achievement, Cognitive development, Educational Psychology, Parental involvement in learning

Presenting Author: Manuela Paechter, University of Graz, Austria; **Co-Author:** Silke Luttenberger, University of Teacher Education Styria, Austria; **Co-Author:** Ilona Papousek, University of Graz, Austria; **Co-Author:** Elisabeth Weiss, University

of Graz, Austria; **Co-Author:**Sigrid Wimmer, University of Graz, Austria; **Co-Author:**Andreas Fink, University of Graz, Austria

Summer vacations interrupt the rhythm of learning and may result in a loss of knowledge and skills. In a meta-analysis with US-American studies, summer learning losses amounted to one tenth of a test score standard deviation, which is equivalent to about one month of schooling (Cooper et al., 1996). Despite its overall importance, the phenomenon of summer learning loss has nearly exclusively been investigated in the USA. Research in Europe is merely at its beginning. Against this background, the present study investigates in an Austrian sample of 110 students in lower secondary education to what degree students' knowledge and skills may suffer from a nine-week summer break and to what degree changes are moderated by socio-economic and family-related variables. The results show losses as well as gains. Students experienced losses in arithmetic problem solving, intelligence measures, and spelling, but gains in reading. Losses or gains in a knowledge domain appear to depend on the degree of practice during the summer vacation. Contrary to US-American studies, students could make up for their losses within nine weeks following the re-start of school. Socio-economic variables such as parents' educational background had a small impact on summer learning losses in arithmetic problem solving. The study has implications for teachers and parents. Teachers cannot rely on their students' knowledge from the previous school year, but instead need to identify students' ability levels and start the new school year with an individualized review of last year's learning contents.

Integrated SFON enhancement with computerized arithmetical training

Keywords: Cognitive skills, Computer-assisted learning, Early childhood education, Numeracy

Presenting Author:Minna M Hannula-Sormunen, University of Turku, Finland; **Co-Author:**Anna Alanen, University of Turku, Finland; **Co-Author:**Jake McMullen, University of Turku, Finland; **Co-Author:**Erno Lehtinen, University of Turku, Finland

This study is based on previous studies demonstrating substantial individual differences in children's own spontaneous focusing on numerosity (SFON) (e.g., Hannula & Lehtinen, 2005). Providing deliberate variation in the aspect of number occurring in everyday surroundings can be an effective way of enhancing children's focusing on numerosity and subsequent development of numerical skills (Hannula, Mattinen & Lehtinen, 2005). The bodily experience of numbers and number combinations has been successfully promoted in a computer game "Fingu", which aims at developing children's awareness of arithmetical combinations of numbers from one to ten (Lindström et. al., 2012). In the current study, we test an integrated model of SFON enhancement and early arithmetics training with iPad game aimed at supporting transfer of arithmetical skills. We created activities that bridge the skills trained in the computer game with children's everyday activities and investigate whether children's arithmetical skills and their SFON tendency develop as a result of a four week intensive playing of Fingu iPad game integrated with everyday activities and SFON enhancement. A quasi-experimental design with a 4-week training and "business as usual" control group and pre-, post-, and delayed post-tests following the training after three months was used. The results show a clear developmental advantage for the training group over the control group in arithmetical skills. An intensive period of SFON enhancement integrated with arithmetic training in a computer game and everyday activities may be a promising and motivating mathematics learning environment for kindergartners.

Differences Among Pre-Service Teachers' TPACK

Keywords: Educational Technology, Pre-service teacher education, Teacher Professional Development, Technology

Presenting Author:Teemu Valtonen, University of Eastern Finland, Finland; **Co-Author:**Sini Kontkanen, University of Eastern Finland, Finland; **Co-Author:**Jari Kukkonen, University of Eastern Finland, Finland; **Co-Author:**Susanna Pöntinen, University of Eastern Finland, Finland; **Co-Author:**Erkko Sointu, University of Eastern Finland, Finland; **Co-Author:**Kati Mäkitalo-Siegl, University of Eastern Finland, Finland

Currently there is a lot of research focusing on pre-service teachers as users of the Information and Communication Technology (ICT). One actively used theoretical framework for studying the topic is the Technological Pedagogical Content Knowledge (TPACK). Challenge with TPACK studies is that they typically treat (pre-service) teachers as one homogenous group, both in studies conducted quantitatively and qualitatively. This research provides a seldom used perspective for TPACK research by focusing on differences among pre-service teachers using both quantitative and qualitative methods. Results indicate that instead of assuming pre-service teachers as a one homogenous group, different subgroups can be indicated with differences among the areas of TPACK. These differences need to be considered in order to better support pre-service teachers with different abilities of using ICT in education. In addition, the aim is to provide insights into possibilities and characteristics of different research methods within TPACK content.

Session P 6

2 September 2017 08:45 - 10:15

Pinni B - B3116

Single Paper

Learning and Social Interaction, Teaching and Teacher Education

Teaching and Instruction - B

Keywords: Collaborative Learning, Communities of learners, Communities of practice, Computer-supported collaborative

learning, Mixed-method research, Motivation, Quantitative methods, School effectiveness, Social interaction, Teacher Professional Development, Teaching / instruction, Teaching approaches, Video analysis

Interest group: SIG 11 - Teaching and Teacher Education

Chairperson: Toni Rogat, Purdue University, United States

Teacher motivation and instructional behavior – Does the school make a difference?

Keywords: Motivation, Quantitative methods, School effectiveness, Teaching / instruction

Presenting Author: Doris Holzberger, Technical University of Munich (TUM), Germany

Teachers' motivational orientations have already been related to teachers' instructional behavior. So far, this research is dominated by a teacher-oriented perspective, investigating individual teachers, and not taking into account school characteristics. School characteristics, however, can be assumed to not only determine teachers' motivational development (cf. Self-Determination Theory) but also to interact with teachers' motivational orientation when predicting instructional behavior (cf. Person-Environment-Interaction). Therefore, the present study examines whether teachers' motivational orientations, their instructional behavior as well as their relationship, differ systematically between schools. PISA 2003 data were re-analyzed, where 1,939 mathematics and science teachers from 198 schools rated their level of engagement as well as the teacher-student relationship, the maximized time use, and the quality of feedback. Multi-level analyses revealed low to medium intra-class correlations for teachers' engagement and instructional behavior. The analyses of random-slopes showed that the regression coefficients for the relationships between teachers' engagement and the three subscales of instructional behavior differ across schools. The present investigation extends previous research by addressing the nested structure of teachers grouped into schools and by examining whether systematic differences can be found for schools. Therewith, it contributes to the discussion on how school, teacher, and teaching characteristics interact with each other.

Scaffolding in the open classroom. Are there different patterns in teachers' supportive behaviours?

Keywords: Mixed-method research, Teaching / instruction, Teaching approaches, Video analysis

Presenting Author: Antonia Scholkmann, University of Hamburg, Germany; **Co-Author:** Jens Siemon, University of Hamburg, Germany; **Co-Author:** Tekla Paulsen, University of Hamburg, Germany

Open learning phases are pivotal in many up-to-date instructional formats, such as inquiry-based or problem-based learning. However, little is known about how teachers actually support the processes students go through in these phases, and which patterns of supportive behaviour might or might not be beneficial for self-directed successful learning. In the present study, a total of 23 teachers from vocational education were videotaped in naturalistic classroom situations in secondary and vocational-educational classes whilst supporting open learning. A total of 2,199 supportive events were coded. Additionally, teachers were surveyed for their approaches to teaching. Patterns of behaviours were inferred via visual inspection as well as with sequential analysis. Results show that most teachers tend to have stable patterns of supportive behaviours associated with their approaches to teaching, which partly differ strongly from the average behaviours. However, some teachers also show variations in their supportive behaviour patterns across lessons they teach, thus demonstrating the flexibility to adapt to situational demands.

Teachers' experiences of mixed peer-mentoring groups of in-service and pre-service teachers

Keywords: Collaborative Learning, Communities of learners, Communities of practice, Teacher Professional Development

Presenting Author: Ulla Kiviniemi, University of Jyväskylä, Finland; **Co-Author:** Päivi Tynjälä, University of Jyväskylä, Finland; **Co-Author:** Hannu Heikkinen, University of Jyväskylä, Finland

This study examines from teachers' perspective the experiences of mixed peer-mentoring groups of in-service and pre-service teachers. The research project started in 2014 along with a Comenius Multilateral Project called PAEDEIA (2013-16), funded by the European Commission. The Paedeia project aimed to develop new practices for integrating teacher studies and working life and enhancing collaboration between schools and teacher education. The research is a preparatory case study for a larger data collection. The data was collected in 2015-2016 by interviews (N=8) and was analysed qualitatively by thematic analysis. Eight themes were identified describing the experiences of the teachers: 1) Expectations of systematic procedures, 2) Relaxation and unwinding, 3) Sense of community, 4) Memories of early career, 5) Practical benefits, 6) Professional reflection, 7) Empowerment and 8) Adopting a role of teacher educator.

Technology-enhanced learning: Content and prosodic features of teacher-student interactions

Keywords: Computer-supported collaborative learning, Social interaction, Teaching / instruction, Teaching approaches

Presenting Author: Raija Hamalainen, University of Jyväskylä, Finland; **Co-Author:** Teija Waaramaa, University of Tampere, Finland; **Co-Author:** Joni Lämsä, University of Jyväskylä, Finland; **Co-Author:** Anne-Maria Laukkanen, University of Tampere, Finland; **Co-Author:** Bram De Wever, Ghent University, Belgium

The recent developments in the technological landscape have an important influence on teacher-student interaction. Computer-supported collaborative learning (CSCL) research on teacher-student interaction has often concentrated more on opening up the content of discussions during an interaction than on understanding the meaning of prosodic features of interaction. However, although the context of a conversation is crucial to understanding interaction in learning, the way the message is conveyed is also important. Therefore, we argue that prosodic aspects (features of speech such as intonation, volume and pace) of interactions are important in CSCL classrooms. The aim of this multidisciplinary study was to combine

content and prosodic perspectives to delve into the features of teacher-orchestrated classroom interactions (a teacher with 27 students) during two months' technology-enhanced physics lessons at a secondary school. This presentation reveals a new understanding of the speech prosody of teacher–student interactions. Our results indicate that prosodic aspects of teacher–student interactions are important (e.g. a teacher's raising intonation in signalling supportiveness). The findings indicated that teachers applied different voice prosody in their discussion activities regarding disputational, cumulative and exploratory talk (see, Mercer & Wegerif, 1999) as well as teacher presentation, group organising and “other” talk. We illustrate how the teacher's intonation varies depending on the situation and the dialogic of the speech. Furthermore, we illuminate prosodic challenges that emerged when teachers act in authentic classroom. In the future, better understanding of prosodic and content features of teacher–student interaction may open up novel ways for orchestrating technology-enhanced learning.

Session P 7

2 September 2017 08:45 - 10:15

Main Building E - E350

Single Paper

Learning and Social Interaction

Social Interaction in Learning and Instruction - C

Keywords: Computer-supported collaborative learning, Conversation / Discourse analysis, Cooperative / collaborative learning, Educational Psychology, Informal learning, Inquiry learning, Literacy, Mathematics, Science education, Secondary data analysis, Social interaction, Teaching / instruction

Interest group: SIG 10 - Social Interaction in Learning and Instruction

Chairperson: Ida Kukliansky, Ruppin Academic Center, Israel

The effects of multimodal representations and discourse on students during inquiry science

Keywords: Cooperative / collaborative learning, Educational Psychology, Inquiry learning, Science education

Presenting Author: Robyn Gillies, The University of Queensland, Australia; **Co-Author:** Bernie Baffour, The University of Queensland, Australia

The study sought to determine the effects of teacher-introduced multimodal representations and discourse on students' task engagement and scientific language during cooperative, inquiry-based science. The study involved eight Year 6 teachers in two conditions (4 very effective teachers & 4 effective teachers) who taught two units of inquiry-based science across two school terms. The results show that the very effective teachers spent significantly more time engaged in using embodied representations to illustrate points or communicate information. They also spent significantly more time engaged in interrogating students' understandings and scaffolding and challenging their thinking than the effective teachers. In turn, the students in the very effective teachers' classes spent significantly more time on-task and used significantly more relevant basic and scientific language to explain the phenomena they were investigating than their peers in the effective teachers' classes. These are behaviours and language that are associated with successful learning in science.

Sibling effects on achievement test scores in large scale assessments

Keywords: Informal learning, Literacy, Mathematics, Secondary data analysis

Presenting Author: Christine Schmid, German Institute for International Educational Research (DIPF), Germany

That siblings do have an effect on achievement test scores in large scale assessments is less an issue of debate than the explanation of such effects. Two concurrent models can be pointed out, the parental dilution explanation and the confluence model. In the presentation the characteristics of both models in predicting age-specific achievement test score patterns by number of children and birth order will be carved out. The comparison of the predicted patterns with the empirical patterns in German and Austrian national samples of TIMSS, PIRLS, and PISA speaks for the validity of the confluence model, as well as for the tutoring effect, as a part of this model. This is especially true as the only child handicap, which is a unique feature of the confluence model, remained significant under control of SES, migration background, sex, and the appraisal in a single-parent or a stepparent family. The last mentioned factors stand for alternative explanations for the only child handicap, representing the so called admixture hypothesis. However, more profound tests of the only child handicap, or a more direct tests of the tutoring effect, which within the framework of the confluence model is assumed to cause the only child handicap, are needed. Such evidence for the tutoring effect could underfeed the argumentation for and acceptance of learning settings, where tutoring behavior by a more competent interaction partner is part of the setting.

Exploring whole class dialogues in computer-supported science learning settings

Keywords: Computer-supported collaborative learning, Conversation / Discourse analysis, Science education, Teaching / instruction

Presenting Author: Anniken Furberg, University of Oslo, Norway; **Co-Author:** Kenneth Silseth, University College of Southeast Norway, Norway

This paper reports on a study of consolidation activities in whole class settings, i.e. activities where the teacher-student

dialogues intend to share, summarize and thematize the experiences made by student during exploratory group work activities. Previous research has shown that, the teacher frequently acts as an important resource, providing various forms of help during students' learning activities. This study adds to this body of research by scrutinizing dialogic sequences in whole class settings taking place prior to and after group work settings where students solves small scale, and often explorative tasks designed by the teacher. By analyzing the interactions between secondary school students and their teacher during a science project, the current study provides insight into the dialogic achievements within whole class activities. The analyses suggest that the teacher provided valuable support in the form of procedural regulation and elicitation of students' conceptual understandings and conceptual elaborations. Most importantly however, the teacher provided support by directing students' orientations away from a focus on how to solve the tasks and towards a focus involving development of conceptual understanding on a more general level. The paper is detailing the discursive strategies used by the teacher.

Supporting students' conceptual sense-making with multimodal representations in science learning

Keywords: Computer-supported collaborative learning, Science education, Social interaction, Teaching / instruction

Presenting Author:Line Ingulfsen, University of Oslo, Norway; **Presenting Author:**Anniken Furberg, University of Oslo, Norway

This paper reports on a study exploring how multimodal representations aimed at visualizing scientific principles and phenomena can be used as conceptual sense-making resources in computer-supported science activities. More specifically, the paper scrutinizes how multimodal representations become structuring resources in teacher-student interactions taking place within dialogic whole-class and group work settings. Taking a socio-cultural perspective, multimodal representations are seen as cultural artifacts that mediate actions and activities in the social practices that constitute teaching-and-learning. The empirical basis of the study is a science project about climate change and sustainable development, where various forms of multimodal representations constituted the very core of the activities taking place. By means of micro-analyses of teacher-student interactions, we demonstrate how multimodal representations become productive social and cognitive resources in teacher-student interactions both in whole-class and group work settings. The analyses show how the meaning potentials of multimodal representations are shared and negotiated within and across classroom settings. Furthermore, the study demonstrates the crucial role of teacher guidance to engage students in conceptually oriented talk. The findings will be discussed according to possible implications for teaching and learning with representations and design of instruction.

Session P 8

2 September 2017 08:45 - 10:15

Virta - 113

Single Paper

Higher Education, Instructional Design

Comprehension of Text and Graphics - B

Keywords: Argumentation, Comprehension of text and graphics, Educational Psychology, Instructional design, Literacy, Multimedia learning, Quantitative methods, Reading comprehension, Reasoning

Interest group: SIG 02 - Comprehension of Text and Graphics

Chairperson: Jannet van Drie, University of Amsterdam, Netherlands

What degree of instructional support is helpful for learner-generated drawing?

Keywords: Comprehension of text and graphics, Educational Psychology, Quantitative methods, Multimedia learning

Presenting Author:Steffen Schmidgall, Leibniz-Institut für Wissensmedien, Germany; **Co-Author:**Alexander Eitel, University of Freiburg, Germany; **Co-Author:**Katharina Scheiter, Leibniz-Institut für Wissensmedien, Germany

Learner-generated drawing may be a task that is too demanding when learners draw on blank paper and receive no support. Therefore, we investigated the role of support on drawing, contrasting three drawing groups with different degrees of support (no vs. low vs. high support) with a non-drawing control group. $N=156$ university students read a text about human swimming behavior and then took three learning outcome tests. In line with our hypotheses, we found a beneficial effect of drawing on higher-order knowledge (transfer and visual-spatial knowledge tests). Unexpectedly, the low and high support groups did not outperform the no support group. Participants in the high support condition might have engaged merely in operating the interface instead of learning substantially. Also, the illustrations used in the low support condition might have interfered with participants' mental representation of the learning content. Future research should investigate which types of support might be helpful under which conditions.

Task Experience and Layout Influence the Negative Effect of Unnecessary Information on Learning

Keywords: Comprehension of text and graphics, Educational Psychology, Instructional design, Multimedia learning

Presenting Author:Gertjan Rop, Erasmus University Rotterdam, Netherlands; **Co-Author:**Anne Schueler, Leibniz-Institut für Wissensmedien, Germany; **Co-Author:**Peter Verkoeijen, Erasmus University Rotterdam, Netherlands; **Co-Author:**Katharina Scheiter, Leibniz Institut für Wissensmedien, Tübingen, Germany; **Co-Author:**Tamara Van Gog, Utrecht University, Netherlands

When designing multimedia instructional materials presenting irrelevant or unnecessary information should be avoided, because it hinders rather than helps learning. However, a recent study seemed to indicate that task experience might be a boundary condition to this negative effect: students learn to ignore unnecessary information with task experience. This study was conducted using learning materials of low complexity, in which the unnecessary information was always presented at the same location. Therefore, in the present study we examined whether task experience is a robust boundary condition to the negative effect of unnecessary information, by using more complex materials, and varying the layout of the task (unnecessary information integrated in or separated from the relevant information). Participants learned about the process of mitosis using a slideshow consisting of six slides, and after each slide their knowledge of the preceding slide was tested. Results showed that the unnecessary information significantly hampered learning only when it was presented separated from the relevant materials. This negative effect on learning no longer occurred after participants gained task experience, thus it seems that participants were able to adapt their study strategy also when learning with more complex materials. However, we only found this effect if the unnecessary materials were presented on the right-hand side of the screen. This surprising finding may be interesting but should be replicated to establish its robustness. When replicated, it suggests that it is important to not only consider study strategies, but also reading direction when doing multimedia research and designing instructional materials.

Memory for textual conflicts predicts sourcing when adolescents read multiple expository texts

Keywords: Comprehension of text and graphics, Educational Psychology, Literacy, Reading comprehension

Presenting Author: Elisabeth Stang Lund, University of Oslo, Norway; **Co-Author:** Ivar Bråten, University of Oslo, Norway;

Co-Author: Eva Wennås Brante, University of Oslo, Norway; **Co-Author:** Helge Strømsø, University of Oslo, Norway

Abstract Eighty-six Norwegian 11th-graders read four texts that discussed two conflicting issues concerning the relationship between sun exposure and physical and mental health, respectively. Before reading the texts, participants' prior knowledge about the topic and interest in health issues were assessed, and after reading, their self-reported critical reading strategies, memory for conflicting content information, and sourcing in the form of attributing key information from the texts to their respective sources were measured. After having removed variance associated with gender, prior knowledge, and interest in the first step of a forced-order hierarchical multiple regression analysis, memory for conflicting content information (but not self-reported critical reading strategies) emerged as a unique positive predictor of sourcing performance. This finding has theoretical importance because it shows that representing conflicting content information also may contribute to sourcing performance among adolescents reading multiple expository texts on a controversial issue. In terms of educational practice, this study highlights the importance of helping adolescents to notice conflicting information when reading multiple texts because such processing, in turn, may facilitate the construction of mental representations that also take source information into consideration.

Should I get a flu shot? The contribution of critical thinking to argumentation skills

Keywords: Argumentation, Comprehension of text and graphics, Reading comprehension, Reasoning

Presenting Author: Christian Tarchi, University of Florence, Italy

In this study we investigated the relationship between critical thinking skills, multiple documents reading, and the quality of learners' arguments following reading. Fifty Italian University students participated in this study. We assessed students' self-perception of cognitive systems, critical thinking skills, epistemic cognition, prior beliefs, topic interest, and topic knowledge. Then, students were assigned six readings reporting divergent perspectives on the topic of vaccination. Finally, students wrote a short argumentative essay in which they were asked to give their opinion on flu vaccination, basing their justification on the texts that they had just read. The results of the univariate ANOVA revealed that students who wrote short essays with a sounder argumentation were characterized by lower rational and experiential scores, and by higher critical thinking skills. This study confirms the importance of source evaluation and hypotheses testing skills in elaborating a sound argument supporting a decision after reading multiple and conflictual documents on a controversial topic.

Session P 9

2 September 2017 08:45 - 10:15

Linna - K103

Single Paper

Higher Education

Higher Education - F

Keywords: Higher education, Learning approaches, Metacognition, Qualitative methods, Student learning, Teacher Professional Development, Teaching / instruction, Teaching approaches, Technology

Interest group: SIG 04 - Higher Education

Chairperson: Marilou Bélisle, Université de Sherbrooke, Canada

Relations between students' perceptions of the teaching-learning environment and engagement

Keywords: Higher education, Qualitative methods, Student learning, Teaching / instruction

Presenting Author: Kaire Uiboleht, University of Tartu, Estonia; **Co-Author:** Mari Karm, University of Tartu, Estonia; **Co-Author:** Liisa Postareff, University of Helsinki, Finland

The quality of learning is influenced by both students' individual characteristics, the level and quality of engagement and by students' perceptions of the teaching-learning environment (TLE). Previous studies have explored a relationship between students' perceptions of the enhancing and impeding factors of the TLE and cognitive engagement (i.e. approaches to learning) and have found that students who employ different approaches to learning perceive different factors as enhancing or impeding. Previous studies have mainly focused on exploring students' perceptions of TLE at the curriculum level, but the current study explores students' perceptions of the enhancing and impeding factors of the TLE at the course level. In addition, the aim is to investigate how students' perceptions are related not only with their cognitive engagement, but also with emotional and behavioural engagement. The data consisted of 33 semi-structured interviews with students from three different undergraduate university courses. The data was analysed using qualitative content analysis. The findings showed that students' perceptions of the enhancing and impeding factors of the TLE were related to 1) course design 2) teaching practices and 3) assessment practices. The enhancing factors were related with cognitive, emotional and behavioural engagement, but impeding factors were mostly related with emotional and behavioural disengagement. The results imply that it is important to support academic staff in developing courses which support students' emotional and behavioural engagement along with cognitive engagement.

Are distance education students different than college students in their learning strategies use?

Keywords: Higher education, Learning approaches, Metacognition, Student learning

Presenting Author:Karel Kreijns, Open University of the Netherlands, Netherlands; **Co-Author:**Celeste Meijs, Open University, Netherlands; **Co-Author:**Joyce Neroni, Open University of the Netherlands, Netherlands; **Co-Author:**Jérôme Gijssels, Open University of the Netherlands, Netherlands; **Co-Author:**Ruslan Leontjevas, Open University of the Netherlands, Netherlands; **Co-Author:**Paul A. Kirschner, Open University of the Netherlands, Netherlands; **Co-Author:**Renate de Groot, Open University of the Netherlands, Netherlands

Learning strategies are actions learners undertake to make learning more effective and to facilitate knowledge acquisition and comprehension. Information regarding learning strategy use of students can be very useful for students and counselors to enhance learning and for educational institutes to improve their education. Since lifelong learning and continuous professional development become prominent, there is an increase in adult students that are enrolled in distance education (DE). Students within DE may use other learning strategies than students within traditional education. A widely used instrument to inquire learning strategy use is the Motivated Strategies for Learning Questionnaire (MSLQ), which is based on strategy use by college students. Since differences between DE students and college students in strategy use were expected, we aimed to explore the underlying structure of the scale in DE students and to propose a best-fit-solution for grouping the items into subscales by means of exploratory and confirmatory factor analyses. In total, 1154 DE students filled out the learning strategy part of the MSLQ. The analyses revealed a differential factor structure of five factors for DE students (as in contrast with the nine factors found for college students). The findings can be explained by a differential interpretation of the items based in differences between educational systems (traditional vs distance education) and age (younger vs older students). Based on these findings, we recommend to use the newly reported subscales for (adult) students within online distance education in which the students can determine their own time, place and study pace.

Using the Double-edged Sword: Instructors' Approaches to Diversity at a University in Hong Kong

Keywords: Higher education, Qualitative methods, Teaching / instruction, Teaching approaches

Presenting Author:Tracy Zou, The University of Hong Kong, Hong Kong

With the growing emphasis on interdisciplinarity and internationalisation in higher education, the classroom today becomes more disciplinary and culturally diverse. A high level of diversity may create precious opportunities for student learning but could also generate tensions for teachers and students. It is sometimes referred as a 'double-edged sword'. This study aims to explore strategies and practices adopted by instructors in teaching a diverse classroom. Fourteen interviews have been conducted with instructors who taught Common Core courses in one university at Hong Kong. Common Core courses have been designed to broaden students' horizons and develop their cultural awareness and competence. A Common Core class contains students from all disciplines and different cultures. The results show that the instructors were aware of the different backgrounds of students. Most felt it had made teaching more challenging and some had leveraged the diversity to create an energetic learning environment. Four major types of good practices have been identified: (1) providing specific guidance and support; (2) encouraging exploration of disciplinary and cultural related topics; (3) facilitating meaningful interdisciplinary and intercultural interactions; and (4) using students' experiences as resources to enhance engagement. The findings also suggest that the disciplinary differences were perceived to exert a larger impact on the teaching and learning practices than the cultural differences based on nationalities.

Students' perception of flipped classroom in university courses

Keywords: Higher education, Teacher Professional Development, Teaching approaches, Technology

Presenting Author:Erkko Sointu, University of Eastern Finland, Finland; **Co-Author:**Teemu Valtonen, University of Eastern Finland, Finland; **Co-Author:**Laura Hirsto, University of Eastern Finland, Finland; **Co-Author:**Kati Mäkitalo-Siegl, University of Eastern Finland, Finland; **Co-Author:**Markku Saarelainen, University of Eastern Finland, Finland; **Co-Author:**Lasse Heikkinen, University of Eastern Finland, Finland; **Co-Author:**Anna Kaasinen, University of Eastern Finland, Finland; **Co-Author:**Jyri Manninen, University of Eastern Finland, Finland

Professionals in learning and instruction are seeking ways to change teacher-centered approaches towards more student-

centered approaches in higher education. One way to enable this change is the Flipped Classroom (FC) pedagogical model, in which lectures still exist but are arranged with the assist of technology (e.g., video materials, online learning platforms with online materials etc.) allowing students to study the lessons with more unrestricted ways (time/location flexibility). Additionally, with the FC model, students are more prepared beforehand to the contact meetings (i.e. classes, demonstrations) and can engage in active, student-centered learning approaches with fellow students in order to learn the content area more in depth. Teacher role is more seen as instructor, guide or mentor for learning the content area. The main aim of this study was to investigate FC model within two university-level courses. Students' general attitudes towards FC design were studied with posttest questionnaire. Additionally, preliminary results of personal perceptions for mastering tasks (Self-efficacy for learning) and learning tasks (Instinct goal orientation) were investigated with pre-posttest design. According to initial results ($N = 38$), majority of the students considered FC design as suitable way of learning for them and were willing to participate in similarly designed courses. Also, initial positive change for Self-efficacy and Instinct goal orientation was found. The FC design, results and study significance for higher education learning are discussed. These initial results will be confirmed with larger sample in the EARLI 2017 conference.

Session P 10

2 September 2017 08:45 - 10:15

Main Building A - A05

Single Paper

Higher Education, Learning and Special Education

Special Educational Needs

Keywords: Achievement, Case studies, Educational Technology, Higher education, Learning and developmental difficulties, Learning disabilities, Mathematics, Motivation, Numeracy, Qualitative methods, Social aspects of learning and teaching, Special education, Student learning

Interest group: SIG 15 - Special Educational Needs

Chairperson: Nadia Leroy, Université Grenoble Alpes, France

Dyslexia in Adolescents: Sharing Insights from a Longitudinal Study

Keywords: Case studies, Learning and developmental difficulties, Qualitative methods, Social aspects of learning and teaching

Presenting Author: Eva Wennås Brante, University of Oslo, Norway; **Co-Author:** Peggy L. Anderson, Metropolitan State University of Denver, United States

In a longitudinal case study we investigated how 13 male adolescents' life and schooling were affected by their dyslexia. Semi-structured interviews and other assessments were developed into case studies by dyslexia researchers in thirteen countries. Participants were interviewed twice; at 10 - 12 years of age and about four years later. The aim was to provide understanding of the impact of dyslexia over time through the study of adolescents' personal perspectives. The Frostig Center studies have revealed the predictive value of six success attributes, in relation to academic achievement. This paper focuses on three of the success attributes; self-awareness, use of effective support systems and appropriate goal setting, which turned out to be strong for these adolescents. Overall, the predominant theme that emerged from the interviews was one of healthy adjustment. Moreover, ten of the adolescents were doing very well academically. However, three boys appeared to be at considerable risk as they showed less hopeful thinking, lower self-efficacy, and insufficient evidence of important success markers. Even though these adolescents still struggle with decoding and are largely dependent upon technological accommodations, the majority of them demonstrate remarkable resilience in the face of dyslexia. When the success attributes are strong, students are better equipped to manage schooling. Thus, we encourage teachers all over the world to persistently build onto the success attributes, thereby providing students with dyslexia these essential capacities for handling educational challenges.

Barriers for Universal Design for Learning (UDL) among higher education students with disabilities

Keywords: Higher education, Qualitative methods, Special education, Student learning

Presenting Author: Júlia Grifol Freixenet, Vrije Universiteit Brussel (VUB), Belgium; **Co-Author:** Katrien Struyven, Vrije Universiteit Brussel, Belgium; **Co-Author:** Caroline Andries, Vrije Universiteit Brussel (VUB), Belgium

Due to an overreliance on self-advocacy, the traditional model of *identify, label, tutor and accommodate* has proven to be ineffective when addressing the needs of students with disabilities in higher education. The Universal Design for Learning (UDL) framework offers a promising alternative, as UDL aims to support access, participation, and progress for *all* learners, resulting in an accessible and more beneficiary learning environment for students with disabilities. The main objective of this qualitative study is to explore whether the UDL framework addresses the students with disabilities' perceptions of learning needs within the traditional model effectively. Findings suggested that students' perceptions align well with the UDL principles, especially with the third principle (i.e., multiple means of engagement). In addition, we found barriers when implementing UDL, as meeting the learning needs for some students can create barriers for others. In order to overcome these weaknesses, UDL needs to address the individual learning needs in a direct way, and not only through environment and curricula changes. Therefore, this study argues strongly for a flexible implementation of UDL, while carefully monitoring students' progress.

Evaluation of a computer-based training for enhancing arithmetic skills in math-disabled children

Keywords: Educational Technology, Learning disabilities, Mathematics, Numeracy

Presenting Author:Joerg-Tobias Kuhn, University of Münster, Germany; **Co-Author:**Christin Schwenk, WWU Muenster, Germany; **Co-Author:**Leonie Maria Strehle, WWU Muenster, Germany; **Co-Author:**Julia Raddatz, WWU Muenster, Germany; **Co-Author:**Christian Dobel, University of Jena, Germany; **Co-Author:**Heinz Holling, WWU Muenster, Germany

Children with mathematical learning disability (MLD) often display substantial deficits in mathematical skills, which may result in substantial impairments in their educational progress and mental health. This study evaluated a computer-based training for elementary school children with MLD (grades 2-4), focusing on basic aspects of number processing, calculation skills, arithmetic fact retrieval, and working memory. During a 19-week intervention period, a less-impaired group of children with MLD ($N = 30$, percentile rank math ability < 25) received the computer-based training and was compared to a waiting control group ($N = 44$). An independent group of children with a more severe form of MLD ($N = 17$, percentile rank math ability < 10) received a weekly small-group numeracy intervention in addition to the computer-based training (waiting control group $N = 18$). Results showed that the less-impaired MLD group displayed substantial gains in curricular arithmetic, fact retrieval, and several basic numerical skills at posttest compared to the control group ($d = .46 - 1.50$), whereas the more severely-impaired MLD group displayed gains mainly in fact retrieval ($d = .91 - 1.30$). At follow-up three months after posttest, stable training effects were found in a measure of curricular arithmetic ($d = .36$) in the less-impaired MLD group. Overall, results show that mathematical skills in children with MLD can be effectively improved and transfer to curricular domains can be achieved, although establishing conditions for stable gains requires further research.

The development of at-risk children's reading skills and motivation during early school years

Keywords: Achievement, Learning disabilities, Motivation, Special education

Presenting Author:Marja-Kristiina Lerkkanen, University of Jyväskylä, Finland; **Co-Author:**Noona Kiuru, University of Jyväskylä, Finland; **Co-Author:**Anna-Maija Poikkeus, University of Jyväskylä, Finland

Early identification of children at risk for reading disability is important to be able to plan intervention to support their reading development from the beginning phases of instruction. This study examined the development of at-risk children's reading skills and motivation during early school years. The participants were 257 children who had been identified to have an early risk for reading disabilities based on pre-reading tests at the end of kindergarten in longitudinal First Steps study. Children's reading skills were followed from school entry until the end of grade 2. The results showed that children who gained age level at the end of grade 2 had better phonological skills, letter naming, and listening comprehension skills than children who lagged behind of age level already in kindergarten. Children who lagged behind of age level, in turn, showed poorer self-concept in reading and more task-avoidance behavior already prior to school entry than children who gained age level. The challenge to early identification is that among at-risk children there are clear differences already at kindergarten which might be difficult to identify.

Session P 11

2 September 2017 08:45 - 10:15

Virta - 114

Single Paper

Cognitive Science, Educational Policy and Systems, Learning and Social Interaction, Learning and Special Education

Learning and Development in Early Childhood - D

Keywords: Assessment methods and tools, At-risk students, Cognitive development, Cognitive skills, Developmental processes, Early childhood education, Educational Psychology, Language (L1/Standard Language), Literacy, Meta-analysis, Motivation and emotion, Social development, Social interaction, Special education, Video analysis

Interest group: SIG 05 - Learning and Development in Early Childhood

Chairperson: Tim Corcoran, Deakin University, Australia

Distinguishing Stimulating from Supporting Maternal Interaction Behavior in Infancy

Keywords: Early childhood education, Educational Psychology, Social interaction, Video analysis

Presenting Author:Anja Linberg, University of Bamberg, Germany; **Co-Author:**Jan-David Freund, University of Bamberg, Germany; **Co-Author:**Sabine Weinert, University of Bamberg, Germany

The distinction of interaction behavior along the dimensions of stimulating and emotional supporting interaction behavior has been found to be fruitful, as both aspects are shaped differently and associated with different background variables. Application of this differentiation has been expanding from older children to the age group of toddlers in recent years. Yet, it is still not clear whether it is also applicable to interactions with children in their first year of life, because research at this age mainly focusses emotional supporting interaction behavior. In expansion of the research field we investigate (1) the extent of emotional supporting and stimulating interaction behavior and (2) their associations to maternal, child, and context characteristics. Using data from the German National Educational Panel Study our analyses are based on data of videotaped play situations between mothers and their 7 month old children ($n=2190$). Results indicate that mothers show both, stimulating interaction as well as emotional supporting behavior. Moreover, OLS-regression analyses revealed that maternal education was significantly associated with both, emotional supporting behavior as well as stimulating behavior,

while household income and child temperament were only associated with stimulating interaction behavior

Differences and similarities in children's acquisition of different implicature types

Keywords: Cognitive development, Cognitive skills, Developmental processes, Language (L1/Standard Language)

Presenting Author:Gerlind Große, Frühkindliche Bildungsforschung, Germany; **Co-Author:**Cornelia Schulze, Leipzig University, Germany; **Co-Author:**Michael Tomasello, Max Planck Institute for Evolutionary Anthropology, Germany; **Co-Author:**Napoleon Katsos, University of Cambridge, UK, United Kingdom

In the current study, we compared the development of two kinds of quantity implicatures, ad-hoc and scalar, in 3- and 5-year-old German-speaking children and adults. We explored children's performance in a child-friendly referential choice task, manipulating three factors: age (3 years, 5 years, adult), the saliency of the alternative term (mention of the stronger alternative term before or after encountering the critical term), and the implicature type (ad-hoc, e.g. 'a car' vs. 'a doll and a car' or scalar, e.g. 'all apples' vs. 'some of the apples'). While the older children and adults were skillful on both types of implicature, the 3-year-olds found the ad-hoc easier than the scalar. For participants of all ages, performance in both implicature types was sensitive to the saliency of the alternative term. These results are compatible with a unitary view of pragmatic inferencing, according to which the two kinds of quantity implicature are generated by the same inferential mechanisms. Nevertheless, aspects of the data also suggest two non-pragmatic processing factors that differentially influence the two implicature types: "Semantic underspecification" of quantifiers in language acquisition and "quantifier domain restriction" in processing multiple displays.

Impact of Early Childhood Education and Care on Socioemotional Development: A Meta-Analysis

Keywords: Early childhood education, Meta-analysis, Social development, Motivation and emotion

Presenting Author:Hannah Ulferts, Freie Universität Berlin, Germany; **Co-Author:**Ana Susac, Freie Universität Berlin, Germany; **Co-Author:**Yvonne Anders, Freie Universität Berlin, Germany

The meta-analysis provides a quantitative synthesis of longitudinal evidence of the impact of variations in quality and quantity of center-based Early Childhood Education and Care (ECEC) on socioemotional outcomes in Europe. The preliminary coding for the effects of global process quality (e.g., warm and responsive interactions measured by CIS, ECERS-R or CLASS) and promotion of early learning (e.g., measured by ECERS-E or ELLCO) produced 109 separate findings from 14 large-scale longitudinal studies, gathering knowledge for around 12,000 children from 10 European countries. Preliminary results of a three-level longitudinal meta-analysis show that increased promotion of early learning benefits children's socioemotional outcomes (Cohen's $d = .16$, $p < .01$) whereas there is no benefit from higher global process quality. Preliminary review for the effects of quantity (e.g. variations in intensity and duration of ECEC) and structural quality (e.g. staff qualification, group size) reveals a complex picture which will be further clarified using the meta-analytic approach. To follow is also a mixed-effects moderator analysis examining potential moderators of effects including age, phase of academic career, measure of ECEC effects, type of outcome, and source of information on outcome. The results complement existing meta-analytic evidence on cognitive development, and carry impact for policy-makers, indicating which aspects of ECEC demand increased attention due to their direct contributions to children's development.

Teachers Assessing Pre-Reading Skills

Keywords: Assessment methods and tools, At-risk students, Literacy, Special education

Presenting Author:Riitta Virinkoski, University of Jyväskylä, Finland; **Co-Author:**Marja-Kristiina Lerkkanen, University of Jyväskylä, Finland; **Co-Author:**Mikko Aro, University of Jyväskylä, Finland; **Co-Author:**Leena Holopainen, University of Eastern Finland, Finland; **Co-Author:**Kenneth Eklund, University of Jyväskylä, Finland

The aim of the study was to investigate to what extent teachers were able to identify difficulties in pre-reading skills (letter knowledge and phonological skills) of especially the lowest achieving students. The accuracy of teacher ratings of students' pre-reading skills was studied by comparing teacher ratings to actual test scores. The data has been used from two Finnish longitudinal studies: Sample 1 (class teachers, $n = 91$; special education teachers, $n = 51$) and Sample 2 (class teachers, $n = 136$; special education teachers, $n = 34$). In this study scoring in the test below the 15th percentile was the indicator of students' low achievement and reading difficulties. The results showed first that the teacher ratings correlated quite well with the test scores. However, closer investigation of sensitivity and specificity of the teacher ratings revealed that a number of children in need of intensified support for their early reading development remained unidentified and on the other hand there were some students identified despite test scores being within normal range. The findings underline the importance for developing more systematic and reliable assessment tools for pedagogical purposes, and respectively, the need to pay special attention to issues related to early identification and assessment of reading difficulties in teacher training.

Keywords: at-risk students, assessment methods and tools, special education, literacy

Session P 12

2 September 2017 08:45 - 10:15

Pinni B - B1096

Single Paper

Motivational, Social and Affective Processes, Teaching and Teacher Education

Motivation and Emotion - D

Keywords: Achievement, Educational Psychology, Emotion and affect, Experimental studies, Higher education, Motivation, Secondary education, Self-regulation, Teaching approaches

Interest group: SIG 08 - Motivation and Emotion

Chairperson: Jakob Tesch, DZHW - German Centre for Research on Higher Education and Science Studies, Germany

Can Students Differentiate Between Dimensions of Need-Supportive Teaching? An Experimental Study

Keywords: Experimental studies, Higher education, Motivation, Teaching approaches

Presenting Author: Martijn Leenknicht, Roosevelt Center for Excellence in Education, Netherlands; **Co-Author:** Lisette Wijnia, Erasmus University Rotterdam & University College Roosevelt, Netherlands; **Co-Author:** Sofie Loyens, University College Roosevelt, Netherlands; **Co-Author:** Remigius (Remy) Rikers, UCR / Utrecht University, Netherlands

Students' basic psychological needs (need for autonomy, competence, and relatedness) should be supported by teachers by providing autonomy support, structure, and showing involvement, in order to enhance students motivation and achievement. In current study, the origin of students' perceptions of need-supportive teaching is studied. Central research question is: Can students differentiate between the dimensions of need-supportive teaching (i.e., autonomy support, structure, and involvement), or are their perceptions intertwined? This was studied using scenarios in which one of the three dimensions of need-supportive teaching was emphasised while the others were kept neutral. Students perceptions of the teacher in the scenarios were compared. Results show that teachers that are autonomy supportive or providing structure are perceived as involved as well. Although, involved teachers are not automatically perceived as autonomy supportive and providing structure. The results indicate that students are able to differentiate in their perceptions and that these perceptions are not intertwined. This also means that it is not sufficient for teachers to only support one of the three dimensions. Further research should focus on contextual factors influencing students' perceptions of need-supportive teaching.

An intervention fostering abilities to regulate achievement emotions with secondary school students

Keywords: Educational Psychology, Emotion and affect, Secondary education, Self-regulation

Presenting Author: Daniela Raccanello, University of Verona, Italy

Achievement emotions and related antecedents such as emotion regulation strategies have recently roused particular interest for both their theoretical and applied importance (Pekrun & Linnenbrink-Garcia, 2014). Notwithstanding the large amount of studies focused on the development of emotion regulation abilities, scarce attention has been paid to specific interventions aiming at developing them within learning contexts. Therefore, we involved 62 eight-graders (included in an experimental or in a control group) to test the efficacy of a two-unit intervention program aiming at fostering abilities to regulate five negative achievement emotions, embedded within the domain of Italian. In a pre and in a post-intervention phase, we measured students' abilities to report functional emotion regulation strategies, the intensity of ten achievement emotions related to Italian, and students' emotion regulation abilities in non-school contexts. Only for the experimental group, after the intervention the number of spontaneously reported functional strategies increased, while the intensity of anxiety and anger related to Italian decreased. However, emotion regulation abilities related to non-school contexts did not vary. Acknowledging limitations such as the short duration of the intervention or the absence of generalizability of its effects to non-school contexts, we provided evidence-based indications on the goodness of the proposed program. From an applied perspective, our findings encourage the development of further intervention programs involving also younger students, based on the awareness of the role played by achievement emotions within school contexts.

University Student's Daily Affect, Sleep, and Motivation: Are they related to Learning Outcomes?

Keywords: Educational Psychology, Emotion and affect, Higher education, Motivation

Presenting Author: Tanja Könen, Goethe-Universität Frankfurt, Germany; **Co-Author:** Julia Karbach, Goethe-Universität Frankfurt, Germany

The importance of sleep, affect, and motivation for learning are well known on a trait level, but we are just beginning to understand the role of their daily states. Important first work demonstrated that higher daily sleep quality was associated with improved daily affect and self-perceived learning goal achievement (Flueckinger et al., 2016). Thus, it would be crucial to know if such daily states are also related to long-term learning outcomes and if they can contribute to explain their development. A sample of 146 students (age 19-31, 90% female) reported on their last night's sleep, their current affect and current motivation at the end of a weekly bachelor class in psychology (as minor subject). They reported on average on 8.87 sessions ($N_{obs}=1295$). Further, they answered a multiple-choice pre- and post-test on the course topic at the beginning and end of the term. Using multilevel-modeling, we found that higher sleep quality was related to higher positive affect on the within- and between-person level. Sleep quality was also positively related to motivation (effort and enjoyment) but only on the between-person level. Sleep duration was unrelated to both affect and motivation. Further, positive affect predicted effort and enjoyment on the within- and between-person level. Interestingly, both average sleep duration and intraindividual variability in sleep duration predicted post-test performance. Thus, sleep quality was related to directly self-perceivable daily functioning and sleep duration and variability were related to long-term learning outcomes. These findings illustrate how educational psychology can benefit from a short-term micro-longitudinal perspective.

Dimensional Comparison Effects of Students' Achievements in Multiple Domains on their Task Values

Keywords: Achievement, Educational Psychology, Motivation, Secondary education

Presenting Author:Hanna Gaspard, University of Tübingen, Germany; **Co-Author:**Yi Jiang, University of Tübingen, Germany; **Co-Author:**Herb Marsh, Australian Catholic University, Australia; **Co-Author:**Benjamin Nagengast, Eberhard Karls Universität Tübingen, Germany; **Co-Author:**Ulrich Trautwein, University of Tübingen, Germany; **Co-Author:**Allan Wigfield, University of Maryland, United States

Different motivational theories assume that students' motivation is shaped by intraindividual comparisons across different domains. Expectancy-value theory (Eccles et al., 1983) assumes that students' intraindividual hierarchies of expectancies and values predict their academic choices, whereas dimensional comparison theory (Möller & Marsh, 2013) assumes that students' academic self-evaluations are affected by dimensional comparisons of their achievements in different domains. Integrating these theories, the present study investigated how students' task values can be predicted by their achievement in multiple academic subjects. Previous studies had shown dimensional comparison effects on intrinsic value and related constructs such as interest. This study aimed at extending these findings by investigating these effects across different subjects and for different dimensions of task value. In a sample of over 800 German students from Grades 5 to 12, students' task values and achievement were assessed in five academic subjects (i.e., German, English, math, biology, physics). The results for dimensions of task value closely related to components of interest (i.e., intrinsic and attainment value) largely supported the assumptions of dimensional comparison theory: Strong evidence was found for negative contrast effects between achievement and value in "far" domains such as math and languages. There were also some positive assimilation effects between achievement and value in "near" domains such as math and physics. Less pronounced dimensional comparison effects were found for facets of utility value. The findings further our understanding of the development of domain-specific task values. Implications of the domain-specificity of task values for intervention research are discussed.

Session P 13

2 September 2017 08:45 - 10:15

Main Building C - C6

Single Paper

Assessment and Evaluation, Higher Education

Assessment and Evaluation - B

Keywords: Assessment methods and tools, Competencies, Design based research, Higher education, Learning Technologies, Mixed-method research, Motivation, Quantitative methods, Social aspects of learning and teaching, Student learning

Interest group: SIG 01 - Assessment and Evaluation

Chairperson: Sarah Howard, University of Wollongong, Australia

How to evaluate the learning outcomes of digital storytelling?

Keywords: Assessment methods and tools, Design based research, Learning Technologies, Student learning

Presenting Author:Veera Kallunki, University of Helsinki, Finland; **Co-Author:**Marianne Vivitsou, University of Helsinki, Finland; **Co-Author:**Hannele Niemi, University of Helsinki, Finland

In this presentation a new tool for analyzing the learning outcomes of digital storytelling is discussed. Digital storytelling - a rapidly generalizing educational pedagogy - has lacked concrete evaluation tools that can be used in teaching and research. Digital storytelling is a pedagogy that connects online technologies and storytelling, making it possible for students to tell their own story relating to the topic to be learned. The pedagogy has been shown to have positive effects on learning in many school subjects, and is reported to promote twenty-first century skills and student engagement. However, although the positive effects of digital storytelling are widely known, further research needs to be done on the reaching of learning outcomes through the use of digital storytelling in teaching. The new perspective offered in this presentation is to evaluate the learning outcomes by reviewing the output itself, the student-generated digital story. In this presentation the findings for the research question, "How can the digital story be evaluated and what kind of aspects should be taken into account in evaluation?", are discussed. Results are based on a design research where the evaluation rubric was created by utilizing theoretical perspectives of learning and digital storytelling, as well as a set of student-generated digital stories as an empirical data bank. The tool that takes into account multiple perspectives of learning, such as "students' storytelling skills", "their cognitive domain of learning", "social skills and digital competence" can be utilized as an evaluation tool both in schools and in research.

How do academics conceptualise and assess engagement? A review of classroom engagement measures

Keywords: Assessment methods and tools, Higher education, Motivation, Social aspects of learning and teaching

Presenting Author:Joanna Tai, Deakin University, Australia; **Co-Author:**Rola Ajjawi, Deakin University, Australia

Conceptualisations of student engagement, in the literature, have progressed from early ideas focussing on the actions of students, to more complex theoretical understandings of what an engaged student might do, feel, belong to, and be: an holistic view of engagement. National assessments of student engagement in higher education exist largely in a survey format, measuring overall engagement with the university and course they are studying. However, we know less about how individual teaching academics currently conceptualise student engagement as compared to theoretical models of

engagement, and national surveys of student engagement. Since they are the “front line” in engaging students, an understanding of academics’ conceptualisations of student engagement could aid in identifying strategies to improve student engagement. Through analysing the tools that classroom educators use to assess engagement, we can better understand their underlying understandings of student engagement. We therefore conducted a review of the literature to identify the range of engagement assessments classroom educators use within higher education contexts. Databases were searched for studies of classroom engagement. A variety of recent methods to assess engagement were analysed. While most consist of a survey focussing on behavioural aspects of engagement, some also contain emotional engagement items. One study also used teacher observations and photographs of the classroom to assess engagement. Published accounts indicate that academics’ conceptualisations of student engagement are still largely behavioural. Holistic conceptions of engagement should be encouraged to promote students’ wellbeing and better learning experiences within higher education.

Assessing self-reflections in medical education using Comparative Judgement

Keywords: Assessment methods and tools, Competencies, Higher education, Quantitative methods

Presenting Author: Liesje Coertjens, Université catholique de Louvain (UCL), Belgium; **Co-Author:** Marije Lesterhuis, University of Antwerp, Belgium; **Co-Author:** Benedicte De Winter, University of Antwerp, Belgium; **Co-Author:** Sven De Maeyer, University of Antwerp, Belgium; **Co-Author:** Nele Michels, University of Antwerp, Belgium

To assess students’ self-reflections in the medical domain, rubrics are commonly used. Recently, however, a new method to evaluate products from performance assessment has been introduced, Comparative Judgment (CJ). The CJ method is based on the assumption that people are able to compare two performances more easily and reliably than assigning a score to a single one. This method has however not been implemented in the domain of medical education. The present study therefore evaluates how the reliability level evolves using this method and how the rank-order obtained relates to the rank-order obtained using rubric ratings. Twenty-two self-reflections were assessed by a group of nine raters using CJ. These were compared by the ratings of two raters who used rubrics. Results indicate that a reliability level of 0.70 is obtained after ten comparisons per self-reflections. With twenty comparisons per self-reflection, this augments to a reliability level of 0.78. The rank-order using CJ correlates strongly with the rank-order using rubrics rating.

Using comparative judgement for peer assessment

Keywords: Assessment methods and tools, Competencies, Higher education, Mixed-method research

Presenting Author: Maarten Goossens, University of Antwerp, Belgium; **Co-Author:** Marije Lesterhuis, University of Antwerp, Belgium; **Co-Author:** Renske Bouwer, University of Antwerp, Belgium; **Co-Author:** Roos Van Gasse, University of Antwerp, Belgium; **Co-Author:** Sven De Maeyer, universitiy Antwerp, Belgium

Peer assessment has its educational merits but questions can be asked whether it generate reliable and valid scores. Literature suggest that traditional scoring methods can’t. A promising new method is comparative judgement (CJ), wherein judges choose the best of two presented tasks in light of a certain competence. Research indicates positive results using CJ as a peer assessment method. In this study 27 students and 4 teachers judged separately the 27 ERD’s of the students and provided each ERD scheme with feedback. Quantitative analyses resulted in reliabilities of the rank-orders of .76 (teachers) and .79 (students) and a spearman rank correlation between the two ranks of .58 ($p < 0.001$) suggesting a poor shared vision of students and teachers. Qualitative analysis of the feedback however showed students were misguided by irrelevant features of the task such as background color. Excluding two task based on the qualitative analysis resulted in a spearman rank correlation between the two ranks of .76 ($p < 0.001$) suggesting these two ERD schemes cause the low initial spearman rank-correlation. CJ shows to be able to measure competences in a reliable way. Furthermore, in terms of validity we can conclude that peers and teachers have an overall shared vision on the competence but that students generally pay more attention to and can be misguided by irrelevant characteristics of a task. Special instructions for students are necessary to learn them to see through unimportant features of the task.

Session P 14

2 September 2017 08:45 - 10:15

Pinni A - A1081

Single Paper

Teaching and Teacher Education

Teaching and Teacher Education - H

Keywords: Attitudes and beliefs, Bilingual education, Educational Technology, Language (Foreign and second), Pre-service teacher education, Primary education, Quantitative methods, Secondary education, Social interaction, Survey Research, Teacher Professional Development, Teaching approaches

Interest group: SIG 11 - Teaching and Teacher Education

Chairperson: Ralph Schumacher, ETH Zurich, Switzerland

Teachers’ perceived professional Space and their Agency

Keywords: Attitudes and beliefs, Secondary education, Teacher Professional Development, Teaching approaches

Presenting Author: Helma Oolbekkink-Marchand, Radboud University Nijmegen, Netherlands; **Co-Author:** Linor Hadar,

University of Haifa, Faculty of Education, Israel; **Co-Author:**Kari Smith, Norwegian University of Science and Technology, Norway

In order to increase student performance, governments increasingly stress the importance of standardization for teaching which is seen as a threat to teachers' professionalism. In this small-scale study we investigated the way teachers use their professional space in these changing circumstances. We studied eighteen cases of secondary education teachers in-depth, using observations, interviews, and storylines. Our analyses revealed two types of trajectories which can be characterized by *bounded* and *contested* agency. In both trajectories the importance of personal factors and environmental factors were acknowledged. Insights into the relation between perceived space and agency can promote our understanding of teacher professionalism.

Practitioners Training Needs for CLIL Teaching and Implementation: the Stakeholders Perspective

Keywords: Bilingual education, Language (Foreign and second), Pre-service teacher education, Primary education

Presenting Author:Laura Pons Seguí, University of Barcelona, Spain

The encouragement and implementation of innovative practices has sometimes preceded the provision of specific qualification for teachers. This is the case of Content and Language Integrated Learning (CLIL) implementation across European regions. Specifically, this is the case of Catalonia, a Spanish region. The study presented here is part of a larger project that aims at identifying CLIL primary teachers' needs for CLIL teaching and implementation to design a training proposal. More concretely, this communication aims at comparing stakeholders perceptions of CLIL primary teachers training needs for the implementation and development of a CLIL Project in schools. The data collection instruments have been questionnaires and semi-structured interviews. Quantitative and qualitative measures have been used to analyze similarities and differences among pre- and in-service teachers, school principals, CLIL trainers, education inspectors and CLIL coordinators. The results of this comparison show that all stakeholders report considerable training needs for language and methodological competence. Nevertheless, training needs vary across groups depending on different factors: previous training and experience as CLIL teacher and the role occupied in the CLIL project among others. The overall results offer some insight on the aspects pre- and in-service training should focus on in order to develop CLIL teachers' competencies, assure CLIL project sustainability and continuity.

The beginning teachers' support network: An important ingredient in the recipe of job satisfaction?

Keywords: Primary education, Quantitative methods, Social interaction, Survey Research

Presenting Author:Laura Monique Thomas, Ghent University, Belgium; **Co-Author:**Ruben Vanderlinde, Ghent University, Belgium; **Co-Author:**Melissa Tuytens, Ghent University, Belgium; **Co-Author:**Geert Devos, Ghent University, Belgium; **Co-Author:**Geert Kelchtermans, University of Leuven, Belgium

A considerable number of beginning teachers leave the teaching profession within the first years of practice. Although the importance of a supportive school team in preventing teachers' early exit is often stressed, research investigating this phenomenon using a network perspective is scarce. Therefore, and to refine theory development on the induction period, the present study explores beginning primary school teachers' support networks in relation to job satisfaction. To meet this objective, an innovative network approach (i.e. social network analysis) is used. Results regarding beginning teachers' career path in their first year after graduation, the composition of their school support networks, and the potential of those networks for their job satisfaction, are discussed.

Teacher identity, beliefs and technology-related well-being

Keywords: Educational Technology, Quantitative methods, Survey Research, Teacher Professional Development

Presenting Author:Antti Syvänen, University of Tampere, Finland; **Co-Author:**Jaana-Piia Mäkinen, University of Tampere, Finland, Finland

The accelerating digitization of society has resulted in a demand to large scale implementation of ICT in teaching. Also the current changes in curriculum policies reflect this. We suggest that the demand to increase the educational use of ICT may cause technostress to teachers, which can be defined as a specific type of work stress associated with the use of technology at work. We will present findings from two empirical datasets that explore teachers technology-related well-being and factors predicting it. Study 1 (n = 2,741) found the key predictors of the technostress were ICT competence, the concordance of the educational use of ICT with the teaching style, school support, and attitudes to the educational use of ICT. Study 2 (n = 183) examines some of these found factors, further exploring relationship between well-being and professional identity.

Session P 15

2 September 2017 08:45 - 10:15

Main Building A - A32

Single Paper

Assessment and Evaluation, Teaching and Teacher Education

Teaching and Teacher Education - I

Keywords: Assessment methods and tools, Attitudes and beliefs, Competencies, Cooperative / collaborative learning, E-learning / Online learning, Educational Technology, Higher education, Language (Foreign and second), Pre-service teacher

education, Quantitative methods, Teaching approaches, Video analysis

Interest group: SIG 11 - Teaching and Teacher Education

Chairperson: Elsa Eiriksdottir, University of Iceland, Iceland

Transforming the classroom experience for trainee teachers

Keywords: Cooperative / collaborative learning, E-learning / Online learning, Pre-service teacher education, Teaching approaches

Presenting Author: Miguel Nussbaum, Pontificia Universidad Católica de Chile, Chile; **Co-Author:** Camila Barahona, Pontificia Universidad Católica de Chile, Chile

When transforming the classroom experience the aim should be to free up class time to focus on practical activities. In the proposed flipped classroom strategy, students cover traditional classroom content through short videos, followed by formative assessment. Formative assessment also provides a space for developing critical thinking by combining learning objectives with higher-order thinking skills. The formative assessment system generates a report on the student performance, that allows the teacher to interact with the students by recalling and analyzing the detected weaknesses. In a final collaborative stage student solve problems by taking into account their peer's point of view.

Future teachers' learning gains in the field of German as a second language

Keywords: Competencies, Higher education, Language (Foreign and second), Pre-service teacher education

Presenting Author: Jennifer Paetsch, University of Bamberg, Germany; **Co-Author:** Fränze Sophie Wagner, Humboldt-Universität zu Berlin, Germany; **Co-Author:** Annkathrin Darsow, Humboldt-University Berlin, Germany

Language support for multilingual learners plays a major role in classrooms today. In Germany, teacher education includes opportunities to learn (OTL) in the field of German as a second language (GSL) which aim at enabling future teachers to support second-language learners in their skill development. The present study examines the relationship between future teachers' GSL learning gains and OTL within the framework of the Berlin GSL-training. Data was collected in the context of the project *Sprachen-Bilden-Chancen: Innovationen für das Berliner Lehramt* summer 2015. The sample consists of 108 Bachelor and 72 Master students who study different subjects at different universities in Berlin. Students showed significantly higher skills after attending GSL-training. Moreover, there was a significant relationship between the students' self-reported OTL and their learning gains in the DaZKom-test. To test our assumption, that differences in the GSL competencies of students who attended the GSL-training and those who did not are mediated by OTL, we will specify a mediation model in further analysis.

Measuring preservice teachers' professional vision of inclusive education: videography instrument

Keywords: Assessment methods and tools, Pre-service teacher education, Quantitative methods, Video analysis

Presenting Author: Karolien Keppens, Ghent University, Belgium; **Co-Author:** Ruben Vanderlinde, Ghent University, Belgium

Globally, schools and teachers are facing a growing diversity in student populations, which is reflected in worldwide educational policies to implement more inclusive learning environments. According to the literature, pre-service teachers need to be supported in their future role as facilitators of inclusion. As a consequence, pre-service teachers should be able to recognize and interpret effective teaching strategies in dealing with student diversity. This is conceptualized by Stürmer, Könings and Seidel (2013) as professional vision. In assessing professional vision on a large scale, the use of video has become a prominent tool. One way to study professional vision through video is the method of comparative judgement. However, comparative judgement has not yet been applied to study pre-service teachers' professional vision through video. Therefore, this study aims to develop a reliable and valid video-based comparative judgement instrument to measure pre-service teachers' professional vision of inclusive classrooms in a standardized way. This paper describes the development of the instrument along with two validation studies to inquire the validity of the instrument. The first study is an expert study (n=45) investigating whether the selected video clips are discernible examples of inclusive classrooms. The second study - a pilot study (n=100) - investigates whether our model of professional vision fits the data generated by our measure (e.g. comparative judgement), and whether the videoclips do not involve too much complexity. Results of both studies confirm the validity of the instrument to measure pre-service teachers' professional vision of inclusive classrooms in a standardized way.

Pre-service Teachers' TPACK and Intentions to Use ICT in Teaching

Keywords: Attitudes and beliefs, Competencies, Educational Technology, Pre-service teacher education

Presenting Author: Jari Kukkonen, University of Eastern Finland, Finland; **Co-Author:** Teemu Valtonen, University of Eastern Finland, Finland; **Co-Author:** Erkko Sointu, University of Eastern Finland, Finland

Previous research suggests that teachers' knowledge and skills should be one strong predictor of teachers' intention to use ICT in education. For testing this, we are combining technological pedagogical knowledge (TPACK) and intentions to use ICT for teaching in the Theory of Planned Behaviour (TPB). In this study, first year pre-service teachers' intentions to use ICT in education was investigated. Among the target group of 589 first year pre-service teachers from three universities in Finland, attitudes were strongly positively related with the intention to use ICT, but the skills measured with TPACK21 and interestingly self-efficacy were not in positive relation to behavioural intentions to use ICT. However, the target group was first-year teacher students and the result may indicate that the recently started students have not gained the knowledge and

skills (TPACK) as well as not gained experiences enforcing self-efficacy related to teaching with ICT.

Session P 16

2 September 2017 08:45 - 10:15

Main Building D - D11

Single Paper

Motivational, Social and Affective Processes, Teaching and Teacher Education

Motivation, Attitudes and Beliefs

Keywords: Attitudes and beliefs, Emotion and affect, Higher education, Motivation, Motivation and emotion, Neuroscience, Pre-service teacher education, Primary education, Quantitative methods, Science education, Self-regulation, Survey Research, Teacher Professional Development

Interest group: SIG 08 - Motivation and Emotion, SIG 10 - Social Interaction in Learning and Instruction

Chairperson: Baerbel Fuerstenau, TU Dresden, Germany

'I love to teach them about my subject': Starting preservice-teachers motives to teach.

Keywords: Higher education, Motivation, Pre-service teacher education, Teacher Professional Development

Presenting Author:Marjon Fokkens-Bruinsma, University of Groningen, Netherlands; **Co-Author:**Ellen Jansen, University of Groningen, Netherlands; **Co-Author:**Els van Rooij, University of Groningen, Netherlands; **Co-Author:**Esther Canrinus, University of Oslo, Faculty of Education, Norway

This study describes the first findings of a pilot study in which a developmental intake assessment instrument is implemented. The instrument allows us to determine students' basic competences, beliefs and needs and provides us with possibilities to better coach students throughout our teacher education programme. In this paper, we focus on the first part of the instrument, which contains questions about previous experiences that are relevant to teaching, more specifically on the reasons that preservice teachers have to teach and how the skills they already possess could benefit the students they teach. Data were collected in a Dutch first-grade teacher education programme in February 2016. 87 preservice teachers completed the assessment. Students were asked to explain why they would like to teach and how their skills could benefit the students they were going to teach. All data were coded in terms of a) prior teaching and learning experiences, b) perceptions of the task, c) perceptions of one's abilities, d) values, and e) teaching as a fallback career, and were then labeled into adaptive versus maladaptive motives. The most prevalent motive among our respondents was the desire to transfer knowledge (25%), closely followed by the love for the subject domain (22%). Interestingly, all motives that were frequently mentioned were adaptive motives. In contrast with other studies, in our study the desire to transfer knowledge was the most important motive for applying for the teacher education programme.

Measuring Primary Children's Images of and Attitude toward Curiosity

Keywords: Attitudes and beliefs, Primary education, Science education, Survey Research

Presenting Author:Tim Post, University of Twente, Netherlands; **Co-Author:**Juliette Walma van der Molen, University of Twente, Netherlands

This paper presents the results of a study to validate a questionnaire that measures primary children's images of and attitudes toward curiosity (the CIAC questionnaire). Many policy documents and scientific studies on 21st-century learning advocate the importance of stimulating children's curiosity. However, research shows that in most classrooms little opportunity is given to children's wonderment and questioning behaviour. We sought to bridge that gap by focussing on children's images of and attitude toward curiosity, rather than their curious behaviour. In our view, children's curious behaviour will only be cultivated by a positive classroom climate in which children value the epistemic importance of asking questions, derive pleasure from their questioning behaviour, and feel that their epistemic questions are appreciated by their teachers. To measure these images and attitudes validly and reliably, we developed and tested a new measurement instrument. Based on a literature review on attitude, curiosity, and 21st-century learning, we developed a framework that describes the underlying components of children's images of curiosity (i.e., social vs. epistemic images) and their attitudes toward curiosity (e.g., perceived importance of curiosity, their self-efficacy). Subsequently, these components were translated into nine scales that comprise the CIAC. Results of a validation study among 737 children (age 8-13), using factor analyses, largely confirmed the factor structures of the image and attitude scales and showed good convergent and discriminant validity. These results will be presented, including the results of a correlational study that investigated potential differences between subgroups of children in the sample.

Subtypes of emotion regulation: exploring patterns in classroom behaviour

Keywords: Emotion and affect, Neuroscience, Primary education, Self-regulation

Presenting Author:Lysandra Sinclair-Harding, University of Cambridge, United Kingdom; **Co-Author:**David Whitebread, University of Cambridge, United Kingdom

Emotion regulation describes the ability to influence the experience and expression of affect. Adaptive ER contributes to healthy development, social competence and academic success (Kochanska, Murray & Harlan, 2000). This study investigated emotional reactivity and regulation in middle childhood. One hundred and twenty-eight children were recruited from five UK primary schools. From within their school setting, participant sensitivity to emotion-eliciting events were

recorded using skin conductance data by ambulatory technology, whilst age-group paired children performed two LEGO construction tasks. Observed behaviours were video-recorded and coded to establish regulatory tendencies. These were compared to self-reports of emotion regulation and teacher-reports of emotion and behavioural strengths and difficulties. Iterative partitioning cluster analysis methods were used to identify four regulatory profiles. 1) The 'Adaptive' cluster: were prosocial, had positive self-perceptions of their ability to regulate their emotions, frequently expressed emotion and employed a range of positive regulation strategies. 2) The 'Maladaptive' group had significant problems relating to their peers., displayed a range of behavioural problems in class and had little self-confidence in their ability to regulate their emotions. They used few positive regulatory strategies and expressed little emotionality. 3) The 'Reactive' cluster was physiologically sensitive and expressed very little emotion. They displayed inattentive/hyperactive symptoms in class. Finally, 4) the 'Distracted' group were generally prosocial and emotionally expressive. They relied upon distraction strategies to regulate their emotions. These results indicate four meaningful profiles that could support the identification of vulnerable individuals for positive school-based intervention and support.

Do private uplifts and hassles affect teachers' emotional exhaustion? Results from a diary study

Keywords: Emotion and affect, Quantitative methods, Teacher Professional Development, Motivation and emotion

Presenting Author:Juliane Schmidt, Leibniz Institute for Science and Mathematics Education (IPN), Germany; **Co-**

Author:Uta Klusmann, Leibniz Institute for Science and Mathematics Education (IPN), Germany; **Co-Author:**Oliver Lüdtke, Leibniz-Institute for Science and Mathematics Education (IPN) AND Centre for International Student Assessment, Germany

Recent studies showed that teacher burnout has a significant impact on their performance at school and on their students' achievement (Klusmann et al., 2016; Shen et al., 2015). Burnout is defined as a multidimensional syndrome that is influenced by factors that are located in the work environment of an individual. However, whether burnout is indeed a work-related phenomenon that is unrelated to private resources and stressors has not yet been systematically investigated. Therefore, the aim of the current study was to examine whether daily *private* uplifts and hassles are related to emotional exhaustion—the core component of burnout—beyond *work-related* uplifts and hassles. In a diary study over a course of 14 consecutive days, 141 beginning teachers provided information about their daily work-related and private uplifts and hassles as well as about their daily emotional exhaustion. Results showed, first, that daily emotional exhaustion was negatively related to daily work-related uplifts and positively linked with daily work-related hassles. Second, daily private uplifts had a statistically significant negative association with daily emotional exhaustion that went beyond the influence of work-related uplifts and hassles, whereas private hassles were not statistically significantly related to teachers' emotional exhaustion. However, further analyses showed that the association between private uplifts and emotional exhaustion was not robust. Therefore, private uplifts and hassles seem to be not relevant for emotional exhaustion. Therefore, future research might rather focus on work-related factors when developing approaches to reduce or prevent teacher burnout.

Session P 17

2 September 2017 08:45 - 10:15

Linna - Väinö Linna (K104)

Single Paper

Motivational, Social and Affective Processes

Motivation and Emotion - G

Keywords: At-risk students, Attitudes and beliefs, Educational Psychology, Emotion and affect, Inquiry learning, Lifelong learning, Mathematics, Motivation and emotion, Out-of-school learning, Primary education, Student learning, Technology

Interest group: SIG 08 - Motivation and Emotion

Chairperson: Sharon Nichols, University of Texas at San Antonio, United States

From School is Cool to We don't Need No Education: Predictors of School Alienation

Keywords: At-risk students, Attitudes and beliefs, Lifelong learning, Motivation and emotion

Presenting Author:Kaja Marcin, University of Bern, Switzerland; **Co-Author:**Tina Hascher, University of Bern, Switzerland

This cross-sectional study explores differences in the prevalence of school alienation in different school settings, i.e. between primary and secondary schools and the different school tracks in the Swiss Canton of Bern. It investigates the relation between various predictor variables at individual- and classroom-level and the two outcome variables alienation from teacher and alienation from learning. It aims at describing the educational settings of primary and secondary schools with regard to how well they support the young adolescent students in fulfilling their developmental needs and how this relates to the development of school alienation. The sample includes students from Swiss primary schools in grade 4 (N = 486) and secondary schools in grade 7 (N = 550). Data was collected using a standardized questionnaire and analyzed applying descriptive hierarchical linear regression analysis. Separate multilevel models were developed for the primary and the secondary school samples, to compare the predictive strength of contextual factors on alienation from teachers and learning at school in the different educational settings. **Keywords:** school alienation, basic needs, attitudes, emotion, motivation

Control and value appraisals predict enjoyment and boredom in primary school children

Keywords: Emotion and affect, Mathematics, Primary education, Motivation and emotion

Presenting Author:Dave Putwain, Liverpool John Moores University, United Kingdom; **Co-Author:**Wendy Symes, University of Munich, Germany; **Co-Author:**Sandra Becker, University of Munich, Germany; **Co-Author:**Reinhard Pekrun, Ludwig-Maximilians-Universität (LMU), Germany

According to control-value theory (CVT), activity and outcome-related control beliefs and subjective values give rise to specific achievement emotions. Enjoyment is proposed to arise from positive subjective value accompanied by strong control. Boredom is proposed to arise principally from lack of subjective value, and may also be a function of very low or high control. We tested these propositions in a sample of primary school students, a population that has not been extensively studied in relation to CVT. Furthermore, we included different types of control beliefs (action-control and action-outcome beliefs) and subjective values (intrinsic, attainment, and utility). Data were collected from 579 primary school students over three waves (emotions at Time 1 and Time 3, control and value appraisals at Time 2) and analysed in a series of structural equation models. Enjoyment was predicted by higher intrinsic, attainment, and utility value. Only attainment value, however, interacted with control beliefs; higher action-control and outcome-control beliefs amplified the positive relationship between attainment value and enjoyment. Positive utility value and control beliefs predicted higher enjoyment in an additive fashion. Control beliefs did not significantly predict enjoyment in the models with intrinsic value. Boredom was predicted by lower intrinsic, attainment, and utility value. Intrinsic value interacted with action-control beliefs; higher action-control beliefs amplified the negative relationship between intrinsic value and boredom. These results support the role of control and value appraisals as antecedents of learning-related emotions and highlight the importance of attending to different types of subjective values.

Are we alienating our digitally competent students? Consequences for academic well-being.

Keywords: Educational Psychology, Out-of-school learning, Technology, Motivation and emotion

Presenting Author:Lauri Hietajärvi, University of Helsinki, Finland; **Co-Author:**Katariina Salmela-Aro, Helsinki Collegium for Advanced Studies, Finland; **Co-Author:**Kai Hakkarainen, University of Helsinki, Finland; **Co-Author:**Kirsti Lonka, University of Helsinki, Finland

This study examines how students' digital skills are associated with academic well-being in two cohorts. It has been proposed that the conventional school system is alienating students with advanced digital skills. More precisely, as these skills are mainly developed out-of-school, the more digitally competent students might be less engaged, value school less or experience burnout when being taught the "traditional" way. However, studies testing this hypothesis are scarce. The data was collected during semester 2013-14 from 20 comprehensive (7th grade, N=1324, F=66.5%) and 19 high schools (1st year, N=1318, F=52.4%) in Helsinki. The questionnaires assessed self-reported digital skills (productive, creative, technical), schoolwork engagement, lack of school value, and school burnout. Structural equation models were specified in which the mean scores of the well-being outcomes were regressed on the skills as latent factors. The models fit the data acceptably. In comprehensive schools productive skills were related to higher school value and lower burnout, whereas creative skills were related to higher burnout. Interestingly, in high school, productive skills were related to higher engagement and school value as well as lower burnout. In turn, creative skills were related to lower engagement and school value as well as higher burnout. Surprisingly, technical skills were related to lower school burnout in high school. These results suggest that, especially in high schools, being creatively digitally competent is related to lower academic well-being. We will further analyze the developmental dynamics between these phenomena and the longitudinal results will be presented. Pedagogical and theoretical implications will be discussed.

Students' engagement in student-centered versus teacher-centered STEM learning environments

Keywords: Emotion and affect, Inquiry learning, Student learning, Motivation and emotion

Presenting Author:Annemie Struyf, University of Antwerp, Belgium; **Co-Author:**Haydée De Loof, University of Antwerp, Belgium; **Co-Author:**Jelle Boeve-de Pauw, University of Antwerp, Belgium; **Co-Author:**Peter Van Petegem, University of Antwerp, Belgium

Over the past decade, the issue of young peoples' declining interest and engagement in STEM (Science, Technology, Engineering and Mathematics) has been a key theme in science education research and policy. A number of pedagogical strategies to foster student's interest and engagement in STEM have been taken. One approach is the integrated STEM education approach, where students need to connect the different components of STEM through real world applications and project-based work. This approach is more student centered and invites young people to be active learners. In the current paper, we investigate the impact of an integrated more student-centered STEM learning environment, versus a teacher-centered STEM learning environment, on students' behavioral and emotional engagement. Observations and focus groups were done in six classes of six Flemish secondary schools (8th grade) between January and March 2016. Different STEM learning environments and students' engagement were investigated. The findings in the current paper show that the implementation of an integrated student-centered STEM approach is effective to get students more behaviorally and emotionally engaged. Further longitudinal research is needed to investigate if such an approach additionally leads to more STEM literate students and more students enrolling in higher STEM education. _

Teacher Professional Development - E

Keywords: Cognitive skills, Developmental processes, Early childhood education, Educational policy, Higher education, In-service teacher education, Mathematics, Pre-service teacher education, Qualitative methods, Reasoning, Teacher Professional Development, Teaching / instruction

Interest group: SIG 11 - Teaching and Teacher Education

Chairperson: Caroline Mansfield, Murdoch University, Australia

Who does take part in which kind of teacher professional development?

Keywords: Educational policy, In-service teacher education, Mathematics, Teacher Professional Development

Presenting Author: Michael Besser, Leuphana University of Lüneburg, Germany; **Co-Author:** Dominik Leiss, Leuphana University of Lüneburg, Germany

In 2013, overall 67 mathematics teachers participated in teacher professional development (TPD) courses either dealing with formative assessment (TPD-FA) or not dealing with formative assessment but with general ideas about competency oriented mathematics (TPD-NFA). Based on all mathematics teachers' prior beliefs, interest and self-efficacy concerning formative assessment, clusters of teachers are identified by hierarchical cluster analysis. Results of this cluster analysis point out: (1) There exists a cluster of teachers having high self-efficacy, low beliefs, and low interest concerning formative assessment. These teachers (2) mainly participate in teacher professional development not dealing with formative assessment (TPD-NFA), but (3) do only have little pedagogical content knowledge (PCK) concerning formative assessment. Since formative assessment is said to be crucial for successful teaching, these findings have to be thought about carefully.

Developmental tasks for kindergarten teachers at their career start in kindergartens

Keywords: Developmental processes, Early childhood education, Qualitative methods, Teacher Professional Development

Presenting Author: Sabine Leineweber, University of Applied Sciences and Arts Northwestern Switzerland, Switzerland

Kindergarten teachers in Germany are a new professional group. They have undergone a newly designed teacher training for the first time at university level especially for working in the field of Early Education and Care (ECEC). The graduates start their work in a kindergarten under unusual conditions: there is neither a professional profile for their orientation nor even a clear description of the professional work they are supposed to execute. So they will have to develop their own specific professional profile based on what they have learned in their university courses and do their work accordingly. Here they have to meet a multitude of expectations. The presented study analyses the career start which is highly relevant for the professional. It analyses what kind of requirements they are about to meet and how they cope with them. The entering of the professional field can be understood as an implementation of an innovation. Thus theories of innovation and transfer constitute the frame of this study (Bormann 2011). The study follows an approach of biographically oriented professionalization. The theoretical frame is the concept of developmental tasks and the model of professionalization (Košinár 2014). Subject of this longitudinal study are the first two cohorts of university trained kindergarten teachers during their career start. Based on guideline-interviews and through content analysis a model of developmental tasks for the career start of kindergarten teachers has been worked out. By contrasting case-studies I analysed three different modes of dealing with requirements and identified institutional factors of influence.

Individual characteristics of teacher candidates: Re-examining the “negative selection” hypothesis

Keywords: Cognitive skills, Educational policy, Higher education, Teacher Professional Development

Presenting Author: Julia-Carolin Brachem, DZHW - German Centre for Research on Higher Education and Science Studies, Germany; **Co-Author:** Hildegard Schaeper, DZHW - German Centre for Research on Higher Education and Science Studies, Germany

Teachers' individual characteristics are considered to be relevant for teachers' professional competencies, successful teaching, the development of students' competencies, and student achievement.

Previous research regarding the choice between teacher education and other study programmes and the selection within teacher education has mainly considered cognitive, interest, personality, and sociodemographic aspects, highlighting, amongst other things, that the teaching profession attracts people with rather unfavourable characteristics (“negative selection” hypothesis).

Our study contributes to this body of research, addressing the questions (1) whether students' individual characteristics, such as cognitive abilities, vocational interests, and personality, have an effect on the choice of a teacher education programme or another study programme (2) and on the choice of a specific teaching degree, differentiating STEM and non-STEM majors.

Going beyond existing studies, we analyse a larger sample and distinguish simultaneously between teaching degree and field of study. We use data from the Starting Cohort 5 (First Year Students) of the German National Educational Panel Study (NEPS), which includes an oversampling of teacher education students (telephone interviews 2011/2012, N = 6,476).

Our empirical results partly support and partly contradict the “negative selection” hypothesis. They lead to the conclusion that it is crucial for education policy and players involved in teacher education to take into account the heterogeneity among teacher candidates in terms of the academic level of teacher education programmes and the subjects chosen.

Preservice Math Teachers' Implementation of Tasks and Links with Mathematical Knowledge for Teaching

Keywords: Mathematics, Pre-service teacher education, Reasoning, Teaching / instruction

Presenting Author: Engin Ader, Bogazici University, Turkey

The aim of this study is to investigate preservice mathematics teachers' quality of implementation of tasks and its links with mathematical knowledge for teaching (MKT), both in their field experiences in middle school classrooms and in microteaching experiences, within a course at university. The sample consists of 40 (37 female, 3 male) senior preservice middle school mathematics teachers at a university in Turkey. As a measure of their mathematical knowledge for teaching, they took the Turkish translation of the primary TEDS-M released items test. Quality of implementation of mathematics tasks is conceptualised in accordance with Stein and Kaufman's (2010) triadic framework where high quality implementation is accepted as maintaining the cognitive demand throughout the implementation of tasks, attending to students' thinking and establishing mathematical reasoning as the intellectual authority. Data regarding teacher candidates' implementation of tasks were collected using the Classroom Observation Coding Instrument (Stein & Kaufman, 2010). The comparisons between preservice teachers' quality of implementation of tasks in microteaching and practice teaching experiences did not show major differences. There were only significant differences in favour of preservice teachers' attending to students' thinking while teaching at middle school classroom settings. This is discussed to be in links with preservice teachers' perceptions about how realistic the context was. Teachers' MKT was not found to be related with any indicators of quality of implementation of tasks, in any of the experiences. Yet, the links of contextual factors and teacher knowledge with quality of task implementation, particularly attending to student thinking need to be further studied.

Session P 19

2 September 2017 08:45 - 10:15

Main Building A - A3

Single Paper

Motivational, Social and Affective Processes

Motivation and Emotion - H

Keywords: Achievement, Collaborative Learning, Educational Psychology, Instructional design, Language (L1/Standard Language), Mathematics, Motivation, Motivation and emotion, Parental involvement in learning, Social aspects of learning and teaching, Student learning, Teacher Effectiveness, Teaching / instruction

Interest group: SIG 08 - Motivation and Emotion

Chairperson: Thomas Cochrane, New Zealand

Mediating Role of Basic Needs: Parental Conditional Regard, Teacher Autonomy Support and Well-Being

Keywords: Educational Psychology, Motivation, Parental involvement in learning, Motivation and emotion

Presenting Author: Aysenur Alp, Middle East Technical University, Turkey; **Co-Author:** Aylin Koçak, Hacettepe University, Turkey; **Co-Author:** Athanasios Mouratidis, Hacettepe University, Turkey

Based on SDT (Ryan & Deci, 2000) several researchers have tried to uncover the contextual features that satisfy adolescents' psychological needs for autonomy, competence, and relatedness. In most of these studies however, researchers have mainly focused on one aspect of the social context, either the school or the family environment, and also focused on either the issue of need frustration or need satisfaction and their implications on ill-being or well-being, respectively. Therefore, in this study, we aimed to test whether adolescents' perceptions of parents' conditional negative regard (PCNR) and teachers' autonomy support (TAS) are associated with need satisfaction and need frustration which in turn are related to adolescents' life satisfaction and subjective stress. To test our hypothesis, we recruited 258 Turkish adolescents ($N = 258$, $M_{age} = 16.77$, $SD = 1.01$). Results of SEM showed that PCNR was positively related to need frustration which in turn was positively associated with adolescent's subjective stress and TAS was positively related to need satisfaction which in turn was positively associated with life satisfaction. These findings imply that while need frustration operates as a mediating mechanism between PCNR and subjective stress, need satisfaction functions as an intervening mechanism between TAS and life satisfaction. Therefore, future intervention programs which aim to increase adolescents' well-being should focus on diminishing PCNR and enhancing teachers' autonomy supported behaviors.

Learners' habitual social comparisons can hinder effective learning partner choice

Keywords: Collaborative Learning, Educational Psychology, Social aspects of learning and teaching, Student learning

Presenting Author: Josephine Neugebauer, University of Freiburg, Germany; **Co-Author:** Kai Sassenberg, Leibniz-Institut für Wissensmedien (IWM), Germany; **Co-Author:** Devin G. Ray, The School of Psychology, Aberdeen, United Kingdom

Students' achievement heavily depends on who they learn with and from in school. While learning with others students can easily become aware of differences between themselves and their learning partners. This awareness facilitates social comparisons between learners and can influence learners' behavior in collaborative learning. However, research on the influence of social comparisons on learning partner choices is lacking. Thus, we investigate how habitual and strategic

social comparison motives influence who students seek to learn with. Specifically, we propose that a predisposition to habitual social comparison (i.e., high Social Comparison Orientation) renders learners insensitive to the beneficial influence of strategic social comparison motives. Two studies were conducted with a total sample size of $N = 230$ university students. Participants completed web-based studies in which we assessed the influence of habitual and strategic social comparison motives on students' choice of learning partner for an upcoming learning task. Across both studies, we found that only participants who were not predisposed to habitual social comparison benefited from strategic social comparison motives. Thus, a habitual tendency towards social comparison appears to negate the beneficial effects of strategic social comparison motives when students choose their own learning partners. This finding joins a growing body of work documenting the importance and impact of habitual social comparison in the context of knowledge exchange between peers.

Dimensional Comparisons in Primary School: A Validation of the Generalized I/E Model

Keywords: Achievement, Language (L1/Standard Language), Mathematics, Motivation

Presenting Author: Christoph Niepel, University of Luxembourg, Luxembourg; **Co-Author:** Samuel Greiff, University of Luxembourg, Luxembourg; **Co-Author:** Ulrich Keller, University of Luxembourg, Luxembourg; **Co-Author:** Antoine Fischbach, University of Luxembourg, Luxembourg

The internal/external frame of reference model (I/E model) focuses on the impact of comparison effects on the formation of verbal and mathematics self-concepts. Thereby, the I/E model claims positive associations between achievement and academic self-concept within the same domain (social comparison effect) and negative relations across domains (dimensional comparison effect). The recently introduced generalized I/E model expands the focus of the I/E model to other domain-specific outcomes such as academic interest in different domains. Whereas the original I/E model can be considered as established in higher grades, research in primary school children is relatively scarce. The GI/E model was never tested in primary school to date. The present study therefore examined the relations between verbal and mathematics achievements on the one hand and corresponding domain-specific self-concepts (core of the I/E model) and interests (extension GI/E model) on the other hand in two large samples of 3,994 first-grade and 4,017 third-grade elementary school children in Luxembourg. For first-graders, we found evidence for social comparison effects in that achievement on the one hand and academic self-concept and interest on the other hand were positively related within the same domain. However, we did not find any evidence for dimensional comparison effects across domains. For third-graders, we found evidence for both effects. Accordingly, our results fully supported the assumptions of the GI/E model for third-graders but only partially for first-graders; findings were discussed in line with prior research on social and dimensional comparison effects.

The Relevance of Teachers' Autonomy Support at Work for Students' Perception of Instruction

Keywords: Instructional design, Motivation, Teacher Effectiveness, Teaching / instruction

Presenting Author: Barbara Otto, Ludwigsburg University of Education, Germany; **Co-Author:** Natalie Vannini, Goethe-Universität Frankfurt, Germany; **Co-Author:** Nir Madjar, School of Education, Bar-Ilan University, Israel

So far, little is known about the specific factors that have an impact on teachers' need supportive behavior in the classroom. Therefore, the current study aimed at investigating the specific role of teachers' autonomy support at work for students' perceptions of need supportive classroom instruction. In order to answer this research question data of 141 classes and their associated mathematics and German teachers were assessed. Students had to report on their perception of need supportive instruction in both subjects whereas their teachers had to indicate their level of perceived autonomy support at work. Data were analyzed by two-level Hierarchical Linear Modeling. The analyses revealed a significant effect of teachers' perceived autonomy support on students' perception of need supportive instruction in both subjects. The findings are discussed with regard to their practical implications.

Session P 20

2 September 2017 08:45 - 10:15

Virta - 112

Single Paper

Instructional Design

Instructional Design - D

Keywords: Communities of learners, Comprehension of text and graphics, Conversation / Discourse analysis, Educational Psychology, Experimental studies, Higher education, History, Instructional design, Learning analytics, Mathematics, Problem solving, Student learning

Interest group: SIG 06 - Instructional Design

Chairperson: Kati Keski-Mäenpää, University of Jyväskylä, Finland

How does the presentation of source information affect processing of multiple documents?

Keywords: Educational Psychology, Experimental studies, History, Instructional design

Presenting Author: Martin Merkt, Leibniz-Institut für Wissensmedien, Germany

In this experiment, we investigated how the presentation of source information affects learners' processing of multiple

documents. In particular, 123 participants worked on a task that asked them to explain differences between eight documents' coverage of the German Emergency Law. These differences were caused by the documents' origin that was pointed out to the participants in the source information. This source information was either presented in a block before or after all of the documents' contents, or it was presented in a more integrated fashion, either directly before or directly after the corresponding document, resulting in a 2x2-factorial between subject design. Controlling for historical thinking skills, we observed an interaction with regard to the participants' performance. More specifically, when presenting the source information integrated with the documents' contents, performance was better when the source information was presented before the respective documents' contents. In contrast, when the source information was presented in a block all at once, performance was better when the source information was presented after the documents' contents. This latter finding is explained with the assumption that learners mainly attend to source information if they are aware of conflict. When the source information was presented in a block before all of the contents, learners had no chance to be aware of the conflict while the source information was presented.

Investigating task difficulty and generativity on the learning effect of delayed instruction

Keywords: Experimental studies, Instructional design, Mathematics, Student learning

Presenting Author:Junsong Huang, National Institute of Education, Singapore; **Co-Author:**Rachel Lam, ETH Zurich, Switzerland; **Co-Author:**Manu Kapur, ETH Zurich, Switzerland

Past studies have shown that compared to problem-solving *after* receiving instruction, students who solve problems *before* receiving instruction (i.e., delayed instruction) attain better learning outcomes. However, the effect of delayed instruction was mainly examined using problem-solving as the generative task. We conducted two experimental studies to examine delayed instruction without involving problem-solving. Two characteristics of a generative task were manipulated: the degree of generativity (i.e., generating analogies - more generative vs evaluating given analogies - less generative), and the level of task difficulty (i.e., analogy between two-variable and three-variable algebraic word problems - more difficult vs analogy between two two-variable algebraic word problems - less difficult). In Study 1, participants independently generated two-variable problems from a given two-variable problem (SGA2-2), or evaluated pairs of two-variable problems given by teachers (TGA2-2). Both conditions were followed by an instruction on formulating algebraic equations for two-variable problems. Findings revealed that the TGA2-2 condition outperformed the SGA2-2 condition on the immediate posttest. In Study 2, the task difficulty level was higher. Participants independently generated three-variable problems from a given two-variable problem (SGA2-3), or evaluated pairs of two- and three-variable problems given by teachers (TGA2-3), followed by the same instruction as in Study 1. Findings revealed that the SGA2-3 condition outperformed the TGA2-3 condition on the immediate posttest. These findings suggest that a generative task's difficulty and generativity levels contribute to the boundary conditions that optimize delayed instruction for learning.

Do self-generated symbolic representations support performance in propositional logic items?

Keywords: Comprehension of text and graphics, Instructional design, Mathematics, Problem solving

Presenting Author:Sarah Malone, Saarland University, Germany; **Co-Author:**Natalie Ott, Saarland University, Germany; **Co-Author:**Markus Vogel, University of Education Heidelberg, Germany; **Co-Author:**Roland Bruenken, Saarland University, Germany

Learning and problem solving can be fostered in general by providing multiple representations (*multimedia effect*, Mayer, 2009). In addition, learners benefit even more from text and picture if they have created the pictures themselves by drawing while reading (*generative drawing effect*, Schmeck et al., 2014). The present study investigated, whether these effects can be replicated for multiple symbolic representations (text and formula). A 2x2 mixed design study was conducted with the between subjects-factor *representation generation* (demanded vs. not demanded) and the within subjects-factor *type of given representation* (text vs. formula). N=125 students, randomly assigned to one of the two groups, had to solve 30 problems from the field of propositional logic, either after having translated them into the missing representation (generation of text resp. formula demanded) or directly (generation of text resp. formula not demanded). One third of the problems was represented as a text and another third as a formula. The remaining served as control items and therefore, included both representations. Results show, that the participants performed by tendency better in those items that provided the problems in both representations, than if only one representation was given. Generating the missing representation did not have a fostering effect on problem solving.

Contrarily to generative drawing, representation generation seems not to be not beneficial, if a second symbolic representation has to be created. The multimedia effect for multiple symbolic representations could be confirmed, however, it is restricted to ready-made representations.

A Blended-Learning Higher Education Seminar with Learning Analytics Support

Keywords: Communities of learners, Conversation / Discourse analysis, Higher education, Learning analytics

Presenting Author:Nicolae Nistor, Ludwig-Maximilians-Universität (LMU), Germany; **Co-Author:**Mihai Dascalu, "Politehnica" University Bucharest, Romania; **Co-Author:**Larise Lucia Stavarache, "Politehnica" University Bucharest, Romania; **Co-Author:**Stefan Trausan-Matu, "Politehnica" University Bucharest, Romania

The use of online knowledge communities (OKCs) as learning environments, e.g., in higher education encounters two main issues: the learning guidance issue, and the newcomer integration issue. While the former can be solved by instructional design, the latter is still open and may be solved by Social Learning Analytics (SLA) support. This paper proposes B-LABS

(Blogs and Learning Analytics Based Seminar), a higher education seminar with a formal component as a face-to-face seminar, and an informal component comprising learning in OKCs. B-LABS was carried out during summer term 2016 at a large German university with a group of N = 65 undergraduate students. SLA tools were employed to select from the OKCs with adequate topics those with most intensive discussions. Based on questionnaire data and exam grades, the effects of OKC community responsiveness, participation in the seminar, and student demographics, on perceptions of the seminar, acceptance of blogs as learning environments, and cognitive seminar effects were assessed. The students successfully followed the B-LABS script, two thirds of the learning groups managing to initiate and sustain discussions with blogger OKCs. The learning outcome included students' insight in mathematics didactics and knowledge of OKC specific educational and psychological theories. Student acceptance of the learning environment was predicted by performance expectancy and perceived social influence. Future B-LABS tools development includes refining functions that identify expert performers in OKCs, and predict OKC newcomer integration likeliness.

Session P 21

2 September 2017 08:45 - 10:15

Pinni B - B1100

Single Paper

Teaching and Teacher Education

Teaching and Teacher Education - K

Keywords: Cognitive skills, Comparative studies, Conceptual change, Content analysis, Educational policy, Higher education, In-service teacher education, Interdisciplinary, Pre-service teacher education, Social aspects of learning and teaching, Teacher Professional Development, Teaching / instruction

Interest group: SIG 11 - Teaching and Teacher Education

Chairperson: Héctor Javier Pijera Díaz, University of Oulu, Finland

Using Statistics as a Way of Interpreting Social and Historical Events

Keywords: Interdisciplinary, Pre-service teacher education, Social aspects of learning and teaching, Teaching / instruction

Presenting Author: Zuhail Yilmaz, Yeditepe Üniversitesi, Turkey; **Co-Author:** Kübra Ergül, Yeditepe Üniversitesi, Turkey;

Co-Author: Gursu Asik, Bahcesehir University, Turkey

The statistics taught in schools should support students' ability to understand the world. This understanding entails being a reflective citizen who can utilize mathematical and statistical knowledge to explore social and historical events in the world with the aim of becoming more effective in managing ourselves and society. This study aims to realize this objective through connecting interdisciplinary subject areas such as history and geography with statistics. In this study, seven senior secondary mathematics education pre-service teachers (PTs) were presented with big historical events and issues (i.e. Hiroshima and Nagasaki, Battle of Gallipoli, etc.). Then, they analyzed the data related to the events through utilizing TinkerPlots software. Also, a blogger platform was used as a mean for sharing social reflections on these events with a connection to the statistical results gathered in the classroom. At the end, how these in-class statistics applications influence PTs' way of interpretation of social, historical and political life and how they reflected on their understanding of statistical concepts were reported.

Europeanisation in teacher education: Framing the mobility of European policies and practices

Keywords: Comparative studies, Content analysis, Educational policy, Teacher Professional Development

Presenting Author: Vasileios Symeonidis, University of Innsbruck, Austria; **Co-Author:** Christian Kraler, Teacher Education and School Research, Austria

This paper aims at presenting the complexities of analysing the ongoing process of Europeanisation in teacher education, providing a framework for mapping the mobility of European policies and practices related to the specific field. At first, a literature review and a content analysis of official EU policy documents will identify the key moments in which important political decisions have been taken with regard to the teachers and teacher education agenda in Europe, outlining the main characteristics of the relevant policies and practices as developed in the international policy sphere. The main actors involved in this process of Europeanisation and the dynamic relation of policy flows will then be described, in an effort to illustrate how Europeanisation works in the field of teacher education. Actor network theory (Latour, 2005; Law 2008; Fenwick and Edwards, 2010) enables us to map the main actors and interrelations involved in the recontextualisation of ideas, solutions and processes in teacher education. The findings of this study indicate that a linear model of policy implementation is not sufficient to describe the Europeanisation process in teacher education. Thus, a dynamic framework, which considers "uploading" policies (from national to EU level) as important as "downloading" them (from the EU to national level), is presented. The framework takes into consideration the dimensions of research, policy and practice in relation to predominant teacher education issues, helping us to move beyond the global-local dichotomy and towards a glocal approach (Caena, 2014).

Representing teachers' domain-specific conceptions of financial literacy by using concept maps

Keywords: Conceptual change, Content analysis, In-service teacher education, Teaching / instruction

Presenting Author: Seraina Leumann Sow, Swiss Federal Institute for Vocational Education and Training, Switzerland;

Co-Author: Carmela Aprea, Friedrich Schiller University Jena, Germany

In Switzerland, issues around money and financial matters are an integral component of the curricula in Vocational Education and Training (VET). However, the planned and implemented lessons are not only determined by curricula, but by multiple, complex and interrelated factors. One key factor are teachers' characteristics supporting (or hindering) targeted and successful learning and instruction processes. Particularly teachers' mental representations with respect to general or domain-specific aspects of teaching-related phenomena and processes play an important role. In contrast to other (e.g., mathematics or science), little is known about teacher's conceptions in the domain of economics in general and in the subdomain of financial literacy in particular. Hence, this study intends to describe and analyse content and structure of domain-specific conceptions of financial literacy of Swiss VET teachers applying the method of concept mapping for data collection. Results about contents show among others, that the following four main strands are fundamental: (1) budgeting and indebtedness, (2) consumer behaviour and the influence of the family, advertising and consumer requests, (3) salary and mandatory taxes as well as (4) financial institutions with the focus of asset building. Concerning the structure of the content-related conceptions, the concept maps present a mixed picture with regard to their extent, elaboration and organisation. The majority of the maps were portrayed rather integrated, the relations between the concepts were mainly labelled with accurate verbal explanations and few to no symbol types to express qualitatively different concepts and/or relations were used.

It's all about learning opportunity? The influence of learning opportunities on economic knowledge

Keywords: Cognitive skills, Comparative studies, Higher education, Teacher Professional Development

Presenting Author: Christin Siegfried, Goethe-Universität Frankfurt, Germany

Due to the unsatisfactory results of different studies focusing on economic competence of student in Germany, economic education became an important point within the political discussion of general education (Schumann, Oepke & Eberle, 2011). Economic acting is an essential part of everyday life. The financial and economic crisis is only one example that highlights the importance of economic competence (Schumann et al., 2011). Thus, in most school curricula, economic topics are already implemented (Marx, 2015). Despite this fact different studies found out, that the economic competence of students is still lacking (e.g. Retzmann et al., 2012). Therefore, the question is raised to what extent teacher themselves lack in economic competence. While different studies already have taken place to analyse economic knowledge of students, there are only few once focusing on economic knowledge of teachers. Due to this, data of three universities in the federal state of Hesse of students studying education of business administration and teacher students of the subject politics and economics was collected. Based on this data the following paper analyses the relationship of economic knowledge and its different predictors using a path analysis. Results show that there is a huge difference in economic knowledge of the participants, which can be mainly explained by the attendance of economic opportunities to learn.

Session P 22

2 September 2017 08:45 - 10:15

Pinni B - B3107

Single Paper

Educational Policy and Systems, Lifelong Learning

Workplace Learning

Keywords: Assessment methods and tools, Communities of practice, Informal learning, Mixed-method research, Quantitative methods, Reflection, Social interaction, Vocational education, Workplace learning

Interest group: SIG 14 - Learning and Professional Development

Chairperson: Marold Wosnitza, RWTH Aachen University, Germany

Feedback and learning from errors in the insurance industry

Keywords: Informal learning, Quantitative methods, Social interaction, Workplace learning

Presenting Author: Regina Mulder, University of Regensburg, Germany; **Co-Author:** Veronika Anselmann, University of Regensburg, Germany

Feedback on errors often aims on avoiding making similar errors. Less is known about how feedback after errors can influence learning of employees at the workplace. Learning from errors can be defined as a subcategory of non-formal experiential learning. In our study we focus on different types of errors: knowledge and rule based errors (KRE) and slips and lapses (SL). The aim is to find out if the perceived feedback culture and the individual feedback orientation influences learning activities after errors at work. We conducted a cross-sectional questionnaire survey in the insurance industry ($N=154$). We used the Critical Incident Technique and asked participants to describe a concrete error situation and the received feedback. Results of our path analysis for KRE show that quality ($\beta=.40$) and importance ($\beta=.30$) of collegial feedback and quality ($\beta=.47$) and importance ($\beta=.36$) of feedback from the supervisor as well as individual feedback orientation ($\beta=.46$) have a positive effect on the development of new strategies. Results for SL show that quality ($\beta=.34$) and importance of collegial feedback ($\beta=.44$) positively influences general cause analysis. Quality ($\beta=-.52$) and importance ($\beta=-.75$) of feedback of the supervisor have a significant negative relation with specific cause analysis. Individual feedback orientation ($\beta=.26$) has a significant positive relation to the development of new action strategies. Implications of our results

concern the importance of an error friendly climate in organizations. Being able to openly address errors in feedback situations is an important factor to foster engagement in learning after errors.

Development and validation of a short scale for measuring innovative work behaviour

Keywords: Assessment methods and tools, Quantitative methods, Social interaction, Workplace learning

Presenting Author:Gerhard Messmann, University of Regensburg, Germany; **Co-Author:**Regina H. Mulder, Institute of Educational Science, University of Regensburg, Germany

This paper aims at the construction of an efficient scale for measuring innovative work behaviour (IWB), which incorporates all work activities employees carry out in relation to innovation development. Assessing IWB is a precondition for fostering employees' engagement in innovation processes. Concerning usability, using resources of employees and organisations carefully and, thus, enabling efficient measurement is crucial. Concerning valid measurement, the complexity of IWB must be taken into account. In order to attain these goals, a study with 369 employees of different companies was carried out. Using exploratory factor analyses, an 8-item scale for measuring IWB based on concrete work activities was adapted from an existing instrument (Messmann & Mulder, 2014). Construct and criterion validity as well as psychometric properties were satisfactory. Implications for future research, including the cross-validation of the scale, and practical implications, including the scale's value for planning professional development activities, will be discussed.

Effects of perceived feedback culture and work motivation on informal learning after feedback

Keywords: Informal learning, Reflection, Social interaction, Workplace learning

Presenting Author:Gerhard Messmann, University of Regensburg, Germany; **Co-Author:**Regina H. Mulder, Institute of Educational Science, University of Regensburg, Germany

This paper investigates whether employees are more engaged in informal learning after feedback if they perceive a strong feedback culture at work and have a self-determined work motivation. Informal learning after feedback incorporates all work activities employees carry out in order to process the feedback and to make it utilisable for future situations. Fostering informal learning after feedback therefore is crucial. This issue was addressed in a cross-sectional questionnaire study with 122 employees of different companies. Regression analyses showed significant effects of perceived feedback culture and work motivation. Interestingly, the relative importance of work motivation and perceived feedback culture differed with regard to employees' engagement in either individual or social activities. Our study implies that informal learning after feedback becomes more likely if supervisors and employees take responsibility in shaping the organisational feedback culture and if attention is paid to employees' basic needs satisfaction as a precondition for work motivation.

Learning at work: A mixed methods approach on workplaces as learning environments

Keywords: Communities of practice, Mixed-method research, Vocational education, Workplace learning

Presenting Author:Heta Rintala, Tampere University of Technology, Finland; **Co-Author:**Petri Nokelainen, Tampere University of Technology, Finland; **Co-Author:**Laura Pylväs, University of Tampere, Finland

The current study explores apprenticeship training focusing on workplace learning. The study uses a mixed-methods design. The quantitative data (n=305 apprentices) was collected using the Workplace as Learning Environment (WLE) survey created by James and Holmes (2012) based on Fuller and Unwin's (2003) expansive restrictive framework. The qualitative data (n=40) was collected through semi-structured individual interviews in ten workplaces, in which each an apprentice, apprentice's co-worker, a workplace trainer and an employer were interviewed about vocational competence, apprenticeship training, and learning and guidance in the workplace. The results from the two data sets will be further interpreted together in order to provide a better understanding of the learning in apprenticeship training. The findings suggest that expansive restrictive framework and the WLE survey are generalizable to the Finnish context. The study shows that there are differences between gender, age, organisation size and vocational sectors in relation to expansive learning environments. The findings demand for an increased attention to finding ways to support varying work-based learning arrangements and workplaces especially when this form of study is offered to youths.

Session P 23

2 September 2017 08:45 - 10:15

Linna - K109

Symposium

Assessment and Evaluation

Validity of longitudinal assessments: Capturing (instructional effects on) students' learning growth

Keywords: Achievement, Assessment methods and tools, Competencies, Psychometrics, Quantitative methods, Reading comprehension, Science education, Student learning

Interest group: SIG 01 - Assessment and Evaluation

Chairperson: Alexander Naumann, German Institute for International Educational Research (DIPF), Germany

Discussant: Detlev Leutner, University of Duisburg-Essen, Germany

This symposium is concerned with validity issues of assessments in educational contexts. To date, researchers and policy-makers rely heavily on educational assessments to draw inferences on individual students, teachers, teaching, schools, etc. Yet valid inferences require that there is empirical evidence supporting test use and interpretation. The four

presentations address two interrelated challenges central to the development and the interpretation of educational assessments: (a) when drawing inferences on teaching or schools, how can we ensure that instruments are capable of capturing effects of instruction? (b) when drawing inferences on individual students, how can we ensure that change in test results can be attributed to learning growth? The first presentation introduces a psychometric framework for measuring the degree to which test items are capable of capturing effects of instruction, that is, instructional sensitivity. The second presentation addresses the development of instructionally sensitive items. The third presentation utilizes item properties to predict the instructional sensitivity of test items. Finally, the fourth presentation deals with the development of reading tests forms to validly assess students' learning growth.

Taken together, all presentations demonstrate how empirical evidence for test use and interpretation can be obtained, fostering the development of indicator and indicator systems to register educational effects at different levels.

Measuring the instructional sensitivity of items

Presenting Author:Alexander Naumann, German Institute for International Educational Research (DIPF), Germany; **Co-Author:**Johannes Hartig, German Institute for International Educational Research (DIPF), Germany; **Co-Author:**Jan Hochweber, University of Teacher Education St. Gallen, Switzerland

Valid inferences on schools, teachers or teaching drawn from educational assessments require that tests are sensitive to the instruction students have received in class. Accordingly, measures of the test items' instructional sensitivity provide empirical support for validity claims about inferences on instruction drawn from educational assessments.

In the present study, we aim at contributing to the measurement framework of instructional sensitivity. We first introduce the concepts of absolute and relative measures of instructional sensitivity. Absolute measures summarize a single item's total capacity of capturing effects of instruction, which is independent of the test's overall sensitivity. In contrast, relative measures summarize a single item's capacity of capturing effects of instruction relative to the test's instructional sensitivity. Building on this distinction, we then provide a longitudinal multilevel IRT (LMLIRT) model that allows estimating both types of measures depending on the identification constraints. Finally, we discuss implications for measuring instructional sensitivity and test development.

Developing Instructionally Sensitive Assessments

Presenting Author:Maria Araceli Ruiz-Primo, Stanford University, United States; **Co-Author:**Min Li, University of Washington, United States

In recent days, instructional sensitivity has been seen as a requirement for assessments if they are to be used for high-stake evaluation purposes (Popham, 2007; Polikoff, 2010). Most of the literature focuses on evaluating instructionally sensitivity of assessments already developed (e.g., D'Agostino, Welsh, & Corson, 2007). The literature on how to develop instructionally sensitive assessments is almost non-existent. In this paper we describe an approach used to develop instructionally sensitive assessment. We provide empirical evidence about the technical quality of the items developed using the approach proposed. We discuss the strengths and weaknesses of the approach and define the next steps to improve the approach and to study instructional sensitivity.

Using item properties to predict the instructional sensitivity of test items

Presenting Author:Jan Hochweber, University of Teacher Education St. Gallen, Switzerland; **Co-Author:**Alexander Naumann, German Institute for International Educational Research (DIPF), Germany; **Co-Author:**Johannes Hartig, German Institute for International Educational Research (DIPF), Germany; **Co-Author:**Iris Kleinbub, University of Education Ludwigsburg, Germany; **Co-Author:**Stephanie Musow, University of Teacher Education St. Gallen, Switzerland

Instructional sensitivity (IS; Polikoff, 2010) is the psychometric property of a test or an item to react sensitive to instruction. Recently, Naumann et al. (2014) proposed a longitudinal multilevel DIF (LML-DIF) model to operationalize IS, using average and classroom-specific changes in item difficulties as indicators of items' global and differential sensitivity. However, these indices do not give any indication to potential causes of high or low IS and do not allow to predict IS for newly constructed items. As shown in this contribution, item properties explaining the difficulty of items can be used to predict items' sensitivity. To this end, the LML-DIF model is reformulated as an explanatory IRT model with item properties (Wilson & De Boeck, 2004). Global sensitivity can be predicted based on the average change of item properties' effects on item difficulty across classrooms. Differential sensitivity can be predicted by allowing for variation of change in these effects across classrooms. The model was applied to the language awareness test (34 items) from a longitudinal study of 9th graders (n=10965). Ten item properties referring to language awareness theory were selected (e.g., application of declarative knowledge). Nine properties contributed to average change of item difficulties, explaining 49% of items' global sensitivity. 63% of items' differential sensitivity was explained based on variation in the properties' effects across classrooms. By allowing to predict important indicators of IS, the approach might be useful to test assumptions about causes of IS and in attempts to purposefully construct items with high or low IS.

Construction of a test series for learning progress assessment in reading using rule-based design

Presenting Author:Natalie Foerster, University of Münster, Germany; **Co-Author:**Joerg-Tobias Kuhn, University of Münster, Germany; **Co-Author:**Jasmin Munske, University of Münster, Germany; **Co-Author:**Elmar Souvignier, University of Muenster, Germany

Aim of the present study was to investigate whether rule-based item design enables to develop equivalent computer-based

reading tests that can be used for learning progress assessment. We constructed a set of items based on the Childlex-database in which four items followed the same construction rules, respectively. For each item we thereby varied four different item properties (e.g. number of syllables or propositional density). Items were designed to assess the efficiency of component processes of reading comprehension on word, sentence, and text level, and were grouped to four equivalent test forms. N = 1930 second graders completed the tests. A partial sample of N = 306 students also finished four standardized school tests for validation purposes. We estimated item and person parameters for accuracy and response time using bivariate IRT-models. Results indicate that all item properties significantly affected either item difficulty or response time but also interactions between properties were found. Moreover, as indicated by the IRT-based test information functions, the difficulty and time intensity of the four test forms was similar (all $\eta^2 \leq .04$). Finally, the correlations with standardized school tests indicate good convergent and discriminant validity of the newly developed tests. Overall, rule-based item design proved to be a promising way to develop equivalent reading test forms. Item difficulties and response times could be predicted by item properties, especially on sentence and text level. As indicated by the interactions between item properties, however, item properties do not affect item difficulty and response times purely additive.

Session P 24

2 September 2017 08:45 - 10:15

Pinni B - B4113

Symposium

Teaching and Teacher Education

Early childhood educators' professional competences fostering Maths and Science

Keywords: Assessment methods and tools, Attitudes and beliefs, Competencies, Conceptual change, Early childhood education, Mathematics, Mixed-method research, Science education, Teacher Professional Development, Video analysis

Interest group: SIG 05 - Learning and Development in Early Childhood

Chairperson: Franziska Vogt, University of Teacher Education St.Gallen, Switzerland

Discussant: Yvonne Anders, Freie Universität Berlin, Germany

The quality of early years' education has been found to have a long lasting effect on children's subsequent educational achievements. Children's attainment in kindergarten is a predictor for later learning, as for example regarding number sense for mathematical learning (Jordan, Glutting & Ramineni, 2010) and early predictors of science content knowledge (Guo, Piasta, & Bowles, 2015). Early educators' professional competence for fostering children's learning are paramount. Effective professional development for early educators' domain specific competences for mathematics and science education are necessary. While some general models of professional competences in the early years are suggested, domain specific models are rare. Mathematics and science education in the early years face specific challenges, as teachers' self-concepts might be considerably lower than for other subjects, due to negative emotions (Benz, 2012; Fleer, 2009) and teacher's content knowledge comprises deep-rooted misconceptions. In addition to a lack of domain specific models of competences, developing a valid and reliable measurement is highly complex. The symposium focuses on domain specific professional competence of early childhood educators and examines how these professional competences can be measured and developed. The approaches to measuring professional competences presented in the four presentations include video analysis, questionnaires and a computer-based standardized video test. The professional competences investigated in relation to early science and mathematics education include attitudes, pedagogical content knowledge and content knowledge, learning support and scaffolding, reflective competence and action-related competence as well as leadership in the domain.

Teaching for Conceptual Change in Preschool: Teachers' Professional Beliefs, Knowledge and practice

Presenting Author: Miriam Leuchter, University of Koblenz - Landau, Germany; **Co-Author:** Henrik Saalbach, University of Leipzig, Germany; **Co-Author:** Ueli Studhalter, ETH Zurich, Switzerland; **Co-Author:** Annette Tettenborn, University of Teacher Education of Lucerne, Switzerland

To support children's conceptual change in early science instruction kindergarten teachers need to be aware of the constructivist nature of children's learning. In the present paper, we thus ask 1) what science-specific pedagogical beliefs and Pedagogical Content Knowledge (PCK) can be identified in kindergarten teachers, 2) to what extent is teachers' practice related to their belief patterns and PCK. In Study 1, we assessed 104 Swiss kindergarten teachers' beliefs and PCK in science by questionnaires. A cluster analysis on teachers' belief data revealed a satisfactory three-cluster solution with one cluster showing high agreement and another cluster low agreement to constructivist-oriented items. The third and largest cluster revealed high agreement to items which emphasize the importance of "hands-on activity" in conceptual learning. The three groups of teachers differ significantly with respect to PCK with "constructivist" teachers ranking highest. In Study 2, we examine the relations between kindergarten teachers' beliefs and their practice. To this aim, 32 kindergarten teachers' tutoring activities within a structured learning environment on 'floating and sinking' were videotaped and their verbal utterances were coded using a scaffolding-coding scheme. We found that teachers' scaffolding utterances mostly targeted clarification of task and procedure. Utterances targeting conceptual change are rather rare. Furthermore, teachers' constructivist beliefs correlated positively with their utterances promoting conceptual change; and teachers' use of content specific language correlated positively with their PCK and negatively with their conceptualization of learning as hands-on

activity. The results indicate the importance of targeting teachers' beliefs and PCK in kindergarten teacher education.

Preschool Teachers' Leadership in Science Education – Making Professional Competencies Visible

Presenting Author:Ornit Spektor-Levy, Bar-Ilan University, Israel; **Co-Author:**Anat Abramovich, Technion-Israel Institute of Technology, Israel; **Co-Author:**Taly Shechter, The School of Education, Bar Ilan University, Israel

This study follows the development of scientific professional competencies and leadership experiences of preschool teachers who take part in professional development program–PULSE: Professionalism, Understanding and Leadership in Science Education. This two-years 120-hour program offers experiential and reflective learning, knowledge enrichment and empowerment workshops. Teachers are required to submit a portfolio that includes: Descriptions of scientific project; analysis of mediated interactions with a small group of children; reflections on professional changes and Leadership Task Report describing the guidance they provide to a colleague in conducting scientific project in the colleague's preschool classroom. The aim of this study is to identify the ways the PULSE program develops teachers' professional competencies to teach science, and self-efficacy to lead other teachers in science education projects. A further aim is to explore what teachers' characteristics support the development of science education leadership. The study follows 47 in-service preschool teachers and applies a mixed-method approach, combining quantitative and qualitative research tools: Attitudes toward Science in Preschool Questionnaire; The Curiosity and Exploration Inventory-II Questionnaire; Qualitative analysis of the portfolio and the Leadership Task Report. Preliminary results revealed that the participants' attitudes toward science in preschool are positive, their level of curiosity and desire to explore are high. Next, for each participant, a profile is calculated, and will be tested against his/her professional and leadership competencies as will be revealed through the portfolio and Leadership Task Report. Findings from these data sources will be provided at the symposium.

Tailored mathematical support during play-based learning – a close look at educators' competences

Presenting Author:Andrea Wulschleger, University of Zurich, Switzerland; **Co-Author:**Rita Stebler, University of Zurich, Switzerland

Children differ considerably in their mathematical competences when they enter kindergarten . To foster every child of a heterogeneous group, a learning environment that enables personalised mathematical learning is required. Playing mathematical games combined with individualised learning support is suggested as an appropriate approach for young children. The study aims at investigating the competences of educators to support mathematics learning in kindergarten. Data was obtained from 36 videotaped situations showing four to six years old children playing the game "shut the box". To analyse the data, the child-educator-interactions were coded in accordance with the type of interaction content (mathematical, instructional, organisational and social). Subsequently, the quality of individualised learning support was coded and rated using a newly-developed coding and rating instrument. Finally, a qualitative content analysis was conducted to provide detailed insight into the scope of educators' learning support. Results show that educators address mathematical topics frequently. Further, they apply a sound diagnosis during children's play but they do not tailor the learning support as precisely. Additionally, the analysis shows differences in the support actions of educators with high and low support competences. The findings are discussed with respect to children's competence development and teachers' training.

Modeling and Measuring Professional Competence of Early Childhood Educators in Mathematics

Presenting Author:Simone Dunekacke, Leibniz Institute for Science and Mathematics Education (IPN), Germany; **Co-Author:**Selma Seemann, IPN Kiel, Germany; **Co-Author:**Aiso Heinze, Leibniz Institute for Science and Mathematics Education (IPN), Germany; **Co-Author:**Miriam Leuchter, University of Koblenz - Landau, Germany; **Co-Author:**Anke Lindmeier, Leibniz Institute of Science and Mathematics Education (IPN), Germany; **Co-Author:**Elisabeth Moser Opitz, University of Zurich, Switzerland; **Co-Author:**Franziska Vogt, University of Teacher Education St.Gallen, Switzerland

This paper presents a domain-specific model and standardized assessment to measure early childhood educator's professional competence in the domain of mathematics with a focus on their performance. Therefore, two performance oriented competences – Reflective Competence and Action-Related Competence – are distinguished. Reflective Competence includes activities to prepare and reflect mathematical learning situations in early childhood education. Action-Related Competence includes spontaneous actions addressing specific problems occurring during mathematical learning situations. In addition to these performance related competences, a knowledge-based factor is also included in the model: Basis Knowledge covering content knowledge and pedagogical content knowledge. To measure these two competences and the basic knowledge of pre- and in-service early childhood educators, a computer-based test with short video vignettes was developed. Structural analysis of data from 119 pre-service educators give evidence that the theoretical assumed three-dimensional model fits best to the data. Accordingly, the model is considered as a suitable tool for further research of early childhood educator's professional competence in mathematics.

Session P 25

2 September 2017 08:45 - 10:15

Main Building C - C8

Symposium

Teaching and Teacher Education

Influences on Teachers' Judgment Accuracy concerning student achievement and educational transitions

Keywords: Assessment methods and tools, Cultural diversity in school, Language (Foreign and second), Learning disabilities, Literacy, Primary education, Quasi-experimental research, Reading comprehension, Teacher Professional Development, Teaching / instruction, Writing / Literacy

Interest group: SIG 01 - Assessment and Evaluation, SIG 11 - Teaching and Teacher Education

Chairperson: Barbara Gasteiger-Klicpera, University of Graz, Austria

Chairperson: Edvina Bešić, University of Graz, Austria

Discussant: Janneke van de Pol, Utrecht University, Netherlands

Teachers' judgment accuracy is a widely discussed and highly relevant topic. Teachers' diagnostic competencies are an essential part of high quality instruction, since in classroom each decision is made by teacher's judgment. Accurate assessment is necessary for teachers to adapt instructions and to enhance students' abilities. Fair placement decisions and support for students' adequate development depends on teacher's accurate diagnostic judgment (Südkamp & Möller, 2012). This symposium aims to discuss different aspects that either enhance or hinder teachers' judgment accuracy. The papers focus on the prognostic validity of teacher ratings about their students' future reading development. These show that behavioral problems and additional learning problems hamper the correct identification of children at risk for reading disabilities. Furthermore, student characteristics (e.g. cultural backgrounds, L1/L2) or teacher characteristics (e.g. experience) influence judgment accuracy. Measuring teacher accuracy in domains like writing abilities is difficult, because writing quality is not easy to conceive and measure. These findings show that teachers should be qualified to use suitable and definite criteria to judge written composition. Teacher judgment is especially important during students' transition from primary to secondary education. Although transition decisions should be based on academic achievement, research has shown that non-academic variables influence these decisions, leading to disadvantages for specific groups, e.g., ethnic minorities. Finally possibilities to enhance the diagnostic competence of teachers through different strategies are presented and their evidence is critically discussed.

How accurately do teachers judge their students' reading abilities? Results of a Multilevel Analysis

Presenting Author:Barbara Gasteiger-Klicpera, University of Graz, Austria; **Co-Author:**Lisa Paleczek, University of Graz, Austria; **Co-Author:**Susanne Seifert, University of Graz, Germany

The present study aims at examining variables (at individual and class level) that influence the accuracy of teacher judgments of 2nd and 3rd graders' reading abilities (decoding and reading comprehension). We posed two research questions: (i) How accurately do teachers judge their students' reading abilities (decoding and reading comprehension)? Due to previous studies we hypothesized that the teachers' judgment and the students' actual achievement correlate about .60 (Hoge & Coladarci, 1989; Südkamp et al., 2012). (ii) Which variables at individual level (student's first language, gender, level of the student's respective reading ability, SEN status) and at class level (class size, percentage of L2 students in class, Grade 2 vs. 3, beginning vs. end of the academic year) predict the accuracy of teacher judgments on the reading abilities (decoding and reading comprehension)? Data of 1,465 students and 86 teachers were collected. Due to the nested structure of the data, multilevel regression analyses were applied. Results revealed about 5% of the variance in judgment accuracy at class level. Generally, teachers judged reading comprehension abilities more accurately than decoding abilities. Low achieving students' abilities, though, were judged less accurately. Accuracy in judging decoding was higher in small classes and in students with special educational needs. Accuracy in judging reading comprehension grew along the years (higher in Grade 3 and at the end of the academic year). Additionally, teachers judged second language learners reading comprehension less accurately. The results are discussed in the light of implications for teacher training.

Are teachers able to predict students' reading development?

Presenting Author:Alfred Schabmann, University of Cologne, Germany; **Co-Author:**Barbara Maria Schmidt, Universität zu Köln/ University of Cologne, Germany; **Co-Author:**Thomas Hennemann, University of Cologne, Germany

We assessed the prognostic validity of teacher ratings about their students' future reading development. Respective ratings of their teachers were collected for a sample of N=171 students in the middle of grade one. At the same time as well as at the end of grade one, standardized reading tests were administered. In order to find out, which student characteristics' influenced the ratings over and above reading skills, data about possible behavior problems, working behavior, as well as mathematical competence (as a proxy for additional learning problems) were gathered. Results show, that the sensitivity of teachers' ratings is very low. Out of students with severe reading problems at the end of grade one, only approximately one third was categorized correctly by the teachers. Furthermore, two main pathways, that lead teachers to the perception of reading problems, were found: (a) low test-score in reading -> problematic (hyperactive) behavior, and (b) average/high reading scores -> low math (!) scores. Behavioral problems as well as additional learning problems hamper the correct identification of risk-children.

Teachers' expertise in assessing written composition

Presenting Author:Ann-Kathrin Hennes, University of Cologne, Germany; **Co-Author:**Barbara Maria Schmidt, Universität zu Köln/ University of Cologne, Germany; **Co-Author:**Igor Osipov, Universität zu Köln/ University of Cologne, Germany; **Co-Author:**Alfred Schabmann, University of Cologne, Germany

The purpose of the current study was to evaluate teachers' expertise in assessing written compositions. Teachers' ratings of texts were compared to the ratings of groups with more or less expertise in measuring text quality. We expected that

teachers' ratings would show a considerable variance due to use of irrelevant criteria. Other groups like lectors/authors would show a higher consistency within their ratings and use essential criteria more often. **Method:** In this study we use a new approach. We rely on the expert-novice paradigm. Different groups of raters with a different amount of expertise rated the same 20 texts as a whole and according to a set of essential criteria. The inter-rater reliability (IRR) was calculated. Our hypothesized the following ranking: IRR experts > IRR teachers > IRR novices. Furthermore we supposed that Novices use less relevant criteria. **Results:** According to our hypothesis, teachers' IRR was between experts' and novices' IRR. However, both analysis of IRR and the criteria used show that teachers and novices use weak criteria frequently. **Conclusion:** The findings of the current study therefore questions the "natural" assumption that teachers are experts in judging students' written compositions – at least in parts. Our findings lead to the practical implication that there is an urgent demand of improvement in teacher education. Teachers should be qualified in using suitable and definite criteria to judge written composition.

Changes in the accuracy of teachers' transition decisions following instruction and training

Presenting Author:Ineke Pit-ten Cate, University of Luxembourg, Luxembourg; **Co-Author:**Sabine Krolak-Schwerdt, University of Luxembourg, Luxembourg; **Co-Author:**Thomas Hoerstermann, University of Luxembourg, Luxembourg; **Co-Author:**Sabine Glock, University of Wuppertal, Germany

This paper focuses on intervention modules to improve teachers' diagnostic competence, especially in regards to decisions on students' transition from primary to secondary education. Although these transition decisions should be based on academic achievement, research has shown non-academic variables to influence decisions, leading to disadvantages for specific groups of students. Using an experimental pre-post design, we investigated the short and long term effects of accountability, theoretical knowledge and the application of prediction rules on teachers' judgment accuracy, respectively. Pre-intervention data showed that although teachers' decision accuracy was of high standard, decision accuracy for ethnic majority students was significantly higher than for ethnic minority students. Increased accountability resulted in increased decision accuracy, especially in regards to decisions for ethnic minority students. Similarly, the introduction of theoretical models of decision making and judgment formation and the application of prediction rules resulted in an improvement of transition decisions only for ethnic minority students. From these studies we can conclude that all three intervention modules can improve the diagnostic competence, that is the accuracy of teachers' transition decisions. In line with the intention of the interventions, the disproportionally high rate of decision errors for ethnic minority students observed pre-intervention was eliminated post-intervention and in line with error rates for ethnic majority students.

Session P 26

2 September 2017 08:45 - 10:15

Main Building A - A2A

Symposium

Assessment and Evaluation

Uncovering problem-solving processes: Theoretical approaches and the potential of log file analyses

Keywords: Assessment methods and tools, Educational Technology, Learning analytics, Problem solving

Interest group: SIG 27 - Online Measures of Learning Processes

Chairperson: Kristina Kögler, Germany

Chairperson: Stephan Abele, Germany

Discussant: Dirk Ifenthaler, University of Mannheim, Germany

Problem solving is an important characteristic of daily work in many professional contexts and hence considered a major 21st century skill. Recently, several research initiatives begin to focus on process-related aspects of problem solving in order to widen the theoretical knowledge about problem-solving success. When observing problem-solving processes, especially computer-generated log files offer an unobtrusive way to retrace the behavior and strategies of the problem solvers. Nonetheless, log file analyses are challenging due to the amount of data and their interpretation. This symposium brings together research approaches from different domains, all assuming that a theory-driven analysis is vital when trying to unleash the potential of log files. Paper 1 highlights the potentials of log files compared to other methodological options such as think alouds or other subjective information by describing studies focusing on visual problem solving. Paper 2 provides a theory of diagnostic problem solving and evaluates it using log files to uncover the relevance of critical information and test behavior to solve authentic diagnostic problems of the car sector. Paper 3 is based on log file data from the business domain and analyses different problem-solving activities with regard to their relevance for problem-solving success. Paper 4 investigates collaborative problem-solving activities of students as part of the PISA 2015 validation study and relates the log file patterns to the collaborative problem-solving success.

Uncovering Visual Problem-Solving Processes: How Logdata can Inform Theory

Presenting Author:Jeroen Van Merriënboer, Maastricht University, Netherlands

Both in research and in instructional design there is an increasing interest in real-life problem solving, such as diagnosing

patients in medicine, controlling air traffic, engineering software, and so forth. The main problem when we study problem solving is that most problem-solving processes are not easily observable. For this reason, thinking-aloud, cued retrospective reporting and interviewing experts are the dominant methods for studying problem solving. The main aim of this contribution is exploring whether logdata provide useful information, in addition to traditional think-alouds or other subjective information, for analyzing and understanding problem solving processes. In order to reach this aim, a series of studies will be described that studied problem solving in visual domains (medical diagnosis of paediatric videos and pathology slides, air traffic control) of problem solvers with different levels of expertise. Both traditional subjective data (e.g., thinking alouds) and logdata (e.g., microscope zooming and panning, mouse clicks, eye movement data) were used to get better grip on the problem solving processes. The studies involve paediatricians with different levels of experience diagnosing authentic paediatric video cases; pathologists with different levels of expertise diagnosing pathology slides, and air traffic controllers with different levels of expertise interpreting radar screens. All three studies showed that logdata add something new to think-alouds, yielding new insights that contribute to further theory development.

Theory of the Diagnostic Problem-solving Process and its Evaluation Using Log-file Data

Presenting Author:Stephan Abele, Institute of Educational Vocation and Vocational Didactics, Germany

In this paper, a theory of the diagnostic problem-solving process in professional contexts is presented and evaluated using computer-generated log-file data. According to this theory, the quality of the mental diagnostic problem-solving process causally determines the problem-solving success. The process is associated with observable problem-solving behavior (i.e., critical information and test behavior) which is both an indicator and determinant of the process quality. To evaluate the theory, log-file data (i.e., the critical behavior) from a computer-based test, a sample of automotive technician apprentices ($N = 339$) and authentic diagnostic problems of the car sector were used. Results showed that (1) the problem-solving behavior had substantial effects on the diagnostic problem-solving success, that (2) these effects were moderated by the quality of the behavior and experience and that (3) the effects of the critical information behavior on the problem-solving success were mediated by the critical test behavior. The findings supported the theory and highlighted the benefits of theory-driven log-file research. The theory combines domain-general and domain-specific aspects and, when teaching diagnostic problem-solving, helps to clarify learning contents, to identify areas where students need support and to figure out relevant learning difficulties. Further studies should investigate whether the theory is applicable to other fields and if a combination of log-file and eye-tracking data can further enhance our understanding of the (diagnostic) problem-solving process.

What Makes a Good Problem Solver? A Log File Analysis of Activity Workflows in an Office Simulation

Presenting Author:Andreas Rausch, University of Mannheim, Germany; **Co-Author:**Steffen Brandt, Open Campus.sh /Kiron, Germany; **Co-Author:**Kristina Kögler, University of Hohenheim, Germany; **Co-Author:**Clemens Froetschl, University of Bamberg, Germany; **Co-Author:**Michael Bergrab, University of Bamberg, Germany

Most assessments of problem-solving competence are based on the evaluation of a proposed solution but ignore the problem-solving processes. These processes are usually described in theoretical phase models. However, in authentic problem scenarios these ideal phases can rarely be identified empirically since real-life problems are metaproblems (i.e., bundles of several types of problems) and various strategies can add to their solution (i.e., weak methods, strong methods, knowledge-based methods). To investigate what makes a good problem solver in the business domain, we analysed log file data from 780 students in commercial vocational education and training (VET) who tackled three authentic problem scenarios for 30 minutes each in a computer-based office simulation. We identified different problem-solving activities and analysed whether test-takers who applied these activities performed better. Due to lack of space only selected results are displayed in heat maps that show the intensity of a particular activity over six equal time intervals and grouped by five levels of problem-solving competence. Our results suggest that good problem solvers adapt their strategies to the nature of a problem. Regarding the different demands of our problem scenarios, it became apparent that it is not enough to identify particular activities but also to consider when these activities are applied in the course of the problem-solving process. Furthermore, high performers show overall higher frequencies of interaction with the problem environment what suggests a very simple weak method of 'more is better'. Limitations and further steps of analysis are discussed.

Collaborative Problem Solving Behavior: A Deep Dive into Log Files.

Presenting Author:Maida Mustafic, University of Luxembourg, Luxembourg; **Co-Author:**Nick Schweitzer, University of Luxembourg, FLSHASE, Luxembourg; **Co-Author:**Katharina Herborn, University of Luxembourg, Luxembourg; **Co-Author:**Samuel Greiff, University of Luxembourg, Luxembourg

The Programme for International Student Assessment (PISA) assessed collaborative problem solving (CPS) for the first time on a large scale in the PISA 2015 assessment (OECD, 2013). PISA used a computerized approach to the CPS assessment, which had the benefit of computer generated log files, which contain process data of a student's behavior. As problem solving lies at the base of CPS (OECD, 2013), behavioral similarities can be expected between problem solving and CPS. In complex problem solving, time spent on task presented a non-linear, quadratic relation to performance, and the frequency of interventions showed a negative relation to performance (Greiff, et al., 2016). Therefore, the hypothesis of the present study was that CPS performance would show the same quadratic relation to time on task, and to the frequency of interventions. A sample of 777 students, from 36 grade 9 and 10 classes, was collected to do a selection of the PISA 2015 CPS units. The results showed no quadratic relation between time spent on task and CPS performance. The number

of interventions showed a small negative relation to CPS performance. These findings indicate that while some behaviors from complex problem solving remain in CPS, others change, possibly to accommodate for the new collaborative aspect.

Session P 27

2 September 2017 08:45 - 10:15

Pinni A - A2089

Symposium

Motivational, Social and Affective Processes

What does it take to be motivated – the impact of social relationships and social skills

Keywords: Achievement, Cultural psychology, Educational Psychology, Motivation, Parental involvement in learning, Peer interaction, Social aspects of learning and teaching, Social interaction, Teaching / instruction

Interest group: SIG 10 - Social Interaction in Learning and Instruction

Chairperson: Frances Hoferichter, Germany

Discussant: Riikka Hirvonen, University of Jyväskylä, Finland

There is wide consent about the important role of motivation for academic outcomes, career success, and personal development. Over the last decades western research has mainly focused on individual factors (e.g., personality, goals) contributing to motivation, while social aspects (e.g., social relationships, social skills, mindfulness) as well as cross-national differences have been scarce in motivational research. The current symposium addresses this gap and takes a multifaceted view on motivation by examining the impact of social relationships and social skills on motivation in student samples from Germany, Macedonia, Russia, and the Philippines. To disentangle motivational processes, all research follows state of the art methods by using multi-method approach, large-scale intervention, latent-structural equation modeling, and latent class analysis. The presentations aim at providing educators and researchers with effective and practical ideas to enhance students' motivation. The main finding of the first presentation underlines the importance of teachers' support for the intrinsic motivation of students in a German sample. The second presentation emphasizes inter-individual differences in students' preference for social relationships as a source of motivation as well as basic needs, framed in self-determination theory. The third presentation focuses on the implementation of a social skills intervention to enhance motivation in a nation-wide grit intervention in Macedonia. The fourth presentation investigates the variation in students' relationships with peers and teachers as source of motivation among Russian and Filipino students. In summary, by applying a multifaceted view and state of the art methods, the symposium contributes to motivational research and educational practices.

The motivating role of peers & teachers among Russian and Filipino students - A Motivation Typology

Presenting Author: Frances Hoferichter, University of Greifswald, Germany; **Co-Author:** Olga Bakadorova, Ernst-Moritz-Arndt-University, Germany; **Co-Author:** Diana Raufelder, Ernst-Moritz-Arndt-University, Germany

This cross-national study investigates the perception of teachers and peers as sources of motivation in a total sample of 1410 seventh and ninth grade Russian (n=396) and Filipino (n=1014) secondary school students. According to the Motivation Typology (Raufelder, Jagenow, Drury, & Hoferichter, 2013), there are four motivation types (MT) based on students' socio-motivational relationships with peers and teachers in school: (1) teacher-dependent MT, (2) peer-dependent MT, (3) teacher-and-peer-dependent MT, (4) teacher-and-peer-independent MT. Cross-cultural studies (e.g., Hoferichter, Raufelder, & Eid, 2014) show that the distribution of students within this typology varies greatly. Hence, peers and teachers are viewed differently in their motivational role in different cultural contexts. The current study expands the knowledge on the typology by investigating students from non-western countries such as Russia and the Philippines. Applying a Multigroup Confirmatory Latent Class Analysis (MCLCA), we found that 57% of Russian students were assigned to the teacher-and-peer-dependent MT, whereas 85% of Filipinos were assigned to the teacher-and-peer-independent MT. These results manifest the different impact of social environmental variables (e.g., social relationships in school) on students' motivation, which is of particular importance in current time, marked by the globalization and migration processes. Practical implications for school psychologists and educators derived from the results will be discussed.

Grit in the Classroom: How to Improve Motivation and Learning Outcomes

Presenting Author: Christian Krekel, London School of Economics and Political Science, United Kingdom

A growing body of empirical evidence in psychology and economics points to the important role of socio-emotional skills in shaping motivation learning outcomes. In particular, grit – passion and perseverance in the pursuit of long-term goals – has been shown to predict educational success over and beyond IQ. In the current study, the concept of grit as an essential motivational aspect is introduced, how it is measured, how it can be effectively cultivated in classroom settings, and its impacts on learning outcomes. To this end, a small-scale intervention in Turkey and a large-scale nation-wide intervention in Macedonia are presented, aiming at fostering grit amongst students and/or teachers to mainstream grit as social skill contributing to students' motivation. Finally, a short overview is presented of the extent to which grit can be put into practice to enhance motivational processes in education.

Enhancing students' motivation – the impact of teacher support and teacher-parent partnership

Presenting Author: Charlott Rubach, University of Potsdam, Germany; **Co-Author:** Rebecca Lazarides, University of

Potsdam, Germany

Based on Epstein's model of overlapping spheres of influence (1987) this study examined whether teachers' behavior is more strongly related to 9th and 10th grade students' motivation, self-concept and school-based beliefs, if teachers are working in collaboration with parents. Data stemmed from a longitudinal study that assessed student ($N=1118$) and teacher data ($N=52$) in 13 secondary schools in Germany. Using Two-level structural equation models showed that, teachers' support had positive effects on students' intrinsic motivation, self-concept and on students' valuing of family-school-partnership at the class level. Additionally, formal forms of partnership and information exchange moderated the relations between teacher-student relationship and students' valuing of family-school-partnership

Inter-individual differences in social motivation related to Self-determination & school-engagement

Presenting Author:Alexander Lätsch, University of Greifswald, Germany; **Co-Author:**Diana Raufelder, Ernst-Moritz-Arndt-University, Germany

Little is known about the association between inter-individual differences in motivation, self-determination and school engagement. To address this gap, the study examined whether self-determination predicts school engagement among students who are assigned to four different motivation types (MT) based on their socio-motivational relationships with peers and teachers: (1) peer-dependent MT, (2) teacher-dependent MT, (3) peer-and-teacher-dependent MT and (4) peer-and-teacher-independent MT. To test the association of self-determination and school engagement among the four MT a large sample of students ($N = 1088$) from Brandenburg, Germany was used. The four types were first compared on latent variables using Structural equation modelling (SEM) in Mplus, and afterwards a latent multigroup SEM (MGSEM) was conducted to test whether self-determination (competence, relatedness, and autonomy) predicts emotional and behavioral school engagement for each MT respectively. The results highlight the importance of inter-individual differences for the association of students' psychological needs (competence, relatedness, and autonomy) and their school engagement.

Session Q 1

2 September 2017 10:30 - 12:00

Main Building D - D10B

Single Paper

Instructional Design, Motivational, Social and Affective Processes

Motivation and Secondary Education

Keywords: Cognitive skills, E-learning / Online learning, Educational attainment, Educational Technology, History, Instructional design, Meta-analysis, Motivation, Motivation and emotion, Science education, Secondary education, Social interaction

Interest group: SIG 06 - Instructional Design, SIG 08 - Motivation and Emotion

Chairperson: Danny Kostons, University of Groningen, Netherlands

Course design perception in MOOCs : comparing performance between on-campus and worldwide students

Keywords: E-learning / Online learning, Educational Technology, Instructional design, Motivation

Presenting Author:Sophie Dandache, Université catholique de Louvain (UCL), Belgium; **Co-Author:**Min Reuchamps, Université catholique de Louvain (UCL), Belgium; **Co-Author:**Pierre Baidewyns, Université catholique de Louvain (UCL), Belgium; **Co-Author:**Nathalie Schiffino, Université catholique de Louvain (UCL), Belgium; **Co-Author:**Marianne Frennay, Université catholique de Louvain (UCL), Belgium

This study highlights the importance of taking into consideration the motivation to enroll in a MOOC when constructing it. More precisely, we want to see whether two groups of learners can be distinguished in function of their will to obtain or not a certificate. We will then compare how, in function of their motivation to enroll in a MOOC, the link between the participants' satisfaction, their perception of the course's instructional design and their rate of success can differ. Therefore, participants who followed a MOOC on political sciences were asked to answer to a survey before and after having followed the course. The sample ($N= 226$) was composed of students who were following the course on-campus in a flipped classroom way and of external participants from all around the world. By this, we raised the likelihood of having learners of the both types (i.e., who is versus is not interested in obtaining a certificate). Results showed indeed that the sample could be clustered in function of their motivation to follow the course. By the mean of EFA, three factors could be retained to reflect the learner's opinion on the different instructional design elements namely: *workload*, *design* and *assessment*. Finally, path analyses were conducted to compare the link between learners' satisfaction, opinion on the instructional design and success on the MOOC. Results showed that the paths significantly differed between both clusters. Results are discussed in terms of elements to take into consideration when building and/or following a MOOC.

Autonomy support and thwart in the classroom: triggers for teachers

Keywords: Motivation, Secondary education, Social interaction, Motivation and emotion

Presenting Author:Alexander Minnaert, University of Groningen, Netherlands; **Co-Author:**Kim Stroet, Leiden University, Netherlands; **Co-Author:**Marie-Christine Opdenakker, University of Groningen, Netherlands

The first years of secondary education are precarious for students, as their commitment to education tends to decline. Teacher-student interactions are critical in this regard, with according to Self-Determination Theory, amongst others,

teachers' autonomy support and thwart being of relevance. While optimizing teacher-student interactions is a major concern, little is known on what situations trigger teachers to express optimal or suboptimal utterances. In the present study, two such potential triggers were researched, both quantitatively and qualitatively, namely how innovative the teacher's school is in terms of (amongst others) having students share responsibility for their learning processes, and progression of the school year. Multilevel analysis showed, in line with expectations, teachers' expression of autonomy thwart to be most uncommon in the most innovative schools, while no differences between types of schools were found for teacher autonomy support. Further, in line with expectations, expressions of autonomy support became less common as the school year progressed, while for autonomy thwart no effect of progression of the school year was found. In the last step of the analyses, these differences between types of schools were examined qualitatively to establish what teaching practices had induced them.

Micro-level views on task characteristics, situational interest and the use of learning strategies

Keywords: Cognitive skills, History, Secondary education, Motivation and emotion

Presenting Author:Isolde Baumgartner, University of Passau, Germany; **Co-Author:**Matthias Boehm, University of Passau, Germany; **Co-Author:**Jutta Mägdefrau, University of Passau, Germany; **Co-Author:**Andreas Michler, University of Passau, Germany; **Co-Author:**Christof Wecker, University of Passau, Germany

Interestingness and personal significance as components of situational interest are regarded as key factors for learners' use of learning strategies and may be influenced by characteristics of learning tasks (e.g. task structure, graphical design elements, and the type of intended learner activity). Especially challenging tasks influence personal significance and the use of learning strategies. So far, classification systems for describing characteristics of tasks are still lacking. Thus, this study presents the development of a classification system and investigates the relationship between task characteristics, learners' situational interest and their use of *learning strategies*. It is hypothesized that surface task characteristics mainly affect interestingness, whereas the type of activity should affect both components of situational interest. Furthermore, personal significance is hypothesized to predict learners' use of elaboration strategies especially for tasks that are ill-structured, less illustrated, or require challenging learner activity. Initially, a classification system for the *task characteristics* was created. Subsequently, the participants (N = 801 9th graders) solved 34 tasks. For each task situational interest and learning strategy data was collected. Changes in the relationship between the components of situational interest and the use of learning strategies caused by the influence of task characteristics were explored by a combination of SEM-analyses and meta-analyses. The classification system was verified. Descriptive analyses revealed that surface characteristics of the tasks affected interestingness, whereas students' activity affected both components of situational interest. Only personal significance predicted the use of elaboration strategies, varying significantly by the type of task. Implications of the findings were discussed.

Encouraging a career in science? A review of school effects on students' future orientation in STEM

Keywords: Educational attainment, Meta-analysis, Science education, Secondary education

Presenting Author:Sarah Reinhold, Technical University of Munich (TUM), Germany; **Co-Author:**Doris Holzberger, Technical University of Munich (TUM), Germany; **Co-Author:**Tina Seidel, Technische Universität München (TUM), Germany

Although previous research points out that schools play a central role for students' future orientation in science, technology, engineering and mathematics (STEM), relationships have not yet been investigated based on a joint theoretical foundation and therefore have not been established sufficiently. In order to investigate the status quo and derive suggestions for further research in this area we conducted a systematic literature review. By means of data base and manual journal search we found 251 articles. According to our inclusion criteria, we finally included 28 peer-reviewed journal articles published between 1990 and 2015, investigating school effects on students' future orientation in STEM via quantitative, qualitative, or mixed methods. Our analyses showed that the studies were diverse concerning investigated constructs for future orientation in STEM, hypothesized relationships, as well as in their results. In order to systematically advance the research field, we derive an integrated framework of school factors and future orientation in STEM and two main challenges for future research: (1) need for theory-based research, and (2) towards more sophisticated models.

Session Q 2

2 September 2017 10:30 - 12:00

Main Building D - D11

Single Paper

Teaching and Teacher Education

Teaching and Teacher Education - S

Keywords: Assessment methods and tools, Attitudes and beliefs, Comparative studies, Competencies, Developmental processes, Higher education, Learning approaches, Mixed-method research, Pre-service teacher education, Secondary education, Teacher Professional Development, Teaching approaches

Interest group: SIG 11 - Teaching and Teacher Education

Chairperson: Paul Ayres, University of New South Wales, Australia

Mathematics Teachers' Attitudes Towards Homework and their Comparison to Science Teachers' attitudes

Keywords: Attitudes and beliefs, Comparative studies, Learning approaches, Mixed-method research

Presenting Author: Ida Kukliansky, Ruppin Academic Center, Israel; **Co-Author:** Haim Eshach, Ben-Gurion University of the Negev, Israel

Homework (HW) is an integral part of the learning process. Homework's advantages can be divided into three aspects: cognitive, pedagogical, and affective and its disadvantages can be divided into affective, social, and pedagogical aspects. Teachers' attitudes are known to have a great influence on their actual practices in their classes; thus, it is important to extend our knowledge about teachers' attitudes toward HW. This research was divided into two parts. In the qualitative part of the study 25 teachers were interviewed. The interviews dealt with the rationale behind assigning HW, their advantages and disadvantages, and the types of HW given. Through inductive analysis categories were extracted. The research tool in the quantitative part of the study was a questionnaire that was distributed to 154 teachers of mathematics and 63 science teachers. In general, teachers' attitudes toward HW were found to be moderate with an average of 3.48/5. The study compares between male and female mathematics teachers', between teachers with different experience and between teachers teaching at different school levels. In addition, comparing the mathematics teachers' mean attitudes toward HW revealed that they were significantly higher than those of science teachers in several categories. These differences probably stem from the different approaches toward mathematics and science teaching.

Task-Specific Difficulty Judgments of Teacher Students

Keywords: Assessment methods and tools, Competencies, Secondary education, Teacher Professional Development

Presenting Author: Justine Stang, University of Passau, Germany; **Co-Author:** Detlef Urhahne, University of Passau, Germany

The study aimed to examine the accuracy of task-specific difficulty judgments of teacher students and the influences of personal characteristics such as self-perceived judgment ability or curriculum knowledge on task-specific judgment accuracy. Ninety-two teacher students participated in the online study. Teacher students were mainly female and studied on average at the university for about five semesters. They had to decide whether ten mathematics tasks are real learning material of sixth-graders or not and were asked to estimate the difficulty of twelve mathematics tasks. These judgments were compared with the reported difficulty of the standardized mathematics tasks. Results showed that teacher students had problems to judge task-difficulty. They overestimated task-difficulty and seldom could bring the tasks into the correct difficulty order. Higher curriculum knowledge, however, helped teacher students to judge task-difficulty more accurately. The results are discussed in terms of content with implications for research and educational practice.

Changes in Dealing with Requirements during Practical Training

Keywords: Developmental processes, Mixed-method research, Pre-service teacher education, Teacher Professional Development

Presenting Author: Julia Kosinar, University of Applied Sciences and Arts Northwestern Switzerland, Switzerland; **Co-Author:** Ozlem Altin, University of Applied Sciences and Arts Northwestern Switzerland, Switzerland; **Co-Author:** Melanie Billich Knapp, University of Applied Sciences and Arts Northwestern Switzerland, Switzerland

Teacher trainees complete four phases of practical training during their studies at the School of Teacher Education in Switzerland. The study "Developmental tasks of teacher trainees in their field studies" examines the individual perception of demands and their description by students at the end of each practical training. The data was collected through guided interviews (N=36) and was categorically analysed in an inductive procedure (Böhm 2004).

As a theoretical background we used the concept of developmental tasks (Havighurst). For career entry an empirically proved canon of professional developmental tasks (role-taking, classroom-management, adaptive instruction and cooperation) has been identified (Keller-Schneider & Hericks 2011). Through our data a compilation of requirements for practical training emerged. The results show a high compatibility of demands in the named four domains but also that challenges differ according to different states of professional development. In addition, a fifth dimension was found, labelled as "undergoing a training situation". Subsequently, based on more than 80 challenges mentioned in interviews, a questionnaire was developed, asking for 1. the relevance teacher students assign to various demands, 2. how competent they consider themselves in dealing with these and 3. the extent they feel stressed by them. Up to now, it was conducted in two pre-tests. In our contribution, the identified developmental tasks will be illustrated by concrete data and interesting outcomes of the survey will be presented. The results confirm the relation between the three dimensions which will be proved by conducting them to a theoretical model of processes of professionalisation.

Teacher students' experiences of flipped learning – Relations with learning orientations and goals?

Keywords: Attitudes and beliefs, Higher education, Learning approaches, Teaching approaches

Presenting Author: Laura Hirsto, University of Eastern Finland, Finland; **Co-Author:** Sanna Väisänen, University of Eastern Finland, Finland

The aim of this paper is to explore and present teacher students experiences of flipped learning in relation to their learning orientations and goals for their own learning in the course and in teacher education. The flipped learning design includes generally the ideas that students are 1) provided online (lecture) material before class time, 2) engaged in discussion and collaborative group work during face-to-face sessions, and 3) engage in higher-order activities. There seems to be support

for the efficiency of the flipped learning design on student attainment and engagement. However, there is also evidence that students' experiences in learning environments depend also from their learning orientations. Teacher students' experiences varied in terms of their learning profiles, and their time use for preliminary assignments. There seemed to be also differences in the experiences between elementary teacher students and subject teacher students.

Session Q 3

2 September 2017 10:30 - 12:00

Main Building C - C7

Symposium

Instructional Design

Differentiated instruction to address student diversity in learning: effects, practices and training

Keywords: Cultural diversity in school, Learning and developmental difficulties, Meta-analysis, Mixed-method research, Primary education, Qualitative methods, Secondary education, Student learning, Teacher Professional Development, Teaching / instruction

Interest group: SIG 11 - Teaching and Teacher Education

Chairperson: Katrien Struyven, Vrije Universiteit Brussel, Belgium

Organiser: Katrien Struyven, Vrije Universiteit Brussel, Belgium

Discussant: Leonidas Kyriakides, University of Cyprus, Cyprus

Depending on the societal, economical or political perspective different forms of student diversity in education are emphasised. This symposium presents four papers studying 'differentiated instruction' as a pedagogical-didactical means to address student diversity in learning (interests, readiness and profile). The first paper focuses on the 'state of the art' in research on differentiated instruction by means of a systematic literature review on ability grouping in primary schools. The second presentation describes the results of a study on differentiated instruction practices in Alpine primary schools with mixed-age groups. The third and the fourth paper focus on professional development (PD) initiatives in order to enhance teachers' differentiation practices. The third presentation focuses on PD for mathematics teachers in primary schools in the Netherlands, the fourth on PD for subject-teachers in secondary education in Belgium. The discussion by Leonides Kyriakides will address common themes in the four papers and critical suggestions, aimed at deepening our understanding and advancing the research on differentiated instruction.

Cognitive effects of differentiation practices: A systematic review and meta-analysis

Presenting Author: Marjolein Deunk, University of Groningen, Netherlands; **Co-Author:** Annemieke Smale-Jacobse, University of Groningen, Netherlands; **Co-Author:** Hester de Boer, University of Groningen, Netherlands; **Co-**

Author: Simone Doolaard, University of Groningen, Netherlands; **Co-Author:** Roel J. Bosker, Rijksuniversiteit Groningen, Dept of Education and GION, Netherlands

The importance of dealing with cognitive differences of students by applying differentiation practices, like taking into account individual instructional needs within ability groups, is currently greatly emphasized by educationalists. The effectiveness of these practices, however, remains unclear. Especially the question how to ensure that students of all ability levels profit equally of the differentiation is yet unanswered. We conducted a systematic review and a meta-analysis in order to give an overview of the effects of differentiation practices on language and math performance in primary education, synthesizing the results of empirical studies ($n = 21$) on this topic since 1995. We found that using computerized systems as a differentiation tool and using differentiation as part of a broader program or reform had small to moderate positive effects on students' performance. Between- or within-class homogeneous ability grouping had a small negative effect on low-ability students, but no effect on others. The finding that ICT can be a useful tool to facilitate differentiated instruction is not covered in earlier reviews. In line with earlier reviews, our findings emphasize that ability grouping alone is not enough to guarantee 'good' differentiated instruction. Embedding differentiation practices in a broader educational context is important.

Differentiated instruction in mixed-age classes – Results from a study in small, alpine schools

Presenting Author: Robbert Smit, University of Teacher Education St.Gallen, Switzerland

A teacher in a mixed-age class is necessarily aware of the need to consider individual learning goals when preparing the lessons. Differentiation can be defined as an approach to address the diverse needs of individual students and small groups of students to maximize the learning opportunity for each student in a classroom (Tomlinson, 1999). Mixed-age teachers use different teaching practices to deal with their age-heterogeneous classes. But what do these practices look like? How intensely do they use them? And can we consider them as differentiated instruction? The Swiss-Austrian project "Small schools in the alpine region" explored the situation of small schools as a place for teaching and learning in three rural provinces. We employed a mixed-methods research design with a prior questionnaire survey ($N = 260$ teachers), followed by a case study of 31 schools. Based on interviews with the teachers, it shows that they use a variety of different teaching practices, but mainly during seatwork. Many teachers, however, do not employ differentiated instruction to its full potential. The teachers complain that they often miss the time to meet the individual needs of each child. One reason is that they have to share their attention to several grades. The quantitative analysis evinces that school development in a professional teaching team fosters good and more frequent differentiated instruction moderated by high self-efficacy

expectations.

Training primary education teachers to differentiate: Effects on teaching and student learning

Presenting Author: Evelyn Kroesbergen, Utrecht University, Netherlands; **Co-Author:** Eva van de Weijer-Bergsma, Utrecht University, Netherlands; **Co-Author:** Emilie Prast, Utrecht University, Netherlands; **Co-Author:** Johannes Van Luit, Utrecht University, Netherlands

The increasing diversity of students within primary school classrooms requires teachers to adapt their lessons to the varying educational needs of their students ('differentiation'). In the current large scale study, project GROW, we evaluate the effects of an intensive professional development (PD) program targeting differentiation in primary school mathematics on teachers' instructional behavior and student achievement and motivation. Thirty primary schools (grade 1 to 6) divided over three cohorts participated in the two-year study. Schools from the different cohorts received training in a phased design with repeated measurements. Student achievement was evaluated in 5658 and motivation (self-efficacy, self-concept and task value) in 1028 students, respectively. Instructional behaviors during mathematics lessons were observed in 61 teachers. Several control variables were included (i.e., grade level, intelligence and working memory). Results show that teachers who received the PD program adopt more often differentiation practices than teachers in the control cohorts, but only after 2 years. In year 1, growth in student mathematics achievement was larger in the cohort that received the PD program. Preliminary analyses also showed positive effects on student self-efficacy, but not on self-concept or task-value. Effects on students were not visible in year 2. The results of this large-scale study show that teacher professional development about differentiation in primary mathematics education can have positive effects on teacher behavior, student achievement and motivation. However, the results also indicate that implementation of differentiation is not straightforward and requires long-term efforts. Future research should examine how PD can be further optimized to enhance implementation of differentiation.

Differentiated instruction in secondary education: Results from a professional development programme

Presenting Author: Wouter Smets, Karel de Grote University college, Belgium; **Co-Author:** Debbie Deneve, Karel de Grote Hogeschool Antwerpen, Belgium

This study presents the analysis of an in-service teachers' professional development programme. The participants intend to introduce differentiated instruction in their lessons. They share a commitment to innovate their teaching habits in order to deal better with student diversity in the classroom. Therefore, the concept of differentiated instruction such as articulated by Tomlinson (2000) is used, focusing on student's readiness levels, interests and learning profiles. After a 3-days PD program the participants worked collaboratively in teacher teams and got four months of coaching from an external expert. Participants were interviewed in order to disclose the concerns and successes they experienced during this innovation process. Four factors emerged during the interviews: (1) urgency for innovation; (2) facilities; (3) support; (4) teachers' and students' mindset. Depending on the school and the teacher team in which differentiated instruction is introduced, they are experienced as a concern or rather as a success factor. These factors are discussed using Fullan's (2001) framework for educational change. The introduction of differentiated instruction may be seen as a complex and context-dependent process.

Session Q 4

2 September 2017 10:30 - 12:00

Virta - 120

Symposium

Motivational, Social and Affective Processes, Teaching and Teacher Education

Teacher Self-Efficacy and Its Development in Diverse Contexts

Keywords: Emotion and affect, In-service teacher education, Pre-service teacher education, Qualitative methods, Self-efficacy, Teacher Effectiveness, Teaching / instruction

Interest group: SIG 11 - Teaching and Teacher Education

Chairperson: Marjolein Zee, University of Amsterdam, Netherlands

Discussant: Robert Klassen, University of York, United Kingdom

Research over the past 40 years has shown that teachers with high self-efficacy are generally more effective in handling problems, use more student-centered approaches, and develop more positive relationships with students (Zee & Koomen, 2016). However, findings reveal that the sources and effects of teacher self-efficacy depend considerably on contextual factors, such as the nature of the teaching task, domain of learning, level of teaching experience, and student characteristics. The papers in this symposium account for these and other factors. Using diverse methodological approaches, the researchers investigate teacher self-efficacy in diverse contexts on four continents. The first paper examines how teachers with different levels of expertise (novices to experts) interpret and respond to items designed to measure their teaching self-efficacy. Paper 2 explores the ways in which preservice teachers' emotions and self-efficacy interact over time. The third paper focuses on how physical education teachers develop their sense of teaching efficacy. The final paper assesses differentiation of teacher self-efficacy measures by examining how practitioners judge their capabilities for teaching students with autism spectrum disorders versus students in regular education. The use of think-aloud protocols, longitudinal quantitative analyses, survey data, and portfolio content analysis allows for a rich exploration

of the multifaceted nature of teacher self-efficacy. The expert discussant will offer a synthesis and future directions. Reference Zee, M., & Koomen, H. M. Y. (2016). Teacher self-efficacy and its effects on classroom processes, student academic adjustment, and teacher well-being: A synthesis of 40 years of research. *Review of Educational Research*. doi: 10.3102/0034654315626801

Cognitive Processes Underlying Self-Efficacy in Expert, Novice, and Beginning Teachers

Presenting Author: Izabele Jonusaite, University of York, United Kingdom; **Co-Author:** Lisa Kim, University of York, United Kingdom; **Co-Author:** Robert Klassen, University of York, United Kingdom

This study examined the cognitive processing underlying teachers' self-efficacy beliefs. Data were collected from 33 participants: 11 expert teachers, 11 novice teachers, and 11 beginning (pre-service) teachers from the United Kingdom. Using think-aloud protocol analysis, six 22 codes were reduced to 6 themes that illustrated how teachers determined their level of teaching self-efficacy. Results from the study showed that expert teachers differed from their novice and beginner counterparts in the perspective they engaged when determining their self-efficacy, with experts referring to the student point-of-view and novices and beginners taking a personal point-of-view. Expert teachers relied on their greater store of knowledge and teaching histories in determining their level of self-efficacy. The findings have the potential to enhance our understanding about how self-efficacy beliefs develop and deepen our understanding of how teachers process challenging classroom situations.

Examining Preservice Teachers' Enjoyment and Self-Efficacy Beliefs: A Cross-Lagged Panel Study

Presenting Author: David Morris, St. Mary's College of Maryland, United States

Although enjoyment and self-efficacy are regarded as important motivational constructs, little is known about their relationship in the context of teaching. In this longitudinal study, 94 preservice teachers were asked to report their enjoyment and teaching self-efficacy at the beginning and end of a teacher education program. Over the course of the program, the preservice teachers became more self-efficacious but reported slightly less enjoyment associated with their teaching. A cross-lagged panel design was used to explore reciprocal causal relationships between these variables. Controlling for past levels of self-efficacy, preservice teachers' enjoyment at the beginning of the program predicted their subsequent beliefs about their capabilities to use instructional strategies, motivate student engagement, and teach in culturally responsive ways. It did not, however, predict their self-efficacy for classroom management. Inconsistent with theoretical descriptions and research in other domains, there was little evidence that preservice teachers' beliefs about their capabilities informed their enjoyment of teaching. Implications for theory and teacher education are discussed.

Teaching Self-Efficacy and its Sources in Teacher Training Experiences in Physical Education

Presenting Author: Roberto Tadeu Iachite, Universidade Estadual Paulista, Brazil; **Co-Author:** Roraima A. Costa Filho, Sao Paulo State University, Brazil

During the teacher training process, student-teachers should learn how to address high cognitive, emotional, and behavioral demands generated by teaching. At the same time, they need to develop and strengthen their personal belief that they will be able to handle challenges. In the context of physical education, these demands can be even greater due to the environmental conditions where classes are taught. This study aims to measure, describe, and analyze the beliefs of personal efficacy for teaching physical education and its construction from the situations experienced during school-based teacher training. Eight-seven student-teachers (54% women; $M_{\text{age}} = 21.8$) from a state university in Sao Paulo, Brazil, responded to a sociodemographic questionnaire and the Teachers' Sense of Efficacy Scale (Tschannen-Moran & Woolfolk Hoy, 2001). To describe the sources of teaching self-efficacy, we analyzed reflective portfolios (thematic codes based on theory) developed by the student-teachers during and at the end of the teacher training process. Student-teachers showed moderate-high teaching self-efficacy beliefs, which were based mainly on mastery experiences and social persuasion. The relevance of teaching self-efficacy beliefs for teacher education, in particular for the teacher training process in the physical education context, is discussed.

Self-Efficacy for Teaching Special Populations in Two National Contexts

Presenting Author: Abigail Love, University of Kentucky, United States; **Co-Author:** Christen Dillon, University of Kentucky, United States; **Co-Author:** Ellen Usher, University of Kentucky, United States

The purpose of this study was to assess two teacher self-efficacy measures, one general and one specific to teaching learners with Autism Spectrum Disorder (ASD), among teachers ($N = 205$) in two national contexts: Australia and the U.S. Currently, 1 in 68 children in the U.S. is diagnosed with ASD (Centers for Disease Control and Prevention, 2015) and this growing population of learners has been noted as one of the most challenging groups to teach (White, Smith, Smith, & Stodden, 2012). This study compared teachers' efficacy beliefs on this learner-specific measure and its relationship to other variables known to be associated with teacher self-efficacy. Measures included Hoy & Woolfolk's (1993) Teachers' Sense of Efficacy Scale and a researcher-developed self-efficacy scale for teaching students with ASD. Results indicated that Australian teachers reported higher general teaching self-efficacy and that U.S. teachers reported higher self-efficacy for teaching students with ASD. Both general teaching self-efficacy and self-efficacy for teaching students with ASD were positively correlated with self-efficacy for self-regulation and with job satisfaction. Self-efficacy for teaching students with ASD was negatively associated with a measure of job stress for the Australian sample. Results confirm previous findings showing that teaching self-efficacy varies according to the teaching context, which includes reaching particular student groups. Using a population-specific instrument potentially provides more explicit understandings about a teachers' beliefs

for teaching certain students.

Session Q 5

2 September 2017 10:30 - 12:00

Pinni B - B3117

Symposium

Enhancing language competences and reading of second language learners

Keywords: At-risk students, Cultural diversity in school, Reading comprehension, Second language acquisition, Self-efficacy, Student learning, Teaching / instruction

Interest group:

Chairperson: Annette Tettenborn, University of Teacher Education of Lucerne, Switzerland

Organiser: Annette Tettenborn, University of Teacher Education of Lucerne, Switzerland

Discussant: Petra Stanat, Humboldt-Universität zu Berlin, Germany

This symposium deals with the topics migration background and non-native speakers (German/English language learners) and their impact on acquisition of literacy and language skills. Immigrant children are faced with challenges according to their language acquisition and often reach a lower mean achievement level than non-immigrant students at school.

The study of Paetsch et al. analyzed the effects of a form-focused and meaning-focused intervention with respect to the learning on German as second language skills and content knowledge learning in a field experimental pretest-posttest-design. Small effects resulted for vocabulary in both conditions.

The experimental study of Sander et al. investigated effects of stereotypes on learning processes. The authors found that immigrant children's vocabulary growth was inhibited in the stereotype threat conditions, whereas non-immigrant children seemed to benefit.

The study of Taboada used the literacy-in-social-study intervention program (USHER) to increase reading comprehension, academic vocabulary and motivation in middle school English learners in social studies classes. Preliminary indicated significant increases in comprehension, academic vocabulary, and reading self-efficacy.

The study of Naepflin et al. used the Paired Reading method in an out-of-school intervention study with paraprofessional tutors to enhance reading fluency. The findings indicated no training effect in the subsample of poor readers with migration background, but vocabulary knowledge appeared to be relevant for the development of reading fluency.

The symposium points out contributions to enhance language and reading skills of non-native speakers in a more effective way and discusses implications for teacher preparation.

Improving second language skills: Effects of focus on meaning and focus on form

Presenting Author: Jennifer Paetsch, University of Bamberg, Germany; **Co-Author:** Annkathrin Darsow, Humboldt-University Berlin, Germany; **Co-Author:** Anja Felbrich, Institute for Educational Quality Improvement (IQB), Germany; **Co-Author:** Petra Stanat, Institute for Educational Quality Improvement (IQB), Germany

Weak language skills in the language of instruction are assumed to be a key factor contributing to the lower mean achievement levels immigrant students reach in school. Although a number of programs for supporting immigrant students to become proficient in the language of instruction are implemented in schools, we know very little about their effectiveness. In the present study, 362 third-grade students from immigrant families received additive second language support in German over the course of a whole school year according to two different approaches: a form-focused intervention ($n = 125$) and a meaning-focused intervention ($n = 127$). We implemented a field-experimental pretest-posttest-design including a control group ($n = 110$) to test the efficacy effects of both interventions with respect to the learning on German as second language skills as well as on content knowledge learning. To control implementation quality, we used coded video recordings of two lessons per teaching group (64 videos in total) with several coding categories, including indicators of the two approaches, as well as quality of teaching and classroom interaction characteristics. Preliminary results showed that children who received the form-focused intervention did outperform neither children in the meaning-focused intervention nor children in the control group, who received no language support ($n = 110$) in respect to their grammatical or reading skills. Small effects in favor of the both intervention groups seem to emerge for vocabulary. Further analyses will explore the role of implementation quality in more detail.

How Stereotypes Effect Vocabulary Acquisition of Students with and without Immigrant Background

Presenting Author: Andreas Sander, TU Dortmund University, Germany; **Co-Author:** Annika Ohle, TU Dortmund, Germany; **Co-Author:** Lysann Zander, FU Berlin, Germany; **Co-Author:** Bettina Hannover, FU Berlin, Germany; **Co-Author:** Nele MyElvany, Center for Research on Education and School Development, TU Dortmund University, Germany

Students who, due to an immigrant background, have another family language than the language of instruction at school are faced with challenges regarding their language competence acquisition. We investigated stereotype threat as a cause for lower vocabulary growth of immigrant children in an important phase of language development: during their primary school years. In an experimental design we studied $n = 118$ children with an immigrant background and $n = 72$ native children attending 4th grade. Following a vocabulary pretest, children were randomly assigned to (two slightly varying) stereotype threat conditions or a control condition. Afterwards children were supposed to learn difficult new words. In line

with our expectations, immigrant children's vocabulary growth was inhibited in the stereotype threat conditions when compared to the control condition. In contrast, non-immigrant children learned more in the stereotype threat conditions than in the control condition; it seems: they profited from stereotype lift. The discussion focusses on our findings' implications for a more effective promotion of language skills of non-native speakers of German at school.

Fostering Reading Comprehension and Self-Efficacy in Middle-School Social Studies

Presenting Author:Ana Taboada Barber, Univeristy of Maryland, United States

The need to address comprehension skills in conjunction with discipline-specific content knowledge has become salient with the advent of the Common Core State Standards (CCSS, 2010) in the United States. The CCSS call for students to engage with a wide range of complex texts across the disciplines, including English Language Learners (ELLs). In the current study, we focus on a literacy-in-social studies intervention called United States History for Engaged Reading (USHER). USHER is grounded in the reading engagement model (e.g., Guthrie & Wigfield, 2000; Guthrie et al., 2004; Wigfield et al., 2008) which emphasizes student reading engagement via cognitive-strategy use and supports for reading self-efficacy. Our purpose was to increase reading comprehension and motivation in middle school ELs in social studies classes. A secondary goal was to increase social studies academic vocabulary. Participants included four sixth-grade social studies/language arts teachers and their students [i.e., n=149 students; with 62% of students speaking a language other than English (90% Spanish)]. We approached the intervention with a formative experiment (Jacob, 1992) mixed - methods research design. The emphasis of this methodology is on the factors that enhance or inhibit the effectiveness of an intervention in achieving a pedagogical goal (Reinking & Bradley, 2004). Quantitative results indicated statistically significant increases in comprehension, academic vocabulary, and reading self-efficacy beliefs from pre- to post-implementation. Our qualitative findings indicate that each teacher had areas of strength in relation to USHER practices, as well as challenges. We'll describe implications for teacher preparation.

Extracurricular reading enhancement of third graders with German as a second language

Presenting Author:Catherine Naepflin, University of Teacher Education of Lucerne, Switzerland; **Co-Author:**Caroline Villiger, University of Teacher Education Bern, Switzerland; **Co-Author:**Isabelle Hugener, University of Teacher Education Lucerne (PH Luzern), Switzerland; **Co-Author:**Manuela Frommelt, Unviersity of Teacher Education Lucerne, Switzerland; **Co-Author:**Silke Hauri-Junghans, Pädagogische Hochschule FR, Switzerland; **Co-Author:**Erich Hartmann, Université de Fribourg, Switzerland

Reading ability is a crucial factor for school success and a key competence for lifelong learning and professional success. However, some pupils have difficulties in acquiring sufficient reading competences during their school trajectory. One group of at-risk students represents the second language learners. Our intervention study LIT aimed at increasing the reading fluency of pupils with poor reading performance at Grade 3. They participated in an out-of-school Paired Reading program where they read over 20 weeks averaged 2.3 times a week for 16 minutes aloud with non-professionals as tutors (volunteers). By the means of a randomized controlled field trial, the effectiveness of the program was investigated. In this presentation we focus on a subsample of third graders with German as second language (n=42). Analyses about the effectiveness of the program showed only a significant time effect, but no significant program effect. Significant correlations were found only between reading self-concept and reading fluency Furthermore, findings showed that initial vocabulary knowledge had a significant effect on the development of reading fluency. Further analyses will be done to investigate why the Paired Reading program in this subsample did not show any effect. Implications for further implementation of Paired Reading programs with second language learners will be discussed.

Session Q 6

2 September 2017 10:30 - 12:00

Main Building A - A2A

Symposium

Lifelong Learning

The use of Research Methods to study Learning Transfer

Keywords: Assessment methods and tools, Communities of practice, Educational Psychology, Informal learning, Lifelong learning, Meta-analysis, Mixed-method research, Motivation, Qualitative methods, Quantitative methods, Quasi-experimental research, Teacher Professional Development, Workplace learning

Interest group: SIG 17 - Methods in Learning Research

Chairperson: Carla Quesada-Pallarès, Spain

Chairperson: Andreas Gegenfurtner, Germany

Discussant: Eva Kyndt, KU LEUVEN, Belgium

Organizations invest a lot of time and effort in providing their employees with the competences they need to do their job; sometimes in the form of workshops, sometimes by creating communities of practice. But in order to know if this investment is actually worthy, we must ensure that employees not only learn but use what they have learned into their workplace: they transfer their learning. From the 80s, learning transfer has been studied using various approaches but the scientific literature does not seem to show qualitative advances in its methodology. In this symposium, we intend to bring together methodological reflections on qualitative, quantitative, and mixed method research on transfer. Each contribution will focus

on one method and discusses the empirical affordances and constraints for studying learning transfer in professional and corporate settings. Contribution 1 uses meta-analysis to study work environment support's role on learning transfer. Contribution 2 focuses on a quasi-experimental design to explore the impact of implementation intentions on learning transfer. Contribution 3 develops a mix-method research to deepen the learning transfer process in virtual communities of practice. Contribution 4 studies learning transfer within staff development programs from a qualitative perspective. The involvement of a distinguished scholar in professional learning and human resource development will conclude the symposium by promoting a discussion of the four presentations, analyzing how different research methods can be used to advance the field, and suggesting new research methods that could improve the study of how employees transfer their learning from training to the workplace.

Training transfer and the role of work environment support: A meta-analysis

Presenting Author:Ashley Hughes, Michael E. DeBakey VA Medical Center and Baylor College of Medicine, United States; **Co-Author:**Stephanie Zajac, Rice University, United States; **Co-Author:**Amanda L. Woods, Rice University, United States; **Co-Author:**Eduardo Salas, Rice University, United States

Estimates demonstrate that as little as 52-92% of acquired learning is lost within a year following training (Arthur, Bennett, Stanush, & McNelly, 1997; Saks, 2002), wasting billions in organizational spending on training each year (Miller, 2012, 2013, 2014). As such, research on training transfer has garnered attention from theoretical and empirical research alike (e.g., Baldwin & Ford, 1988; Blume, Ford, Baldwin, & Huang, 2010; Ford & Weissbein, 1997; Tracey, Tannenbaum, & Kavanagh, 1995). Work environment factors have received much attention in the recent research to ensure training is transferred. Specifically, empirical work has shed light to the roles of organizational support and motivation to transfer in predicting training transfer. To this end, we conducted a meta-analytic examination of three work environmental factors and their relationship with training transfer. Results demonstrate that all factors (organizational support, supervisor support, and peer support) positively and moderately correlate with training transfer ($p=0.30-0.50$); interestingly, motivation to transfer was found to fully mediate all three relationships -organizational support, supervisor support and peer support- to training transfer. Secondly, peer support explains the most variance (i.e., 47% of R^2) in training transfer of variables included in this model. Lastly, future research should perform more longitudinal tests on the impact of support over time. Ultimately, this study aims to inform theory and impact the state of the science such that practitioners can feel confident that the effort and expenditure put toward ensuring training transfer is well-spent.

Using implementation intentions in a quasi-experimental design to improve learning transfer

Presenting Author:Carla Quesada-Pallarès, Universitat de Manresa, Spain; **Co-Author:**Pilar Pineda, Universitat Autònoma de Barcelona, Spain

The aim of this paper is to test implementation intentions as a strategy to increase transfer of learning within a quasi-experimental pre-post two groups design. It uses intentional sampling, formed by 61 Spanish public employees after responding different questionnaires based on the Model to Predict Transfer (Quesada-Pallarès & Gegenfurtner, 2015). Implementation intentions (Gollwitzer, 1993) were tested as an intervention strategy to improve transfer level of the experimental group. Results indicate there are no significant differences in the transfer level between control and experimental group, so the effect of implementation intentions to increase transfer cannot be established. This study disproves its hypothesis which allows us to propose new paths for research, and advancing in the evaluation of transfer of learning.

The use of mixed-methods to study the learning transfer process in virtual communities of practice

Presenting Author:Miren Fernández, University of the Balearic Islands, Spain; **Co-Author:**Victoria Marsick, Columbia University: Teachers College, United States

The formation of [online] communities of practice (vCoP) has been found productive in promoting sharing of knowledge, skills and experiences, and in supporting better and faster learning as a result of this exchange. In this paper we show a research situated in this field within the Spanish context. Its general purpose was to analyse the performance of the organization as a learning place, to establish when and why professionals use informal learning and communities of practice, and propose a system for certifying informal learning. The method used was a multi-case study and we opted for a mixed non-simultaneous methodology. The cases were selected by following an intentional sampling method. The selected sample consisted of eight cases. The instruments used for data collection were the questionnaire and interview. The main outcomes show that there is a lack of transfer of final products (created in vCoP) into the workplace. Neither managers nor professionals consider that they profit from the final products produced even though they use informal learning because it permits direct and immediate learning transfer. Although it is difficult to evaluate the participation in vCoP and informal learning acquired through this participation, participants and moderators establish the learning transfer process and knowledge/skills gained to the workplace as an essential criterion. In sum, this study can be used to improve and spread good practice in this domain and it also sheds light on the challenges of assessing informal learning outcomes in organizations.

Reconstructing the Why: A Qualitative Interview Study on Transfer of Training

Presenting Author:Andreas Gegenfurtner, Technische Hochschule Deggendorf, Germany; **Co-Author:**Michael Hellwig, University of Regensburg, Germany

What are the benefits (and pitfalls) of using qualitative research approaches to study transfer of training? This presentation will present three cases from a qualitative interview study. Participants were university lecturers who were mandated to participate in staff development programs to improve their teaching skills. The three cases illustrate different motives and their associated transfer activities. Grounded in goal content theory, the analyses shed light on why training participants initiate, execute, and maintain efforts to apply trained teaching skills to their lectures and seminars. In addition to reconstructing the Why of transfer, the presentation will address the theme of this symposium and emphasize the potential benefits and risks of using qualitative research instruments to study transfer of training.

Session Q 7

2 September 2017 10:30 - 12:00

Main Building C - C8

Symposium

Learning and Social Interaction

Child Language in Preschool Settings: Development and Support

Keywords: Competencies, Developmental processes, Early childhood education, Experimental studies, Language (Foreign and second), Language (L1/Standard Language), Pre-service teacher education, Quantitative methods, Second language acquisition, Teacher Professional Development, Video analysis

Interest group: SIG 05 - Learning and Development in Early Childhood

Chairperson: Ulla Licandro, Leibniz University of Hannover, Germany

Discussant: Franziska Vogt, University of Teacher Education St.Gallen, Switzerland

Documenting and supporting children's communicative development is a crucial part of the professional activities in early childhood education and care (ECEC). This interdisciplinary symposium offers research evidence supporting both areas of expertise. On the one hand, it focuses on the children themselves – two studies analysed children's language skills (i.e., emerging phonological, lexical, grammatical, and narrative knowledge). On the other hand, the language supporting competencies of early childhood professionals are investigated – one study explored their knowledge and practices in language support. The final study combined both target groups and research aspects. All four studies applied different kinds of quantitative and qualitative data analysis (e.g., language sampling of the children; videos and interviews of the adults) and research methods (e.g., coding via category systems, qualitative content research). The collected findings will provide scientific findings to discuss the questions, which aspects of child language should be targeted by early language support as well as how practitioners may do so effectively in ECEC. Special attention will be given to the heterogeneity of the investigated children (mono- and bilingual, performing below average, etc.) as well as deriving implications for the education and professional development of early childhood professionals.

Narratives as a window into children's emerging second language skills

Presenting Author: Ulla Licandro, Leibniz University of Hannover, Germany

Telling a story requires the narrator to move beyond the observable and to create meaning by coordinating, integrating, and encoding large amounts of information solely through language, which makes preschool narrative skills an important predictor and facilitator of literacy and academic success. Regardless, little is known about dual language learners' (DLLs) emerging narrative skills. The current study explored the oral narrative skills of preschool-age Turkish-German DLLs. All participating children produced a narrative sample in response to a wordless picture book and completed further assessments. Considerable variance emerged between children, which could be partly accounted for by age, expressive language skills and nonverbal intelligence. Implications for the support of DLLs in early childhood education and care will be discussed.

Language Supporting Practices of Early Childhood Professionals – Results of the BiSS-Study allE

Presenting Author: Christine Beckerle, Hannover University, Germany; **Co-Author:** Katja Mackowiak, Leibniz University of Hannover, Germany

The study "Conditions of Success in Everyday Language Support in Kindergarten (allE)" is part of the nationwide initiative "Education through Language and Writing (BiSS)" in Germany. It focuses on the evaluation of advanced training concepts on language support in Early Childhood Education and Care (ECEC). In a pre-post- and mixed-methods-design, the language supporting competencies of the ECEC professionals were analysed via videos and interviews, the children's language skills via language tests and profiles. This paper concentrates on the language supporting techniques, which ECEC professionals use in daily kindergarten life to promote children's language development. One main finding is that the professionals are very heterogeneous in their use of these techniques in total as well as of the three different kinds of techniques (correcting, modelling, and stimulating techniques). One hypothesis, that will be investigated, is that different numbers of techniques are practised in different situations: Professionals could use a higher number in more structured dyadic bookreading situations and a smaller number in more complex situations with groups of children in freeplay and eating situations. An open question, that will be addressed, is whether the professionals use a different number of techniques dependent on their work experience.

Let's Talk – Developing an intervention to support preschool children's oral language development

Presenting Author:Gillian Lake, Oxford Brookes University, United Kingdom

An intervention, which targeted three- and four-year-old children's oral language, was developed for this study. The intervention was run over twice-weekly sessions, for ten weeks. Incorporating good Early Years practice, the first session in the week was a group shared storybook reading session with a puppet, where dialogic discussion took place and the children practised sequencing the story using visual prompts. The second weekly session consisted of planning, acting out and reviewing a planned pretend play episode based on the storybook which was read in that week's first session. Ninety-four children were randomly assigned to a control or treatment group and were tested at pre- and post-test on a battery of vocabulary and narrative assessments. The results of a Randomised Control Trial were positive in favour of the intervention. The most important of these results was a statistically significant effect on the receptive vocabulary of the children in the treatment group, with a large effect size, as measured by the standardised *British Picture Vocabulary Scales* (Dunn *et al.*, 1997). A further positive effect concerned the *Mean Length of Utterance* (MLU) of the children - this score was higher in the treatment group, with a medium effect size. The acknowledgement of the role of the adult in the intervention coupled with the positive effect on the children's MLU and receptive vocabulary mean that the intervention has the potential to be used as a Professional Development tool for supporting language development in the Early Years, in the future.

Early childhood professionals' language support competence – comparing knowledge and practice

Presenting Author:Nadine Itel, University of Teacher Education St.Gallen, Switzerland

Integrating professional language support in everyday activities is a highly challenging task that requires professional competencies by the practitioners. Research has highlighted the importance of professional trainings to develop knowledge about good teaching practice. This study will seek to identify the early childhood professionals' specific knowledge about four strategies to support language development in order to relate it to their practice based on the same language support strategies. 47 early childhood practitioners participated in this study. Two methods for data collection were applied: An interview using film vignettes to assess knowledge and a video observation to assess practice. Both interview and video data were analysed with the same category system using quantitative content analysis. The categories focus on four sets of language support strategies: dialogue, questions, vocabulary teaching, and modeling. Results show that specific knowledge about correcting children's utterances correlates with the number of corrections observed in practice ($r = .327$, $p < .05$), but no correlations can be found between the overall knowledge about initiating and extending a dialogue and the number of dialogues observed in practice. Implications of the results will be discussed regarding future research as well as the practical relevance for developing professional trainings.

Session Q 8

2 September 2017 10:30 - 12:00

Linna - Väinö Linna (K104)

Symposium

Instructional Design, Lifelong Learning, Motivational, Social and Affective Processes

Barriers and Biases for Females Approaching STEM Careers

Keywords: Attitudes and beliefs, Conversation / Discourse analysis, Cultural diversity in school, Educational Psychology, Higher education, Lifelong learning, Mathematics, Quantitative methods, Quasi-experimental research, Self-efficacy, Social aspects of learning and teaching, Social sciences, Teaching approaches, Vocational education

Interest group: SIG 10 - Social Interaction in Learning and Instruction, SIG 14 - Learning and Professional Development, SIG 18 - Educational Effectiveness, SIG 21 - Learning and Teaching in Culturally Diverse Settings

Chairperson: Manuela Paechter, University of Graz, Austria

Discussant: Hanke Korpershoek, University of Groningen, Netherlands

Career orientation and vocational choice are the result of a long socialization process in which adolescents are influenced by different variables in their social context. Social Cognitive Career Theory (Lent, Brown, & Hackett, 2000) distinguishes between different context variables. Such context variables may support adolescents in an optimal career orientation but they also may act as barriers. Barriers can exert pressure on a person to conform to societal expectations in their career decision and they can influence a person's assessment of their skills and abilities, that is, her/his self-concept. Societal expectations of which professions are considered as being appropriate for females and males act as strong barriers in the process of career decisions. Females who consider a career in a STEM-field (traditionally gender-typed masculine) or who are even only interested in a STEM-subject are especially exposed to the influence of barriers. The contributions of this symposium investigate how barriers influence young females in their career orientation and also how barriers can be overcome. They show how barriers influence females' conception of themselves and illustrate the influence of these barriers in three different age ranges and contexts from mathematics education in primary school, choices of young adolescents for a vocational apprenticeship, and STEM for university students. Furthermore, the presentations discuss how significant others (e.g., teachers; family members) influence adolescents' self-concept with regard to abilities that are relevant for a future profession. Bringing these papers together, the symposium discusses prominent barriers for career decisions and concludes with remedies and specific interventions.

Barriers and biases for females in STEM careers

Presenting Author:Bernhard Ertl, Bundeswehr University Munich, Germany

Students' academic self-concept is usually strongly related to achievements. Research has shown that stereotypes exert detrimental effects on both students' academic self-concept as well as achievements. These effects can be a barrier for females' development of a positive self-concept in stereotyped subject areas (e.g., STEM: science, technology, engineering, and mathematics). Specific support by teachers and parents may counteract these effects if they support female students with beneficial attribution patterns. The present study investigates impact factors on the academic self-concept of female students in STEM subjects where the proportion of females is less than 30 %. It goes beyond the mere influence of stereotypes and also considers the students' school and family environment as factors of impact. The study analyses to which degree family factors, school-related factors, and stereotypes may influence such females' academic self-concept. For the investigation of relationships between these variables a structural equation model was conducted based on a survey with 296 females from different German universities. The analytical procedure firstly provided a confirmatory factor analysis for extracting the latent factors of stereotypes, school, and family influences and then provided a structural regression model of the impact of these factors on the students' self-concept. The model explained more than 30 % of the variance of students' academic self-concept. However, even in the selected sample gender stereotypes had a large impact on students' STEM-specific academic self-concept. Positive influences were school aspects that included the students' favourite subjects in STEM at school.

Mathematics self-concept in New Zealand primary school students: Intervening to lower a barrier?

Presenting Author:Penelope Watson, University of Auckland, New Zealand; **Co-Author:**Christine Rubie-Davies, University of Auckland, New Zealand; **Co-Author:**Kane Meissel, University of Auckland, New Zealand; **Co-Author:**Annaline Flint, University of Auckland, New Zealand; **Co-Author:**Lynda Garrett, The University of Auckland, New Zealand; **Co-Author:**Lyn McDonald, The University of Auckland, New Zealand

Despite demonstrating mathematics ability equal to that of males, females remain underrepresented in mathematics-related fields. In terms of career choice, self-concept rather than ability has comprised a critical filter. Globally, persistent differences in mathematics self-concept have favoured males and may be especially influenced by teachers in the early years of schooling. Further, mathematics self-concept often differs by student ethnicity as well as student gender, and declines over time. The current study was conducted longitudinally with a large sample of New Zealand primary school students and their teachers. The influence of an intervention to raise and sustain teacher expectations of student achievement was investigated. Specifically, an investigation as to whether student mathematics self-concept varied over the course of the longitudinal study by student gender, teacher gender, student ethnicity, and overall was conducted. The results of repeated-measures ANOVAs indicated a marginal interaction effect between student and teacher gender disadvantaging the mathematics self-concept of girls in the classes of female teachers during the first intervention phase of the study, but this effect dissipated by the intervention's final phase. A significant interaction effect existed for student gender by ethnicity, and a pattern of a greater mathematics self-concept for boys remained consistent across all ethnicities (except for Pacific Islanders) and phases. Importantly, although a drop in student mathematics self-concept usually associated with increasing student age was expected, no such reduction was noted across the intervention phases of the study. Implications for mathematics self-concept as a powerful determinant of student career choice are described.

Applying reconstructive social research to reveal barriers for female apprentices in STEM

Presenting Author:Gernot Dreisiebner, University of Graz, Austria; **Co-Author:**Michaela Stock, University of Graz, Austria; **Co-Author:**Georg Tafner, Bundeszentrum für Professionalisierung in der Bildungsforschung, Austria

Career choices of adolescents often follow gender-stereotypical patterns, with young females deciding less frequently for a vocational apprenticeship in STEM. The purpose of this study is to reveal the framework of orientations underlying these career choices and to investigate which barriers young females are confronted with before and after entering the labour market. For this purpose, group discussions are conducted with nine groups of male and female students (N = 31) in vocational education before entering the labour market, followed by narrative interviews after the students have entered their vocational field. The material is analysed utilizing the documentary method (Bohnsack, 2010), allowing for contrasting between the two genders. The preliminary results indicate, that especially for young females who choose a vocational apprenticeship in STEM and who are constantly confronted with barriers of gender-stereotypical nature, stereotypes play an important role in their individual framework of orientations.

Barriers in Gender-untypical Career Aspirations – Same Patterns for Females and Males?

Presenting Author:Silke Luttenberger, University of Teacher Education Styria, Austria; **Co-Author:**Stephanie Toldo, University of Graz, Austria; **Co-Author:**Manuela Paechter, University of Graz, Austria

Influence factors on career aspirations guide adolescents' career-related choices and serve as obstacles to adult career satisfaction and job tenure. Adolescents' career aspirations are affected by many factors, such as individual (e.g., self-efficacy, interest) or contextual (e.g., family, peers) characteristics. Gender-untypical choice behavior is still rare, with males deciding less frequently for apprenticeship in social and females in technical (or STEM) domains. Internal and external factors may serve as perceived barriers, or supports, to entry into gender-untypical professions. The present study investigates differences between females and males with gender-typical and gender-untypical career wishes. Altogether, 574 students from 16 pre-vocational schools in Austria took part in a survey on career goals, experiences of barriers in the apprenticeship-finding process in their desired profession, and congruence between student's career wishes with their parents and their best friend's career wishes. Generally adolescents with gender-untypical career wishes experienced

external barriers, which directly influence the career choice process. Furthermore, only boys with gender-untypical career wishes experienced internal barriers (e.g. insecurities in interests and estimation of own abilities). Boys, however, experienced more support from the family and reported of male role models within the family. The pattern for females was different: females with untypical career wishes did not report internal barriers. But they missed social support and career role models.

Session Q 9

2 September 2017 10:30 - 12:00

Main Building D - D14

Symposium

Cognitive Science, Instructional Design, Learning and Instructional Technology

Learning to write Synthesis Texts Part 1; Process studies

Keywords: Attitudes and beliefs, Cognitive skills, Educational Psychology, Higher education, Literacy, Primary education, Writing / Literacy

Interest group: SIG 12 - Writing

Chairperson: Elke Van Steendam, KU LEUVEN, Belgium

Discussant: Elke Van Steendam, KU LEUVEN, Belgium

Learning tasks that require students to consult, select, contrast and integrate information from multiple sources in written form are frequently required by universities, especially in certain fields (social sciences, humanities, etc.). The production of a written synthesis of multiple texts, whether it is referred to as such (as being a synthesis as such) or any other name (essay, literature review, research proposal, etc.) is viewed as a complex task with strong potential for fostering learning. Our research has shown how challenging this task is for students, due both to its intrinsic difficulty and to the lack of guidance students generally receive, even though a synthesis is a relatively common assignment.

On this theme we offer two symposia: (1) on process studies relating processes, quality of learning and texts and learner characteristics, to find effective processes, and (2) on effective interventions, related to learner characteristics. In Symposium I the research groups participating in this symposium will present the results obtained from studies that are part of larger research programmes. All four studies present finished studies on the process to synthesize content elements in a unified, coherent text, in various countries ($n=3$), populations (upper primary, undergraduate students, pre-master students), and various methodologies -- varying from regression of subskills to coherent text production to rhetorical analyses of text, source use and keylogging processes. The symposium will deal with effects of genre, language and individual characteristics.

Rewriting at the Word and Sentence Levels Predicts Children's Essay Content & Structure Quality

Presenting Author: Deborah McCutchen, University of Washington, United States; **Co-Author:** Becky Logan Herrera, University of Washington, United States; **Co-Author:** Mary Northy, University of Washington, United States; **Co-Author:** Teixeira Clark, University of Washington, United States; **Co-Author:** Emma Huey, University of Washington, United States

American author Ernest Hemmingway once stated, "The only kind of writing is rewriting." In this study we examined whether skill in rewriting sentences, as measured by a sentence revision task tapping both word-level derivational morphology and sentence-level syntactic skills, predicts performance on a standardized essay writing task for fourth- and fifth grade U.S. students, after controlling for grade level, comprehension, and writing fluency. Multilevel analyses indicated that word- and sentence-level revision skill and writing fluency were each uniquely predictive of essay quality. Consistent with Berninger and Amtmann's simple view of writing (2003), we argue that fluent text generation and revision, as well as fluent transcription, during the writing of extended multi-sentence text helps writers reduce working memory demands during writing, allowing them to attend to larger rhetorical goals.

Synthesis writing: relations between writing processes and text quality, moderated by writing style

Presenting Author: Nina Vandermeulen, University of Antwerp, Belgium; **Co-Author:** Brenda van den Broek, University of Antwerp, Belgium; **Co-Author:** Elke Van Steendam, KU Leuven, Belgium; **Co-Author:** Sarah Bernolet, University of Antwerp, Belgium; **Co-Author:** Gert Rijlaarsdam, University of Amsterdam, Netherlands

This study explored the relations between writing processes and text quality of synthesis texts for different types of writers. A total of 74 pre-master's students wrote each two synthesis texts in the context of an academic writing course. Texts were rated on text quality and students' writing processes were registered using keystroke logging software Inputlog. Information on students' writing styles was collected using validated questionnaires. Results show relations between the fluency of text production and text quality and between writing style and text quality. Students who wrote more fluently and students with a more clearly defined writing style wrote better text. Furthermore, a number of moderation effects were found. The effects of variation in the writing process and pausing behaviour on text quality were found to be moderated by writing style. Substantial variation in the writing process leads to good texts for students who characterize themselves as planners. For students who do not characterize themselves as planners, however, it leads to poor texts. With regard to the second moderation effect, we found that students who characterize themselves as planners write better texts when their pausing behaviour is less troublesome. For students who do not characterize themselves as planners, pausing behaviour does not

influence text quality. The results of this study corroborate earlier research showing links between the writing process and the quality of the produced text. In addition, we have shown that this link in some case depends on the writing style of the writer.

Variation in source use in argumentative writing in L1 and L2

Presenting Author:Daphne van Weijen, University of Amsterdam, Netherlands; **Co-Author:**Gert Rijlaarsdam, University of Amsterdam, Netherlands

Source use is an important element of synthesis writing, and thus an essential skill for academic writing. Teaching students appropriate source use skills can help them learn how to avoid plagiarism and reduce cognitive overload while writing. Effective source use might be a language-independent skill, at least to some extent. If so, then teaching students this skill in one language (L1 or L2) might well help them improve their synthesis writing skills in both languages. The aim of this study was to determine whether source use in an argumentative task is a language- or learner-specific skill. Twenty students wrote 8 short argumentative essays each, 4 in their L1 (Dutch) and 4 in their L2 (English) using 6 short sources. Students' texts were analysed, using a plagiarism detection tool, to determine the extent to which they integrated information from the sources in their essays, and whether this varied between tasks and languages. The results suggest that source use skill might be a learner-specific skill, while the extent to which students' vary their source use across tasks within L1 or L2 seems to some extent language dependent. Finally, L2 proficiency seems to act as moderator variable as well.

Influence of genre and task upon students' compositional decisions for synthesis writing

Presenting Author:Danielle Zawodny Wetzel, Carnegie Mellon University, United States; **Co-Author:**David Kaufer, Carnegie Mellon University, United States

This paper reports on compositional decisions in students' synthesis writing from two different versions of a first-year writing course within a North American university. The study employs a computer-aided rhetorical analysis tool (called DocuScope) to investigate how rhetorical task shapes student writing about sources. Drawing on a sample of 70 student texts, the analysis traces and compares features of synthesis writing across assignments that commonly call for a "research summary" but within two different genre types. Unsurprisingly, data analysis shows a marked difference between the text features of each type of synthesis writing. We identify the patterns of variation between these assignments and we argue that the variation reflects tacit linguistic and rhetorical expectations that instructors bring to the different formulations of the assignment. This study contributes to the literature on the way implicit task representations of a writing assignment affects not only the epistemic assumptions framing it but the visible language produced. This study additionally offers practical insights for the instructional design of reading-to-write tasks, especially as they relate to rhetorical context and genre.

Session Q 10

2 September 2017 10:30 - 12:00

Pinni B - B1096

Symposium

Educational Policy and Systems, Learning and Social Interaction

The Quality of Extended Education: Results from Sweden, Germany and Switzerland

Keywords: Achievement, Case studies, Cognitive development, Comparative studies, Educational policy, Informal learning, Out-of-school learning, Primary education, Qualitative methods, School effectiveness, Social development, Student learning, Survey Research

Interest group: SIG 23 - Educational Evaluation, Accountability and School Improvement

Chairperson: Marianne Schuepbach, University of Bamberg, Germany

Discussant: Kristiina Kumpulainen, University of Helsinki, Finland

Driven by the demand for sociocultural infrastructure and the intention to foster socio-emotional development and academic achievement, an increase in extended education for school age students is taking place in several European countries. *Extended education* refers to various extracurricular educational activities such as all-day schools in Switzerland and Germany, educare centres in Sweden, or afterschool programs in the United States. While US-afterschool programs have been examined more extensively, little is known about the quality of extended education activities in Europe, which are usually less goal-oriented and aimed at a more homogenous group of students than their American counterpart. This symposium will highlight trends and shortcomings of the current research, while taking different approaches towards quality into account: First, we will take a look at the quality of *educare centres* in Sweden, which have been widely established since several decades but only recently were met with increased demands regarding their quality. The second contribution will examine regional quality regulations for *all-day schools* in Germany while the third contribution, also from Germany, will present indicators of student-activating settings. Finally, the contribution regarding *all-day schools* in Switzerland will explore different aspects of quality with regard to socio-emotional development and school achievement. The central aim of the discussion is to find out more about the current state of extended education in several European countries and to identify indicators of beneficial settings.

Quality measures for all-day schools in the context of federalism in Germany and output control

Presenting Author:Bettina Arnoldt, German Youth Institute, Germany; **Co-Author:**Peter Furthmüller, Deutsches Jugendinstitut, Germany

Initiated with an investment program by the Federal Government the expansion of all-day schools has strongly increased since 2002. After all-day schools were widely established and developed throughout the country, politics and educational research began to stronger focus the quality of the extracurricular programs. Debates on the implementation of quality standards keep coming up ever since.

In our presentation, we pursue this issue of existing methods of quality control and also examine how the different proceedings can be assessed in the light of theoretical approaches like output control, context control or governance. The „study on the development of all-day schools“ has conducted comprehensive research about the Bundesländer and their regulations on all-day schools. Result of the research is a systematization of differences and similarities in the Bundesländer and their approaches to ensure quality in the domain of all-day schooling.

It can be shown that some Bundesländer have extended their existing instruments of quality development by specific criteria for all-day schools. Other have devised new quality guidelines for all-day schools, which are supposed to provide support for the further development of extracurricular programs. Hardly any quality standards have been introduced, which provide mandatory goals for all-day schools and are checked for compliance. While school autonomy and decentralization have been implemented by almost every Bundesland to govern all-day schools, there is a variety of approaches for definition and supervision of intended outputs.

Quality Aspects of Pupil-Activating Extracurricular Provisions at German All-Day Schools

Presenting Author:Stephan Kielblock, Justus Liebig University Giessen / Macquarie University Sydney, Germany; **Presenting Author:**Johanna May Gaiser, Justus Liebig University Giessen, Germany

The three basic dimensions mentioned above could be approved in this empirical study to be relevant quality aspects of student-activating provisions. Yet, the results additionally present other facets of quality that seem to be more or less overlooked in the discourse on extended educational provisions so far.

The data originates from the Study on the Development of All-Day Schools (StEG; 2012-2015). Within the partial study 'StEG-Q', multi-perspective longitudinal case studies were conducted at all-day schools in Germany. Cases were extracurricular activities at schools such as homework support, theatre club, free play time. StEG researchers interviewed the children and the staff, led group discussions with children, and conducted participant observations in these activities. The data analysis procedure involved empirical and theoretical iterations that resulted in 11 quality dimensions and 20 quality aspects. The results are deeply rooted in the empirical cases, but are as well in an explicit relation to common quality concepts.

Extended Education' in the school context includes a wide range of extracurricular activities. These kinds of provisions share common quality features. In former studies these features are considered to be analogous to the three dimensions of high-quality curricular classes, namely classroom management, student orientation and cognitive activation. Lately, the question has been raised in the German context if these quality dimensions are in fact applicable to non-formal and informal educational contexts. This exploratory study investigates which (quality) aspects can be empirically extracted from extracurricular activities that succeed in activating pupils.

Parent's perceptions of the quality in Swedish school-age educare centres

Presenting Author:Anna Klerfelt, University of Jönköping, Sweden

The aim of the study is to review the results from surveys made by the Swedish School Inspectorate 2010-2017 concerning the quality in Swedish school-age educare centres and – through an analysis of parts of these results and recommendations – to contribute to the discussion of quality issues surrounding extended education. The research question is: What do multiple assessments on the quality of activities within school-age educare centres, as perceived by parents, show? The empirical data is selected from surveys answered by parents during 2010-2017. The analysis will be inspired by Fairclough's (2010) descriptions of Critical Discourse Analysis (CDA) where he describes that CDA looks to establish connections between properties of text, features of discourse practice and wider sociocultural practice. Results comparing previous surveys (The Swedish School Inspectorate, 2010; 2012; 2013) have shown differences in the quality of educare centres, as perceived by parents. In continuation of those efforts, the analysis in this study will look for differences between previous (2010-2016) and current surveys (2016-2017) and for patterns in the results from the surveys conducted during autumn 2016 and spring 2017. The results will be used to support policy-makers, headmasters and teachers in their efforts to review and refine their own work regarding the development of activities within school-age educare centres.

Quality-aspects of all-day schools in Switzerland: What affects academic and socio-emotional skills?

Presenting Author:Marianne Schuepbach, University of Bamberg, Germany; **Co-Author:**Lukas Frei, University of Berne, Switzerland; **Co-Author:**Wim Nieuwenboom, University of Bamberg, Germany; **Co-Author:**Benjamin von Allmen, University of Bern, Switzerland

In the past decade, societal changes and political efforts have led to an increase in all-day schools across Switzerland, which are defined as schools not only comprising regular school hours but also offering education and care during the rest of the day (also referred to as extended education). In current debates on education in Switzerland, all-day schools are granted a central role in view of school achievement and socio-emotional development, but empirical evidence so far is scarce and inconsistent. While the quality of extended education has long been proposed to moderate the impact of all-day schools on educational and socio-emotional outcomes, it is unclear which aspects of quality are most relevant with regard to current all-day schools in Switzerland.

Data were drawn from the longitudinal research project *EduCare-TaSe – All-Day School and School Success?*, comprising 1'990 students from 53 voluntary all-day schools in the German-speaking part of Switzerland. Educational skills and socio-emotional behavior were measured at the end of first grade (T1) and again at the end of second grade (T2), quality of the extended education services was rated during first grade.

Our analyses identified three distinctive quality-components: (1) *Space and Equipment*, (2) *Caregiver-Student Interactions*, and (3) *Cooperation*. Subsequent multilevel-regression-analyses identified caregiver-student interactions and cooperation as important aspects of quality with regard to academic and socio-emotional outcomes: While the level of cooperation had a positive effect on the development of mathematical skills, regardless of extended education utilization, caregiver-student interactions moderated the effect of extended education on externalizing behaviour.

Session Q 11

2 September 2017 10:30 - 12:00

Pinni B - B1100

Symposium

Assessment and Evaluation

Learning analytics in educational practices: Barriers and how they may be overcome.

Keywords: Achievement, Assessment methods and tools, At-risk students, Competencies, Computer-supported collaborative learning, Higher education, Learning analytics, Teacher Professional Development, Teaching approaches

Interest group: SIG 01 - Assessment and Evaluation, SIG 04 - Higher Education, SIG 11 - Teaching and Teacher Education

Chairperson: Bert Slof, Utrecht University, Netherlands

Discussant: Dragan Gasevic, University of Edinburgh, United Kingdom

Learning Analytics (LA) is often coined as collecting, analyzing and reporting learner data for the purpose of better understanding learning and fostering it through providing personalized instruction (Greller & Drachler, 2012). Although the computational power of computers increased and learner data is often logged (Blackboard), educational settings scarcely or ineffectively employ LA-enhanced applications to foster learning (van der Schaaf et al., in press). To address this, educational practitioners, policy-makers, and researchers need to overcome barriers such as (1) taking contextual factors (educational setting) into account during the development and implementation, (2) analyzing and presenting LA-data in such a way that it predicts and prompts desired learning activities, and (3) ensuring user privacy (Ferguson et al., 2015; Gašević, Dawson, Rogers, & Gasevic, 2016; Selwyn, 2015). In the symposium representatives of four state-of-the-art projects discuss how they addressed one or more of the barriers. Furthermore, empirical findings regarding the use (usability and usefulness) of the employed applications and/or their affect on user performance (learning) will be discussed. Whereas all projects have the same scope, they were carried out in different countries (England, Estonia, Luxembourg and, The Netherlands,) and differ in educational context; namely student problem-based learning (project 1), adaptive teaching skills in higher education (project 2), student teachers' acquisition of teaching skills (project 3) and predicting academic achievement in higher education (project 4). The discussant - Dragan Gašević - critically reflects on the scientific and educational relevance of the LA-enhanced applications and offers suggestions for new directions for practice, policy, and research.

Humans vs. Computer-Simulated Agents as Collaboration Partners in CSCL-Environments

Presenting Author:Samuel Greiff, University of Luxembourg, Luxembourg; **Co-Author:**katharina herborn, University of Luxembourg, Luxembourg; **Co-Author:**nick schweitzer, University of Luxembourg, Luxembourg; **Co-Author:**maida mustafic, University of Luxembourg, Luxembourg

The Programme for International Student Assessment (PISA) firstly assessed Collaborative Problem Solving (CPS) in 2015 by a computer-based approach, in which students collaborated with computer-agents via predefined chat communication (Human-Agent format (H-A). In the context of the PISA 2015 Validation Study, the original PISA 2015 CPS units were reformatted into a Human-Human approach (H-H), in which a classmate replaced one agent across all CPS units. The H-H approach reflected more real-life collaboration environments and collaborative learning processes as it allowed group composition effects as well as non-standardized communication between collaborators. The aim of this study was to compare the two contrasting collaborative learning environments to study the effect of interface changes (agents vs. classmate) on students' collaborative learning activities. The sample included 777 students from 36 classes from grade 9

and 10 (grammar schools) in Germany and Luxembourg. By using so called big data techniques (structural equation and bifactor models), the results indicated no practical difference in students' collaborative learning activities and CPS performance. Considering the increasing political and educational implications of CPS assessment, coupled with the unclarity of learning analytics, this study generated foundational knowledge and is therefore of theoretical and educational significance.

What do teachers do with learning analytics? A case study in higher education

Presenting Author:Anouschka van Leeuwen, Utrecht University, Netherlands

The field of Learning Analytics (LA) is concerned with studying (digital) traces of learning and the analysis of these traces to improve learning processes. Teachers have been advocated as one of the central stakeholders for which LA could have value. However, not much is known about the way teachers actually make use of LA while teaching a course. By means of logbooks and interviews, the present study investigated what functions weekly LA reports fulfill for teachers in a University course with a flipped classroom model. Data was collected weekly from students' online and face-to-face activities, which were summarized on teacher reports. The study showed that teachers found the LA reports useful to maintain an overview of student activities, but not all teachers were able to translate these summaries into pedagogical action. The premise of LA delivering *actionable* knowledge is therefore not trivial, and teachers may need training or support to be able to interpret student data and translate them into action.

E-portfolio's with learning analytics in teacher education: Teachers' user experiences

Presenting Author:Pihel Hunt, University of Tartu, Estonia; **Co-Author:**gerli silm, University of Tartu, Estonia; **Co-Author:**Liina Malva, University of Tartu, Estonia; **Co-Author:**Äli Leijen, University of Tartu, Estonia; **Co-Author:**Bert Slof, Utrecht University, Netherlands; **Co-Author:**Marieke van der Schaaf, Utrecht University, Netherlands

There is a need for a more high-quality and just-in-time feedback in the workplace environment (Miller & Archer, 2010). A learning analytics approach, combined with e-portfolios can deal with the complexities of the professional workplace-based environment and ensure just-in-time high quality feedback for learners. This paper reports the experiences of 9 pre-service and 13 in-service teachers in the implementation of an e-portfolio that is enriched with learning analytics. In the context of this study the learning analytics application lies in automated feedback and visualisation modules. The automated feedback module presents personalised feedback based on the received rubric scores. The visualisation module produces informative graphical representations of aggregated and individual data on the basis of information retrieved from the e-portfolio data. Questionnaire was administered and a focus group interview was held to gain insight into the user experiences. The study revealed that in general the teachers felt that the e-portfolio with the learning analytics applications was easy to understand and use and it enhanced their workplace-based performance.

Using big data to understand learning gains in knowledge and understanding in higher education

Presenting Author:Jekaterina Rogaten, Open University, United Kingdom; **Co-Author:**Bart Rienties, Open University UK, United Kingdom

Over the years universities developed various approaches to measuring students' learning and one such strategy is measuring students' learning gains in Higher Education (HE). Learning gains can be defined as change or growth in knowledge, abilities and skills. Learning gains are commonly assessed using pre-post testing, but using principles of learning analytics this study examines whether academic performance within 111 modules can be effectively used as proxy to estimate 17,770 students' learning gains in knowledge and understanding, and how much variance in learning gains is due to students having shared educational experiences at the level of a module. A three-level growth-curve model was estimated separately for Science and Social Science students and results indicated that for Science students studying in any particular module accounted for 33% of variance in students' initial achievements, and 26% of variance in subsequent learning gains, whereas for Social Science students studying in any particular module accounted for 6% of variance in initial achievements, and 19% or variance in subsequent learning gains. Furthermore, gender, ethnicity and prior educational qualifications of students explained additional 6.4% of variance in learning gains for Social Science students' and additional 5% of variance for Science students. These findings have important practical implications for universities who are seeking to widen participation in higher Education and attract students from 'non-traditional' backgrounds.

Session Q 12

2 September 2017 10:30 - 12:00

Pinni B - B1097

Symposium

Instructional Design, Learning and Special Education

Training source evaluation skills: What works, for whom and why?

Keywords: Instructional design, Literacy, Reading comprehension, Student learning

Interest group: SIG 06 - Instructional Design

Chairperson: Marc Stadler, University of Münster, Germany

Organiser: Jean-Francois Rouet, University of Poitiers, France

Organiser: Marc Stadtler, University of Münster, Germany

Discussant: Sarit Barzilai, University of Haifa, Israel

Training source evaluation skills: What works, for whom and why? The goal of this symposium is to reflect on current theories of source comprehension and their implications for effective classroom interventions. Theories of source comprehension provide insights regarding the construct of "source information", the knowledge required to interpret source information and the relationship between source evaluation and readers' validation of text information (i.e., acceptance of information as reliable and accurate; Britt, Richter & Rouet, 2014; Rouet & Britt, 2014). Implications for classroom interventions include the definition of educational objectives and curricula at various grade levels, the selection of instructional methods, the design of tasks and assessment procedures that support the effective teaching of sourcing skills. The symposium will gather leading research groups in the study of sourcing skills in children and teenage students. The contributors will present the design and results of a highly coherent set of recent or ongoing classroom intervention studies targeting various types of populations (ranging from lower secondary school students to adults with intellectual disabilities). The studies are grounded in state of the art theories and empirical findings in the domain.

The expected outcome of the symposium includes a better understanding of what, when and how to effectively teach in order to foster critical source evaluation skills that can prepare students for the independent use of Internet-based information.

Teaching Sourcing in Upper-Secondary School

Presenting Author: Eva Wennås Brante, University of Oslo, Norway; **Co-Author:** Helge I. Strømsø, University of Oslo, Norway; **Co-Author:** Elisabeth Stang Lund, University of Oslo, Norway; **Co-Author:** Ivar Bråten, University of Oslo, Norway

This presentation describes an ongoing intervention in upper-secondary school, where 150 students are taught sourcing strategies by their teachers during a six-week period. The teachers responsible for implementing the sourcing intervention participated in professional development sessions for nine hours before the intervention started, in which detailed guidelines for the intervention were shared and discussed extensively. The intervention focuses on sourcing strategies when selecting information, reading for understanding, and writing argumentative text, and the sourcing intervention is embedded in regular subject-matter teaching in language arts classrooms. Participants in the intervention are compared to 150 upper-secondary school students that receive typical classroom instruction in the same subject during the same period of time. At pre-test, the individual difference variables that were measured included reading comprehension skills, working memory, source knowledge, topic knowledge, topic interest, and topic beliefs. At post-test and delayed post-test (one month later), intervention and control students' sourcing strategies will be assessed by means of an application program where they select and use multiple sources on two socio-scientific topics for a particular purpose (i.e., to write a letter to the editor). Given the ongoing nature of the intervention, this presentation will focus on the design and the instrumentation of the study, and the instructional materials and the content of the intervention will be discussed in detail.

Learning to read critically: an intervention with people with intellectual disabilities

Presenting Author: Ladislao Salmeron, University of Valencia, Spain; **Co-Author:** Pablo Delgado Herrera, University of Valencia, Spain; **Co-Author:** Inmaculada Fajardo, University of Valencia / Interdisciplinary Research Structure for Reading Research (ERI Lectura), Spain; **Co-Author:** Vicenta Ávila, University of Valencia / Interdisciplinary Research Structure for Reading Research (ERI Lectura), Spain

Low level of reading skills and high level of credulity are two critical barriers that people with intellectual disabilities (ID) face when confronting conflicting information from the Internet. We developed a pilot program aimed to enhance the awareness of the importance of attending to information sources when reading on the Internet and to promote the necessary abilities to assess the reliability of claims. By means of several instructional techniques adapted to oral reading (i.e. direct instruction, open discussion, modeling and contrasting cases) and through different socio-scientific controversies, eleven adults with ID participated in nine instructional sessions of 45 minutes each. Attending to utterances during discussions, results from pre- and post-test sessions indicated that participants increased both the references to source information and the connection between their prior knowledge the information on the webpages. Additionally, participants were globally satisfied with the program. Based on this experience, we are currently improving the program, that will be tested in a design with experimental and control groups, including a larger sample of young people with ID (approx. $N=40$). Results from the ongoing study will be presented at the conference.

"Critically Online". Teaching 9th Graders to Evaluate and Use Source Information while Reading

Presenting Author: Marc Stadtler, University of Münster, Germany; **Co-Author:** Johanna Paul, University of Muenster, Germany; **Co-Author:** Ana Pérez, University of Poitiers, France; **Co-Author:** Ladislao Salmeron, University of Valencia, Spain; **Co-Author:** Mônica Macedo-Rouet, University of Paris 8, France; **Co-Author:** Rainer Bromme, University of Münster, Germany

Students in secondary school are often challenged to search information on the Internet without guidance. In order to select trustworthy information they need to consider source information. However, past research found that students hardly attend

to source information while reading. The present study evaluated an intervention program aimed at teaching the identification, evaluation and argumentative use of source information. Students in an intervention group received five consecutive lessons of training teaching them to find source information, evaluate source information against theoretical concepts (expertise, benevolence and media quality) and to use their conclusions to substantiate arguments in a post-reading essay. Students in a control group followed usual classroom instructions. Data was collected in a pretest, an immediate posttest and a delayed posttest one week after the training. Compared to controls, students in the intervention group visited more websites containing source information, included more source citations and evaluations in their post-reading essays and were better at discriminating trustworthy from less trustworthy websites. For most variables effects remained significant in the delayed posttest. We conclude that our intervention program is suitable to foster secondary students' skills to identify, evaluate and argumentatively use source information while reading multiple documents.

What's with that source? Fostering 9th grade students' critical thinking about authors and media

Presenting Author:Mônica Macedo-Rouet, University of Paris 8, France; **Co-Author:**Ana Pérez, University of Poitiers, France; **Co-Author:**Anna Potocki, University of Poitiers, France; **Co-Author:**Johanna Paul, University of Muenster, Germany; **Co-Author:**Ladislao Salmeron, University of Valencia, Spain; **Co-Author:**Jean-Francois Rouet, University of Poitiers, France

Increased amounts of information available from the Internet have triggered new demands on students' reading literacy. Our study presents an instructional intervention aimed at fostering Ninth grade students' critical evaluation of source information. 77 Ninth graders were trained to reason about author competence, author interest, and media quality over the course of three weekly 50-minute workshops. The workshops took place as part of regular class activities in the presence of teachers from various disciplines. Explanations and examples were drawn from various academic and non-academic content areas. Compared to students in a control condition (n=78), trained students referred more to the most reliable source in a simple multiple text reading task. The trained students were also more critical with links presenting unreliable information in an explicit evaluation task. Our results are discussed in terms of beneficial effects of training adolescents to evaluate several source dimensions to improve their multiple-documents comprehension skills, and possible cognitive processes underlying the implicit and explicit source evaluation tasks.

Session Q 13

2 September 2017 10:30 - 12:00

Pinni B - B3118

Symposium

Learning and Instructional Technology

ReTooling for Effective, Efficient, and Enjoyable Collaborative Learning

Keywords: Cognitive skills, Collaborative Learning, Computer-supported collaborative learning, Educational Technology, Emotion and affect, Self-regulation, Social aspects of learning and teaching

Interest group: SIG 27 - Online Measures of Learning Processes

Chairperson: Paul A. Kirschner, Open University of the Netherlands, Netherlands

Discussant: Kristine Lund, University of Lyon, France

There are very many pedagogies for collaborative work and possibly more environments for supporting it. The problem is that in spite of all of this, collaborative learning either does not occur or if it does, it is far from optimal. Optimal is defined here as effectively and/or efficiently and/or enjoyably. Recently we have seen the growth of a number of different types of tools which are not specifically aimed at learning, but rather at the cognitive, social, and emotional processes which underlie learning. This symposium will present four such tools: one group awareness widget to promote interaction and group monitoring, one dealing with functions of cognitive group awareness tools and one retrospective dashboards for socially shared regulated learning. The presenters also discuss the future of re-tooling technology support for collaborative learning.

Providing emotional awareness in CSCL with an Emotion Awareness Tool

Presenting Author:Mattia Fritz, University of Geneva, Switzerland; **Co-Author:**Mireille Betrancourt, University of Geneva, Switzerland

It has been established that learning situations can trigger strong emotional reactions, both positive and negative, and conversely that emotional states influence learning processes and outcomes. In Computer-Supported Collaborative Learning, it may be important to identify and share these individual emotions so that the group can regulate them and progress with the task. For this purpose, an Emotion Awareness Tool – the Dynamic Emotion Wheel (DEW) – was designed based on Scherer's Component Process Model theoretical framework. A pilot study (N=16) was then conducted to investigate the use of the tool in a simulated collaborative task using eye-movement recording. The results show that learners easily appraised their own emotions using the DEW, although they spent more time expressing their emotions rather than looking at the resulting visualizations (which displayed their own and their partner's emotions). In addition, they looked more frequently at emotions represented as natural language words compared to a dimensional representation with line graphs using Valence and Control/Power as appraisal criteria of the situation. This pilot study provided encouraging results and real-use data to improve the design of an Emotion Awareness Tool.

The Widgets of Oz

Presenting Author:Karel Kreijns, Open University of the Netherlands, Netherlands; **Co-Author:**Maren Scheffel, Open University of the Netherlands, Netherlands; **Co-Author:**Joop de Kraker, Open University of the Netherlands, Netherlands; **Co-Author:**Hendrik Drachsler, Open University of the Netherlands, Netherlands; **Co-Author:**Aad Sloomaker, Open University of the Netherlands, Netherlands

Computer supported collaborative learning (CSCL) is a pedagogy where students work together on assignments in online groups. According to Johnson and Johnson (2004) successful collaboration depends on five conditions that should be fulfilled: positive interdependence, individual and group accountability, promotive interaction, appropriate use of social skills, and group monitoring. Whereas the research community paid full attention to the first condition, all the other conditions received much less attention. In this paper we focus on individual accountability, promotive interaction and group monitoring and how to support these activities in CSCL groups through the use of group awareness widgets (GAWs) thereby extending the work of Phielix, Prins, Kirschner, Erkens, & Jaspers (2011). The need of such GAWs has also to be understood from the fact that current CSCL environments may not only support but also impede group communication, coordination, and collaboration. This impediment hampers the group dynamics of working and learning in CSCL groups which, in turn, negatively affects the effectiveness of promotive interaction and group monitoring. GAWs have potential to alleviate these adverse effects related to the group dynamics (Kreijns, Kirschner, & Jochems, 2003). To explore this potential and their effectiveness regarding the support for promotive interaction and group monitoring, two GAWs were integrated in the Elgg electronic environment used by the European Virtual Seminar on Sustainable Development (EVS) in which students collaborate in groups. However, there were ethical and usability issues regarding the use of such GAWs. The present paper will report about these issues and some of our findings.

Functions of Cognitive Group Awareness Tools

Presenting Author:Daniel Bodemer, University of Duisburg-Essen, Germany

Cognitive Group Awareness Tools (CGA tools) provide textual or visual information about others' knowledge, interests, or opinions. They make users aware of the provided socio-cognitive information that can be used in different ways. In the learning sciences such tools are particularly popular for providing implicit guidance to learners that is triggering collaboration and communication behaviour intended to be beneficial for learning. The tools' effectiveness for collaborative learning is usually evaluated on an overall tool level and with a focus on learning outcomes instead of underlying processes. On this basis, research generally indicates that the use of CGA tools can be beneficial for learning. On the other hand, there is also a well-founded reasoning for minor effectiveness and efficiency of information-based guidance approaches. In order to identify how CGA tools work they have to be investigated beyond an overall level and under consideration of the processes potentially affecting the learning outcomes. With a differentiated view, various functions of CGA tools can be identified and distinguished that may trigger cognitive processes. Three of them have been systematically disentangled and investigated in three consecutive experimental studies for collaborative multimedia learning scenarios: content-related information cueing ($N = 172$), providing partner information ($N = 120$), and visualising socio-cognitive constellations ($N = 104$). The results show beneficial effects on learning outcomes for the first two of the investigated functions but not for the third. Quantitative and qualitative analyses on learning processes (e.g. communication and partner modelling) provide further insights that go beyond overall tool effects.

Designing and implementing retrospective dashboards for socially shared regulated learning

Presenting Author:Sanna Järvelä, University of Oulu, Finland; **Co-Author:**Jonna Malmberg, University of Oulu, Finland; **Co-Author:**Hanna Jarvenoja, University of Oulu, Finland; **Co-Author:**Héctor Javier Pijera Díaz, University of Oulu, Finland; **Co-Author:**Muhterem Dindar, University of Oulu, Finland; **Co-Author:**Paul A. Kirschner, Open University of the Netherlands, Netherlands

We developed retrospective dashboards to support and prompt individual and shared regulation of learning 16-17 years old high school students' ($N=31$) advanced physics collaborative learning tasks (15 lessons, each 75min). In the design of the dashboards, four design principles were applied: supporting learners' *awareness* of their own and others' learning process; *externalization* of their own and others' learning process in a social plane; *prompting* the acquisition and activation of regulatory processes; and helping them follow the development of their *cognitive, motivational and emotional strategies* over time. Repeated contextualized self-report data were collected through administration of a 4-item Likert type questionnaire that had them rate their cognitive, motivational, and emotional status as well as group functioning. Pre- and post-test scores enabled calculating group-level self-regulated learning changes and formed a database for visualizing retrospective dashboards and making profiles of students' cognitive, motivational, and emotional progress. Learning analytics was used for "feeding" the intuitive graphic dashboards for self-, co- and socially shared regulation support, which were implemented in EdX® learning environment on iPads. Our findings indicate that visualization of situated-self report data with dashboards might have prompted self-regulatory awareness among the group members and contributed to enhancing learning outcomes.

Session Q 14

2 September 2017 10:30 - 12:00

Linna - K108

Spontaneous mathematical focusing tendencies

Keywords: Assessment methods and tools, Cognitive development, Early childhood education, Educational Psychology, Mathematics, Primary education

Interest group: SIG 05 - Learning and Development in Early Childhood

Chairperson: Joke Torbeyns, KU LEUVEN, Belgium

Organiser: Joke Torbeyns, KU LEUVEN, Belgium

Organiser: Sophie Batchelor, Loughborough University, United Kingdom

Discussant: Minna M Hannula-Sormunen, University of Turku, Finland

Young children's spontaneous focusing on exact numerosity (SFON) has emerged as an important topic for researchers and practitioners interested in (the psychology of) mathematics education. It was first introduced by Hannula and Lehtinen in 2005 and, over 10 years later, our scientific understanding, and the methodological tools used to assess children's SFON, has significantly increased (Hannula-Sormunen, 2015; Rathé et al., in press). Moreover, an ever-growing number of researchers are exploring the existence of distinct but related spontaneous focusing tendencies in the domain of mathematics. This symposium brings together four empirical contributions on the original SFON concept and on related spontaneous mathematical focusing tendencies. These include children's focusing on number symbols and on additive and multiplicative relations. Covering a rich diversity of spontaneous mathematical focusing tendencies, all contributions include a clear theoretical definition of the presented spontaneous mathematical focusing tendency; well-designed methodological tools to investigate this tendency; and new findings on the existence and/or relevance of this tendency for children's further mathematical development. As such, the contributions help to advance (i) our theoretical understanding of SFON and related concepts, (ii) our methodological tools to assess young children's focusing tendencies, and (iii) the potential educational interventions to stimulate their development. A critical discussion will be led by Minna Hannula-Sormunen, the originator of the concept of SFON. She will further elaborate on the theoretical, methodological, and educational challenges that the four contributions offer for future empirical and intervention studies.

Spontaneous Focusing on Numerosity in Imitation and Verbal Task Contexts

Presenting Author: Sophie Batchelor, Loughborough University, United Kingdom; **Co-Author:** Jayne Pickering, Loughborough University, United Kingdom

Individual differences in children's 'Spontaneous Focusing on Numerosity' (SFON) have been measured using imitation-based and verbal-based tasks. Performance on these tasks is positively associated with children's arithmetic skills, but the SFON tasks themselves have been found to be uncorrelated. In this study, we explored the missing relationship between imitation and verbal measures by manipulating (i) the response mode (imitation vs. verbal), (ii) the number of competing non-numerical dimensions (few vs. many), and (iii) the stimuli presentation type (dynamic vs. static) of existing SFON tasks. Children aged 4-7 years completed 6 SFON tasks; 3 imitation and 3 verbal. Results showed that the correlations between all variants of these tasks were low. This suggests that there is limited convergent validity between SFON measures, which stems not only from differing response modes (imitation vs. verbal), but also from other task features such as the number of competing non-numerical dimensions and the stimuli presentation type. Given this pattern of results, we conclude that children's SFON is heavily influenced by task context; thus it is important to elucidate the constructs that different tasks are measuring as well as how they relate to children's early numerical skills.

Young children's spontaneous focusing on Arabic number symbols

Presenting Author: Sanne Rathé, KU Leuven, Belgium; **Co-Author:** Joke Torbeyns, KU Leuven, Belgium; **Co-Author:** Bert De Smedt, KU Leuven - University of Leuven, Belgium; **Co-Author:** Lieven Verschaffel, KU LEUVEN, Belgium

Young children's spontaneous focusing on numerosity (SFON) has been identified as an important contributor to mathematical development. Previous SFON studies only focused on children's spontaneous attention for non-symbolic representations of number and ignored children's spontaneous attention for symbolic representations of number, such as Arabic number symbols. Research has shown that children develop a substantial knowledge of Arabic number symbols from an early age on, which suggests that a separate inclination to spontaneously focus on Arabic number symbols (SFONS) might exist in addition to SFON. The present study aimed to explore this hypothesis by studying children's SFONS in relation to their SFON, mathematical abilities, and teacher rating of math competence. Participants were 111 kindergartners ($M_{age} = 4$ years 8 months) who completed five tasks: a SFON Picture task, a SFONS Picture task, a numeral identification task, a verbal counting task, and a counting objects task. Children's math competence was rated on a 4-point Likert scale by their kindergarten teachers. In line with our hypothesis, our results showed that a separate SFONS tendency can be distinguished within children's existing mathematical competencies in addition to SFON. Children's SFONS was significantly associated with early mathematical abilities (i.e., numeral identification and counting objects ability) and teacher rating of math competence. Extending the research on SFON, this study showed that SFONS can be distinguished in addition to SFON, and moreover, is related to early mathematical abilities and math competence, and thus might be a potentially relevant contributor to early mathematical development.

Spontaneous Focusing on Quantitative Relations as a Predictor of Rational Number Knowledge

Presenting Author: Jake McMullen, University of Turku, Finland; **Co-Author:** Minna Hannula-Sormunen, University of

Turku, Finland; **Co-Author:**Erno Lehtinen, University of Turku, Finland

Recent evidence suggests that students' spontaneous focusing on mathematical aspects of their environment is positively related with their mathematical development. This has been found with younger children's spontaneous focusing on numerosity in relation to early numerical development, as well as older students' Spontaneous Focusing On quantitative Relations (SFOR) in relation to the development of rational number knowledge in both Finland and Belgium (Flanders). The present study aims to further validate the relation between SFOR tendency and rational number knowledge by examining potential mediators of this relation in new educational contexts. Results reveal that SFOR tendency predicted 331 US 6th and 7th graders' rational number knowledge over a five month period, even after taking into account overall mathematical achievement, mathematical motivation, spatial reasoning, and non-verbal intelligence. These results provide further evidence for the relevance of SFOR tendency in the development of rational number knowledge and suggest that this relation is not entirely dependent on motivational factors nor educational context.

Spontaneous quantitative relational reasoning: additive or multiplicative?

Presenting Author:Tine Degrande, KU Leuven, Belgium; **Co-Author:**Lieven Verschaffel, KU LEUVEN, Belgium; **Co-Author:**Jo Van Hoof, KU LEUVEN, Belgium; **Co-Author:**Wim Van Dooren, KU LEUVEN, Belgium

Previous studies showed individual differences in how often children Spontaneously Focus On quantitative Relations (SFOR). Whereas this previous SFOR-research mainly investigated the *extent* to which children spontaneously focus on one specific type of quantitative relations, i.e., multiplicative relations, the present study aimed to investigate the additive or multiplicative *nature* of children's spontaneous quantitative relational reasoning. For that purpose, a quantitative relational task that was open to both additive and multiplicative reasoning was developed and administered to 157 fifth and 122 sixth graders. Results revealed that children more frequently spontaneously reasoned additively than multiplicatively, but that additive reasoning was harder to verbalize than multiplicative reasoning. Both results were more prominent for fifth than sixth graders.

Session Q 15

2 September 2017 10:30 - 12:00

Pinni B - B3109

Symposium

Higher Education

Studying interaction and collaboration in higher education through different analytical lenses

Keywords: Collaborative Learning, Higher education, Qualitative methods, Social aspects of learning and teaching, Social interaction, Student learning, Teacher Professional Development, Video analysis

Interest group: SIG 04 - Higher Education, SIG 10 - Social Interaction in Learning and Instruction, SIG 14 - Learning and Professional Development

Chairperson: Mireille Hubers, University of Twente, Netherlands

Chairperson: David Boud, Australia

Discussant: Maaike Endedijk, University of Twente, Netherlands

This symposium provides a cross section of four different analytical and methodological approaches to studying social interaction and collaboration in higher education. In our rapidly changing society both students and teachers are faced with increasingly interactive work and study environments, which makes it important to understand how social interactions and collaboration play out in these contexts. All four contributions see social interaction and collaboration as a central element of learning processes both among students and professionals in higher education. They share the idea that learning is a process that unfolds over time and can only be understood, if we take into account its temporal nature and the complex interpersonal context it takes place in. In order to understand the role of interaction and collaboration in constituting productive learning, each study takes different approaches to the phenomenon. The first three studies focus on interactional aspects of the learning process of different groups of learners (undergraduate students; university teachers), while the fourth study focuses on the networks that constitute the context in which collaborative learning takes place. The different analytical approaches used across the contributions include examples of a sociocultural in-depth case study (study 1), a process-oriented interaction analysis (study 2), a cross-case machine learning approach (study 3) and a social network approach (study 4). By bringing together findings from different analytical perspectives, we demonstrate how these approaches complement each other and provide a more comprehensive picture that can account for the temporal and situated nature of social learning in higher education.

Students' interactional meaning-making of assessment feedback viewed through a sociocultural lens

Presenting Author:Rachelle Esterhazy, University of Oslo, Norway; **Co-Author:**Crina Damsa, University of Oslo, Norway

This qualitative study examines the characteristics of the interactional meaning-making emerging when undergraduate biology students engage with feedback comments on collaborative assignments. Informed by sociocultural notions, we propose that students' engagement with feedback comments leads them to engage in collaborative meaning-making activities. The interactional processes that are part of these collaborative efforts are essential for students' learning processes and experiences thereof. Our empirical data is generated by an in-depth case study of three student triads

working on feedback provided on assignments. To examine the processual, interactional aspects of meaning-making, we employ a set of empirically sensitive notions that allow a micro-level analysis of the unfolding interactions and follow-up activities. This analysis led to detailed depictions and interpretations of the epistemic and procedural aspects of the on-going meaning-making processes. The findings show that students move along a meaning-making trajectory that comprises different stages. Each stage is characterized by different forms of interactions and a shifting focus between understanding the concrete comment and the underlying domain knowledge. Certain trajectories lead to productive improvements in the assignment, while others end before implementation. With this study we contribute to the understanding of what constitutes productive meaning-making of assessment feedback, thereby opening up new avenues of how to tailor our feedback practices better to students' needs. Moreover, we show the potential of a sociocultural approach to analyzing interactions at micro level to unveil complex processes underlying productive engagement and meaningful learning in higher education contexts.

Process-oriented analysis of student teachers' interaction during social regulation in collaboration

Presenting Author:Jaana Isohätälä, University of Oulu, Finland; **Co-Author:**Piia Naykki, University of Oulu, Finland; **Co-Author:**Sanna Järvelä, University of Oulu, Finland

In order to develop higher education students' and student teachers' skills for the interactive learning settings of the 21st century, it is necessary to understand the cognitive, social and socio-emotional dynamics of collaborative learning. More studies have begun to examine the multi-dimensional and temporally unfolding nature of collaborative learning, particularly in the area of social regulation of learning (e.g. planning and monitoring of one's own, others' and the group's learning). New evidence suggests a relation between social regulation and students' participation and socio-emotional interaction but their temporal emergence is unclear. This study explores how joint participation and socio-emotional interaction occur during episodes with and without social regulation. The participants were student teachers (N = 19) who collaborated in five groups in environmental science. 20 video-recorded lessons (22 h) were used for interaction analysis. The videos were coded moment-by-moment for evidence of joint participation (*joint task focus, active listening, active contributing*) and positive socio-emotional interaction (*humor, socio-emotional support*). The proportions of these interactions were compared between episodes with and without social regulation (*planning, monitoring, evaluating*). The results show that social regulation concurred with a higher prevalence of joint task focus, active contributing and socio-emotional support. This reflects the role of interaction in moments when students need to coordinate their activities. Hence, students' ability to engage in coordinated collaboration should be developed by supporting interaction and awareness of when regulation is needed.

Exploring higher education teacher team learning using text mining analysis

Presenting Author:Rike Bron, University of Twente, Netherlands; **Co-Author:**Maaïke Endedijk, University of Twente, Netherlands; **Co-Author:**Bernard Veldkamp, University of Twente, Netherlands

Designing education that provides students with 21st century skills, also requires more collaboration between university teachers. More and more, faculty has to work in teams to design interdisciplinary and project-based education. Team learning is crucial for developing a shared conception of the team task, and previous survey research has identified the underlying processes *sharing, co-construction* and *constructive conflict*. However, insight is lacking in the nature of these processes and how they evolve at the workplace. It is therefore necessary to open the black box of team learning by studying team learning processes as they occur. The current study aims to explore the nature of sharing, co-construction and constructive conflict in the yet unexplored context of university teacher teams. Using a combination of qualitative coding and quantitative text mining techniques, 278 video-recorded and transcribed team learning conversational episodes were analyzed in terms of topics and team learning processes. The results indicate that the teams discussed a variety of content-, organization-, assessment- and design process-related topics, mainly by means of co-construction. Text mining analysis gave insight in distinctive features of the team learning processes. For example, constructive conflict was characterized by the use of knowledge of experts for supporting their arguments. The study shows the potential of machine learning techniques to build models to automatically classify team learning processes, based on distinctive linguistic patterns and other relevant features.

The use of social network analysis to uncover faculty's teaching interactions in higher education

Presenting Author:Piet Van den Bossche, University of Antwerp, Belgium; **Co-Author:**Sara Van Waes, University of Antwerp, Belgium; **Co-Author:**Sven De Maeyer, University of Antwerp, Belgium; **Co-Author:**Nienke Moolenaar, Utrecht University, Netherlands; **Co-Author:**Peter Van Petegem, University of Antwerp, Belgium

Teachers' professional development is shaped by the network of relationships that surround them. The relationships that teachers use to interact about their instructional practice form their 'teaching networks'. To date, little is known about if and how these teaching networks can be strengthened. Building on social capital and workplace learning research, this study examined the extent to which teaching networks can be strengthened. Longitudinal network data of university teachers were collected over a two-year time period. An intervention was designed to evaluate whether the development of teaching networks was affected in terms of composition and content. Compared to the control group, the intervention group showed stronger development in network composition, specifically in size (larger networks, increased network dynamics) and diversity (more ties to other participants and the workplace), and in network content (a wider network was consulted for solutions, meta-knowledge, problem reformulation and validation). This study highlights the potential of a social network

approach to advance insights into teacher interaction and collaboration in higher education. Finally, it also yields several suggestions for practice and research on network interventions to strengthen professional development.

Session Q 16

2 September 2017 10:30 - 12:00

Linna - K110

Symposium

Assessment and Evaluation, Teaching and Teacher Education

The role of spelling research in the advancement of public good.

Keywords: Assessment methods and tools, At-risk students, Cognitive skills, Early childhood education, Higher education, Learning disabilities, Literacy, Metacognition, Writing / Literacy

Interest group: SIG 12 - Writing

Chairperson: Annemie Desoete, Belgium

Discussant: Christina van Kraayenoord, University of Queensland, Australia

Low literacy skills cost 1 à 2% of the gross national product (Vernooy, 2012). In response to the economic circumstances in Europe, reducing costs of assessment and interventions need to be considered. This symposium aims to study predictors for spelling (dis)abilities and investigate if screeners and interventions can be developed as public good. In the first paper kindergarten predictors of at risk spelling are studied in children followed up from kindergarten till grade 1 ($n = 142$). In the second paper the efficacy of an intervention to improve children's invented spelling in kindergarten was studied ($n = 124$). The third paper focuses on subskills of low-achieving and high-achieving spellers in grade 3 till 6 ($n = 512$). Finally the writing and spelling of students with and without dyslexia ($n = 200$) were compared in higher education. The scientific relevance of this symposium lies in the fact that similar predictors were studied across ages including transparent and less transparent languages. These predictors can guide political and societal decision-makers to develop screeners for the early detection of children at risk. In addition the symposium demonstrates that an early intervention can enhance spelling skills, helping to fill the gap between children at-risk and peers without additional education needs. These studies have therefore several educational implications. Clinicians are encouraged to select early predictors and spelling tests with caution when assessing and predicting abilities and disabilities. In addition the results can guide early and targeted interventions for individuals at risk.

A free screening in kindergarten to predict spelling proficiency in grade 1: does it make sense?

Presenting Author: Christel Van Vreckem, Artevelde University College, Belgium; **Co-Author:** Annemie Desoete, Ghent University / Artevelde University College, Belgium

Rapid naming (RAN), letter knowledge and phonological awareness were found to be the best predictors for reading and spelling skills across languages (Dandache et al., 2014; Verhagen, 2009). Recently, invented spelling seems to be an even better predictor, especially for transparent languages (Bigozzi et al., 2014). Few studies combine all these early predictors simultaneously in a longitudinal design. In this study 142 children (64 boys; 78 girls) of nine randomly selected schools participated to fill this gap by investigating if these skills, measured at the end of kindergarten, predict spelling skills at the end of the first grade. In addition we investigated if these early literacy skills could be screened with a free and non-time consuming instrument. Each early literacy skill correlated significantly with spelling in grade 1. Regression analyses on all predictors simultaneously revealed that we could predict 23% of the variance in spelling. The significant kindergarten predictors were segmentation, rapid naming and letter knowledge. Taking economic circumstances into account, it might be a good idea to use such a short but effective free screener to detect kindergartners at risk and to give them the playful extra support they need.

Improving conceptual knowledge in the writing system in kindergarten: an intervention study

Presenting Author: Lucia Bigozzi, University of Florence, Italy; **Co-Author:** Christian Tarchi, University of Florence, Italy; **Co-Author:** Giuliana Pinto, University of Florence, Italy

This study assessed the efficacy of PASSI (Promoting the Achievement of Sound-Sign Integration), an intervention to improve children's invented spelling in kindergarten. This construct can be defined as the systematic, non-conventional, matching of sounds in words with signs, and it is strictly associated with reading and spelling acquisition. One-hundred and twenty-four Italian children participated in this study. Six teachers (and their respective three classes) were randomly assigned to the experimental group, and six to the control group. All children were tested in invented spelling of words and numbers, knowledge of the alphabet, orthographic awareness, visual-motor integration and drawing twice, before and after the intervention. Results of Generalized Estimation of Equations (GEE) with Huber-White standard error estimates confirmed the efficacy of PASSI in promoting children's invented spelling, and related emergent literacy skills. Theoretical and educational implications of the results are presented and discussed

Measuring spelling competence: Proofreading and editing, or production from dictation?

Presenting Author: Tessa Daffern, University of Canberra, Australia

In response to increasingly politicized decision making in schools comes increased responsibility for educators to consider

measures of academic achievement in terms of their reliability, validity and practical utility. Concerning spelling assessment, this study examined relationships in spelling achievement data from the Australian *National Assessment Program – Literacy and Numeracy* (NAPLAN) Language Conventions Test (a proofreading and editing based measure) and the Components of Spelling Test (CoST) (a dictation based measure). Results of a series of multiple regression analyses were based on a sample of low-achieving and high-achieving spellers from the Australian Capital Territory (ACT) in Year 3 (n=145), Year 4 (n=117), Year 5 (n=133) and Year 6 (n=117). Findings revealed significant relationships between scores in the spelling domain of the NAPLAN Language Conventions Test and the phonological, orthographic and morphological subscales scores of the CoST. Further, the orthographic subscale of the CoST was generally the main predictor of NAPLAN spelling across year level. Analysis also demonstrated that gender was not an influential factor. The findings suggest that heightened sensitivity to orthographic regularities plays an important role in learning to proofread and edit spelling errors, and that children require explicit instruction in the phonological, orthographic and morphological components of spelling. Stability in spelling performance was also found, underscoring a need for educators to systematically utilize assessment outcomes in order to guide instruction, and in particular to provide early and targeted intervention for those students experiencing difficulties in spelling.

Writing skills and feeling of confidence of higher education students with dyslexia

Presenting Author: Wim Tops, University of Groningen, Netherlands

To have a clearer idea of the writing problems students with dyslexia may face during their studies, we compared writings of 100 students with dyslexia and 100 age matched control students in higher education. We also looked into differences in gender and educational level within groups and tried to find subtypes of dyslexia (isolated reading and spelling problems). We ran correlation analysis to identify the relationship between spelling and underlying cognitive mechanisms such as phonological awareness, rapid naming and memory spans. Next, we studied the number and type of spelling errors, the quality of the texts produced, the use of words, and the handwriting, both in a précis writing task (writing a summary of an informative text) and in a dictation task (sentence writing). Our results showed medium to large effect sizes for spelling errors, and medium effect sizes for punctuation and capitalization errors. Furthermore, blind experts judged the quality of the writing lower for students with dyslexia than for the controls, even though the number and types of words used by both groups were very much the same. There was no significant difference in the quality of the handwriting. Finally, using Signal Detection Theory analysis, we observed that students with dyslexia only showed lower sensitivity and were no different from their peers as for response bias (metacognitive experience).

Session Q 17

2 September 2017 10:30 - 12:00

Pinni B - B3111

Symposium

Motivational, Social and Affective Processes

Emotions and Motivation in Mathematics Education

Keywords: Emotion and affect, Mathematics, Motivation, Motivation and emotion, Quantitative methods, Self-efficacy

Interest group: SIG 08 - Motivation and Emotion

Chairperson: Stanislaw Schukajlow, University of Münster, Germany

Organiser: Stanislaw Schukajlow, University of Münster, Germany

Organiser: Katrin Rakoczy, German Institute for International Educational Res, Germany

Organiser: Reinhard Pekrun, Ludwig-Maximilians-Universität (LMU), Germany

Discussant: Stefan Ufer, Ludwig-Maximilians-Universität (LMU), Germany

Emotions and motivation are critically important for students' learning and achievement (Pekrun & Linnenbrink-Garcia, 2014; Wigfield, Cambria, & Eccles, 2012). Various research paradigms have been employed to investigate emotions and motivation. In educational research, emotions and motivation are frequently analyzed from a general nomothetic perspective, which is in danger of neglecting specific academic contexts (Volet, 2001). However, as emotions and motivation have been shown to be context-specific (Schukajlow et al., 2012) and domain-specific, researchers should pay more attention to the influence of domain and context. The symposium addresses this research gap for mathematics education, a field which is an important part of the curriculum all over the world. The symposium integrates contributions from different theoretical perspectives and research disciplines, including mathematics education, educational research, and educational psychology. The contributions deal with students' worry, interest, self-efficacy, and engagement in mathematics and included samples from primary school to higher education. We expect that combining perspectives from these fields will stimulate exchange across disciplines and contribute to research on emotions and motivation in education. Pekrun, R., & Linnenbrink-Garcia, L. (2014). *International handbook of emotions in education*. New York: Taylor & Francis. Schukajlow, S., Leiss, D., Pekrun, R., Blum, W., Müller, M., & Messner, R. (2012). Teaching methods for modelling problems and students' task-specific enjoyment, value, interest and self-efficacy expectations. *Educational Studies in Mathematics*, 79, 215-237. Volet, S. (2001). Understanding learning and motivation in context: A multi-dimensional and multi-level cognitive-situative perspective. Wigfield, A., Cambria, J., & Eccles, J. S. (2012). *Motivation in Education*.

Children's Expectancy/Value Beliefs and Parental Valuing as Predictors of Worry in Math and Reading

Presenting Author:Fani Lauermann, University of Bonn, Germany; **Co-Author:**Jacquelynne S. Eccles, University of California – Irvine, United States; **Co-Author:**Reinhard Pekrun, Ludwig-Maximilians-Universität (LMU), Germany

Children's worrying about their academic performance has profound implications for their learning and wellbeing in school. Understanding the contextual and psychological antecedents of students' worry thus represents an important area of research. Drawing on Eccles and colleagues' expectancy-value theory and Pekrun's control-value theory, the present study examined the motivational underpinnings of elementary students' worries about performing poorly in the domains of mathematics and reading (N = 805, grades 3, 4 and 6). With one exception, the analyses confirmed that children's expectations of success in and valuing of mathematics and reading interacted in predicting children's worry about these domains. Children's worry was strongest when they rated their subjective abilities and expected success in mathematics and reading as relatively low but perceived these subjects as valuable. Moderated mediation analyses further suggested that when children's self-concepts of mathematics and reading ability were low to moderate, students' perceived parental valuing of their performance in these subjects indirectly positively predicted children's worry via its positive predictive impact on children's own subjective valuing of mathematics and reading. Thus, when children perceive high academic performance as potentially difficult to attain, perceived parental valuing might negatively impact their wellbeing in school (by increasing not only their values, but also their worrying). Children's gender, grade level, teacher-rated mathematics and reading aptitude, and prior self-reported worry about mathematics and reading performance were included as control variables in all analyses.

No Interest in Pure Maths? Students' Interest in Problems With and Without a Connection to Reality

Presenting Author:Johanna Rellensmann, University of Münster, Germany; **Co-Author:**Stanislaw Schukajlow, University of Münster, Germany

Students' interest in mathematics is important for their learning of mathematics, and the ability to accurately judge students' motivational orientation is important for mathematics teachers. To trigger students' interest, teachers can select mathematical problems for instruction that students perceive as meaningful for their lives. The aim of this study was to answer the following research questions: (1) Is there a difference in students' interest in solving problems with and without a connection to reality? (2a) Is there a difference in pre-service teachers' judgments of students' interest in problems with and without a connection to reality? (2b) Can pre-service teachers accurately judge students' interest in solving problems with and without a connection to reality? To answer these research questions, we administered a questionnaire in which we asked 100 ninth graders about their task-specific interest after they solved problems with and without a connection to reality. We additionally asked 163 pre-service teachers to judge fictitious ninth graders' interest in solving the same problems. Contrary to our expectations, students' interest in real-world problems was lower than their interest in problems without a connection to reality when task difficulty was controlled for. Further, our findings indicate an important discrepancy between students' interest and pre-service teachers' judgments of students' interest. Pre-service teachers overrated students' interest in solving real-world problems, and they underrated students' interest in solving intra-mathematical problems. Moreover, the accuracy of pre-service teachers' judgments of students' interest was low and ranged widely across pre-service teachers. Implications for teacher education and classroom practice are discussed.

Level, strength, and facet-specific self-efficacy in mathematics test performance

Presenting Author:Karin Street, University of Oxford, United Kingdom; **Co-Author:**Lars-Erik Malmberg, University of Oxford, United Kingdom; **Co-Author:**Gabriel Stylianides, University of Oxford, Cyprus

Students' self-efficacy expectations (SEE) in mathematics are associated with their engagement and learning experiences. Going beyond previous operationalisations of SEE we propose a new instrument that takes into account not only *facet-specificity* (expectations related to particular competences or skills) and *strength* (confidence of the expectations), but also *level* (perceived task difficulty) of these expectations as proposed by Bandura (1997). In particular, we included level-specific items referring to perceived difficulty on a subsequent national test in mathematics. In total 756 Norwegian grade 5, 8, and 9 students completed the "Self-Efficacy Gradations of Difficulty Questionnaire." We tested plausible multitrait-multimethod models using structural equation models. The best fitting model included three factors representing levels of perceived difficulty, and a-priori specified correlated uniquenesses representing four facets related to problem solving or students' self-regulation skills during the test: to (1) complete a certain number of problems, (2) solve tasks of a certain challenge, (3) concentrate, and (4) not give up for a certain amount of time. The results indicated that both test facets and levels of perceived difficulty are related to students' SEE, which in turn are associated with scores on national tests in mathematics. Taking level (difficulty) into account broadens our understanding of the self-efficacy construct, because it allows the distinction between SEE for different levels of perceived difficulty, as well as investigation into the relationship between SEE and performance outcomes for each level.

Students' Engagement Profiles in Mathematics According to Learning Environment Dimensions

Presenting Author:Helen Watt, Monash University, Australia; **Co-Author:**Colin Carmichael, Charles Sturt University, Australia; **Co-Author:**Rosemary Callingham, University of Tasmania, Australia

The Best Practice in Mathematics Education project was funded by the Australian Office of the Chief Scientist, to examine promotion of students' learning, engagement and aspirations in this core learning domain. We draw upon cross-sectional survey data from 551 students in grades 3 to 9 to examine how students' mathematics engagement relates to key dimensions of their learning climate (mastery or performance focused classrooms), teacher enthusiasm, and school caring.

Engagement is known to be associated with positive school outcomes and influenced by environmental factors. Less known is whether, and the extent to which, students have different profiles of engagement across component dimensions (Fredricks, et al., 2004); and, how profiles may differ according to experienced environment dimensions. We first develop profiles of adolescents' behavioural, emotional, and cognitive engagement using multilevel latent class analysis, educating three profiles of "engaged", "compliant" and "disengaged" students, who systematically differed on experienced environmental factors. Mastery focused classrooms, enthusiastic teachers and caring school environment were experienced most by engaged, and least by disengaged students; performance focused classrooms were unrelated to engagement profiles. Identified patterns will be of particular use to teachers in understanding how class, teacher and school influences together shape students' own engagement in mathematics.

Session Q 18

2 September 2017 10:30 - 12:00

Pinni B - B4113

Symposium

Assessment and Evaluation, Cognitive Science, Developmental Aspects of Instruction, Learning and Social Interaction

Meta-analyses in Educational Research: Advances and Challenges

Keywords: Achievement, Computer-supported collaborative learning, Cooperative / collaborative learning, Educational Psychology, Learning approaches, Mathematics, Meta-analysis, Numeracy, Quantitative methods

Interest group: SIG 01 - Assessment and Evaluation

Chairperson: Michael Schneider, University of Trier, Germany

Discussant: Lennart Schalk, ETH Zurich, Switzerland

Meta-analyses quantitatively synthesize findings from several empirical studies examining the same question. They are an important research tool, because huge numbers of empirical studies on learning and instruction are published every year, which do not always yield homogeneous results and which sometimes do not replicate. Meta-analyses do not only report the average effect size for a relation, but complement it with information on the range, variability, and heterogeneity of the effect sizes. Moderator analyses help to explain why the effect sizes are systematically higher in some studies than in others. However, meta-analyses also have their limitations. This symposium aims at demonstrating the general potentials and challenges of meta-analyses. It includes four recent meta-analyses on a wide range of topics – from mental magnitude processing, over self-explanations and computer-supported collaborative learning scripts, to creativity. Each meta-analysis synthesized between 21 and 120 studies. The four studies exemplify the current state of meta-analytic techniques by using different statistical models and software packages for averaging the effect sizes as well as by including extended moderator analyses and checks for publication bias.

What Predicts Mathematical Competence? A Meta-analysis on Numerical Magnitude Processing

Presenting Author: Bert De Smedt, KU Leuven - University of Leuven, Belgium; **Co-Author:** Michael Schneider, University of Trier, Germany

There are large individual differences in mathematical competence and many studies have sought to investigate the cognitive origins of these individual differences. One domain-specific factor that has attracted a lot of attention in the last decade is the ability to process numerical magnitudes. Various studies have reported an association between this ability to process numerical magnitudes, typically assessed by the numerical magnitude comparison task, and broader mathematical competence. Most of these correlations were positive, but varied considerably in their strengths. We conducted a meta-analysis in order to statistically summarize this existing body of evidence and verified if this association was moderated by relevant third variables, including age and the type of measures. Effect sizes were combined by means of a two-level random-effects regression model. The literature search yielded 45 articles reporting 284 effect sizes found with 17201 participants. The overall effect size was $r = .28$, 95% CI [.24, .32]. The effect size was significantly higher for the symbolic than for the non-symbolic measures and did not differ across different ages. The correlation was strongly moderated by comparison and mathematical competence measures. The results support the view that numerical magnitude processing is reliably associated with mathematical competence over the lifespan in a wide range of tasks, measures and mathematical subdomains. Because the association was stronger for symbolic than for non-symbolic measures, symbolic magnitude processing might be a more eligible candidate to be targeted by diagnostic screening instruments and interventions.

Self-Explanation Promotes Mathematics Learning: A Meta-Analysis and Its Implications for Education

Presenting Author: Bethany Rittle-Johnson, Vanderbilt University, United States; **Co-Author:** Abbey Loehr, Vanderbilt University, United States; **Co-Author:** Kelley L. Durkin, Vanderbilt University, United States

Promoting self-explanation (i.e., generating explanations for oneself in an attempt to make sense of new information) is a recommended study strategy and instructional practice. Although often effective, prompting for self-explanation did not improve, or even harmed, learning in some studies. Thus, we conducted a meta-analysis of the published literature on prompting self-explanation to improve mathematics learning ($N = 26$ experiments). Prompted self-explanation led to a small to moderate improvement in conceptual knowledge, procedural knowledge and procedural transfer when assessed immediately after the intervention. Moderator analyses indicated that the effect was stronger if scaffolding of high-quality explanation was provided. Finally, only seven studies have evaluated the effectiveness of self-explanation prompts in a

classroom context, providing some evidence that prompted self-explanation in classrooms can promote procedural knowledge. Overall, prompting for self-explanation is an effective method for improving mathematics learning. Based on this meta-analysis, we propose mathematics educators scaffold high-quality explanation via training on self-explanation or structuring the self-explanation responses.

Supporting Domain Learning and Collaboration Skills with CSCL Scripts: A Meta-Analysis

Presenting Author:Freydis Vogel, Technical University of Munich (TUM), Germany; **Co-Author:**Ingo Kollar, University of Augsburg, Germany; **Co-Author:**Christof Wecker, Ludwig-Maximilians-Universität (LMU), Germany; **Co-Author:**Frank Fischer, Ludwig-Maximilians-Universität (LMU), Germany

Scripts for computer-supported collaborative learning (CSCL scripts) are designed to foster collaborative learning activities which are assumed to be beneficial for domain learning, i.e. the acquisition of knowledge and skills in specific domains. Beyond domain learning, scripts also aim at the development of collaboration skills based on an internalization of the sequence of activities suggested by the CSCL script. To this purpose, CSCL scripts specify and sequence activities, assign them to roles, and distribute them among the learners. In this meta-analysis we synthesized studies that investigated the effect of learning with CSCL scripts compared to collaborative learning without a script on domain learning and collaboration skills. Furthermore, we compared effects of CSCL scripts targeting different script levels. Results show that learning with CSCL scripts has on average a small effect on domain learning ($d = 0.20$, $SE = 0.10$, $p = .02$) and a large effect on collaboration skills ($d = 0.95$, $SE = 0.20$, $p < .01$) compared to collaborative learning without a script. To support domain learning and collaboration skills, the use of scripts for computer-supported collaborative learning can be recommended. The results do not suggest that more specific CSCL scripts in general might hamper learning due to a too high degree of structure.

A Multilevel Meta-Analysis of the Links between Creative Potential and Academic Achievement

Presenting Author:Maciej Karwowski, Academy of Special Education, Poland; **Co-Author:**Aleksandra Gajda, Maria Grzegorzewska University, Poland; **Co-Author:**Ronald A. Beghetto, University of Connecticut, United States

In this talk we discuss the results of a large, multilevel meta-analysis (120 studies, total $N = 52,578$; 782 effects) examining the relationship between creativity and academic achievement in research conducted between 1960 and 2015. Average correlation between creativity and academic achievement was estimated at $r = .22$ (95% CI : .19, .24). An analysis of moderators revealed that this relationship was constant across time, but stronger when creativity was measured using creativity tests as compared to self-report measures and when academic achievement was measured using standardized tests rather than grade point average. Moreover, verbal tests of creativity yielded significantly stronger relationships with academic achievement than figural tests. We discuss theoretical consequences of these findings, as well as methodological challenges related to meta-analyses

Session Q 19

2 September 2017 10:30 - 12:00

Pinni B - B3107

Symposium

Learning and Social Interaction

Exploring the classroom as a context for student regulation

Keywords: Conversation / Discourse analysis, Early childhood education, Emotion and affect, Mixed-method research, Motivation and emotion, Self-regulation, Social aspects of learning and teaching, Social interaction, Teaching / instruction, Teaching approaches, Video analysis

Interest group: SIG 08 - Motivation and Emotion, SIG 16 - Metacognition

Chairperson: David Whitebread, University of Cambridge, United Kingdom

Organiser: Kristiina Kurki, University of Oulu, Finland

Organiser: Hanna Jarvenoja, University of Oulu, Finland

Organiser: Deborah Pino-Pasternak, Murdoch University, Australia

Discussant: Nancy Perry, University of British Columbia, Canada

It is argued that the understanding of self-regulation in childhood requires a *contextualist framework* (Morrison, 2015) able to account for the complex and multilevel interplay of cultural and environmental features that impact on children's self-regulatory growth. The microcosm of a classroom is a clear illustration of that complexity and one that, despite recent sustained research efforts, still calls for a rich exploration of what triggers differences in children's self-regulation development. The aim of this symposium is to showcase recent studies exploring associations between features of classroom contexts and different dimensions of self-regulation including emotional, social, motivational and cognitive. The four contributions presented here explore varied aspects of the classroom context including teacher-student interactions in real time, teacher talk, student perceptions of the classroom context, as well as teacher perceptions of their relationships with individual students. It is through the use of different methodological approaches that associations between these different contextual layers and different aspects of self-regulation are explored. The work is not only rich in terms of methodology and focus but presents findings spanning from early childhood to middle primary schooling as well as covering populations from four different countries. Given the predictive value of self-regulation on children's academic and

social outcomes, reaching a deep and nuanced understanding of processes and interactions that facilitate self-regulation in classrooms is critical not only to advance our theoretical understanding but, as importantly, to inform teacher education and practice as well as the development of early intervention programs.

Associations between teacher-student relationships and young children's self-regulated learning

Presenting Author:Deborah Pino-Pasternak, Murdoch University, Australia; **Co-Author:**Anabela Malpique, Murdoch University, Australia / University of Lisbon, Portugal, Australia; **Co-Author:**Debora Valcan, Murdoch University, Australia

Though research has identified classroom-level features that impact positively on student success (Hamre & Pianta, 2005), only a few studies have explored how teachers' relationships with individual students are associated with their self-regulation in the early years (E.g. Cadima et al, 2016). This study explored individual-level associations between teacher structure, involvement, and autonomy support and children's social (SR) and cognitive regulation (CR) during the first year of compulsory education in Western Australia. It was hypothesised that all three dimensions of teacher behaviour would show positive associations with both aspects of self-regulation albeit differences in the strengths of these associations. Twenty-one teachers distributed in 7 schools reported on 174 students' (88 female) regulation using the Checklist of Independent Learning Development (CHILD) (Whitebread et al, 2009) and on structure, involvement, and autonomy support using selected items of the Teacher as a Social Context Questionnaire (Wellborn et al, 1988). Results showed significant differences by gender in SR and CR as well as in teacher structure and autonomy support in favour of female students. Multigroups path analysis revealed that teacher structure was an equally strong predictor of SR for male and female students but a stronger predictor of CR for males. For females only, autonomy support was positively associated with CR. In turn, for males only, teacher involvement positively associated with SR. This research highlights the importance of teacher behaviour on children's developing regulation and how it can differentially affect female and male students in the early years of schooling.

Exploring regulatory interactions of young children and teachers in challenging day-care situations

Presenting Author:Kristiina Kurki, University of Oulu, Finland; **Co-Author:**Sanna Järvelä, University of Oulu, Finland

Earlier research highlights the importance of social interaction in the development of self-regulation skills. To understand how self-regulation manifests and develops in children's early years, there is a need to evaluate interactive situations in children's everyday lives. This paper focuses on the ways 2 to 5 years children ($N = 30$) regulate emotions and behaviour in socio-emotionally challenging situations and how their regulation is supported by the teachers' co-regulation ($N = 8$). The data consists of videotaped events of challenging situations taking place in normal, everyday day-care situations. The events were analysed by identifying different strategies by children and teachers and how they occur in interaction. The results indicate that, even though children use many strategies in the challenging situations without teacher, the teacher's involvement affects to the selection of employed strategies. Teachers combine different strategies, particularly favouring activity-related strategies instead of emotion-related strategies. The findings highlight the importance of external involvement in challenging situations to support children in learning to solve conflicts constructively and apply regulation strategies according to the demands of a situation. The results also imply that teachers need more means to support children to regulate emotions per se in addition to the emotionally challenging situation.

The social context of the primary classroom: Implications for children's emotion regulation

Presenting Author:Matthew Somerville, University of Cambridge, United Kingdom; **Co-Author:**David Whitebread, University of Cambridge, United Kingdom

Much of the research examining the influence of social contextual factors on the development of children's emotion regulation has focused on the home context and parent-child interactions. Comparatively few studies have investigated the social context of the classroom and its association with the ways in which children express and regulate their emotions. This paper presents the results of a naturalistic study focused on children's emotion regulation in the primary school classroom. The study was carried out in 31 classrooms across 8 primary schools situated in low socioeconomic neighbourhoods of New Zealand. In Phase 1, 508 children ($M = 9.9$ years, 52% female) completed questionnaires on emotion regulation ability, emotion regulation strategy use, and their perception of the social context of the classroom. Four classrooms and 33 children were selected for Phase 2, which involved classroom observations and video-recorded observations of individual children's emotion regulation strategy use. A moderate correlation ($r = .41^{***}$) was found between the perceived social context of the classroom and self-reported emotion regulation ability; however, no association was found between social context and self-reported emotion regulation strategy use. The observational data revealed that the classrooms children rated as most supportive were characterised by autonomy supportive teacher behaviours, clear learning expectations, and warm, low-conflict teacher-child relationships. The implications of these findings for both practice and future research will be discussed.

Self-regulation development as culturally afforded by teachers' socio-motivational talk

Presenting Author:Pablo Torres, University of Cambridge, United Kingdom; **Co-Author:**David Whitebread, University of Cambridge, United Kingdom; **Co-Author:**Ros McLellan, Cambridge University, United Kingdom

This study explored the relevance of teachers' classroom discourse, specifically 'socio-motivational talk', for the development of students' help seeking, clarification seeking, and persistence habits. Five different types of 'socio-motivational talk' for learning of eight teachers were analysed from 24 hours of video-recorded Literacy lessons carried out in eight Year 4 classrooms in the UK and Chile. The types of teachers' talk analysed were: 'Talk for mastery', 'talk for

performance', 'talk for self-efficacy', 'talk against self-efficacy', and 'talk for collaboration'. In addition, the self-regulatory behaviours (help seeking, clarification seeking, and persistence) of a total of 48 eight to nine year-olds, taught by these teachers, were measured while observing their independent engagement in a series of cube assembly tasks. Multilevel regression analysis was applied to predict effects of teachers' 'socio-motivational talk' on the students' self-regulation. Results showed that teachers' 'socio-motivational talk' predicted students' help seeking, clarification seeking, and persistence behaviours in challenging tasks carried out outside classrooms and that differed from everyday learning tasks. In particular, 'talk against self-efficacy' (communicating disappointment with performance) predicted higher levels of help seeking. 'Talk for mastery' (valuing improvement) and 'talk for collaboration' (valuing collaboration and mutual respect of ideas) separately predicted higher levels of clarification seeking. Finally, while 'talk for mastery' tended to predict higher levels of persistence, 'talk for performance' (valuing performance free of errors) tended to predict lower levels of this behaviour. Findings will be discussed in terms of how in naturalistic conditions self-regulation may develop to fulfil socially afforded 'culturally adaptive functionalities' (CAF).

Session Q 20

2 September 2017 10:30 - 12:00

Main Building E - E221

Symposium

Learning and Instructional Technology

You See? Improving Instruction by Visualizing Eye Movements

Keywords: Educational Psychology, Educational Technology, Instructional design, Multimedia learning

Interest group: SIG 06 - Instructional Design

Chairperson: Tamara Van Gog, Utrecht University, Netherlands

Discussant: Lucia Mason, University of Padova, Italy

Looking over another, more competent person's shoulder has been an effective way of learning since time immemorial. Modern eye-tracking technology allows for taking this to the next, time and place independent level, by visualizing recorded eye movements overlaid on the original task. However, findings on the effectiveness of instructions that visualized where other task performers were looking are mixed. The contributions to this symposium investigate under which conditions visualizing eye movements positively affects learning. The first contribution shows that observing someone else's eye movements can improve performance on number line tasks from pretest to posttest compared to practicing, although observing their mouse cursor proved equally effective. The second contribution suggests that the ambiguity of an expert model's verbal explanation might be a potential boundary condition for the effectiveness of eye movement modeling examples (EMME), which might explain why EMME were thus far ineffective for teaching problem-solving skills compared to regular video examples. The third contribution builds on recent research showing that EMME can also be used for learning strategy training (i.e., text-picture integration), and takes it in a new direction, by investigating effects of prior knowledge and beliefs about the model's competence on learning outcomes. Finally, the fourth contribution is more fundamental, yet highly relevant for this line of research, by showing that people can make sense of visualizations of other people's eye movements. Our discussant, an eminent EARLI-scholar who has published on the use of EMME for learning strategy training, will synthesize and discuss the four empirical contributions.

Gaze Guidance in Number-line Tasks

Presenting Author: Thomas Gallagher-Mitchell, Liverpool Hope University, United Kingdom; **Co-Author:** Damien Litchfield, Edge Hill University, United Kingdom; **Co-Author:** Victoria Simms, Ulster University, United Kingdom

In this paper we present an investigation into the use of visual cues during number-line estimation, and their influence on cognitive processes for reducing number-line estimation error. Participants completed a 0-1000 number-line estimation task pre and post a brief intervention in which they observed static-visual or dynamic-visual cues (control, anchor, gaze cursor, mouse cursor) and also made estimation marks to test effective number-target estimation. Results indicated that a significant pre-test to post-test reduction in estimation error was present for dynamic visual cues of modelled eye-gaze or mouse movement. However, there was no significant performance difference between pre-test and post-test for the control condition or static anchor intervention condition. Findings are discussed in relation to the extent to which anchor points alone are meaningful in promoting successful segmentation of the number-line, and whether dynamic cues promote the utility of these locations in reducing error through attentional guidance. More broadly, we highlight the application of dynamic intervention cues to improve behavioural responses and the potential for this paradigm to provide a baseline measure of accuracy in following and interpreting gaze cursors.

Effectiveness of Eye Movement Modeling Examples: The Role of Instructional Ambiguity

Presenting Author: Tim van Marlen, Utrecht University, Netherlands; **Co-Author:** Margot van Wermeskerken, Utrecht University, Netherlands; **Co-Author:** Halszka Maria Jarodzka, Open University of the Netherlands, Netherlands; **Co-Author:** Tamara Van Gog, Utrecht University, Netherlands

Eye movement modeling examples (EMME) show students a demonstration of a task by another person (the model), with the model's eye movements superimposed on the task. Earlier research has shown mixed results regarding the effectiveness of EMME compared to regular modeling examples (ME). We hypothesize that this might be related to the

ambiguity of the model's verbal explanation, with EMME presumably being more effective than ME when verbal instructions are ambiguous (i.e., not immediately clear what the model is referring to). Prior research showed no differences between EMME and ME with unambiguous explanations on acquiring geometry problem-solving skills. We investigated in 57 university students whether EMME would be more effective than ME when explanations are ambiguous. If so, EMME would foster attention to the verbally referenced information during example study (evidenced by more, longer, and faster fixations) and lead to higher performance and faster response times on practice problems after example study. Results revealed that participants in the EMME condition indeed fixated the verbal referents more often and faster than participants in the ME condition. However, there were no differences in performance accuracy, and participants in the ME condition were faster at solving the isomorphic problems. These findings suggest that although EMME help guide visual attention towards the relevant information, which should (theoretically) foster integration of the visual and auditory information, this does not affect learning the problem-solving procedure. However, given that our participants had high prior knowledge, we are currently replicating this study in a younger sample.

Using Eye Movement Modeling Examples to support Learning with Multiple Representations

Presenting Author:Marie-Christin Krebs, Leibniz-Institut für Wissensmedien, Germany; **Co-Author:**Anne Schueler, Leibniz-Institut für Wissensmedien, Germany; **Co-Author:**Katharina Scheiter, Leibniz-Institut für Wissensmedien, Germany

We investigated in two experiments whether Eye Movement Modeling Examples (EMME) are beneficial for learning with multiple representations and if their effectiveness is influenced by characteristics of the learner and/or the model. In Experiment 1 (N=75), two groups received EMME showing eye movements by a trained model, demonstrating multimedia-processing strategies on learning material with multiple representations. Before observing the EMME, participants were informed either that the model was a successful learner (competent model) or another participant of the experiment (neutral model). A third group received no EMME. After learning all participants completed a posttest. Results indicated an interaction between learner and model characteristics regarding learning outcomes: Only learners with lower prior knowledge benefitted from EMME, but only when they received a neutral model. There was no EMME effect for learners with higher prior knowledge. Experiment 2 (N=180) investigated the influence of prior knowledge on the effectiveness of EMME in more detail. Furthermore, we addressed the influence of social comparison orientation. The procedure was similar to Experiment 1 except for the fact that participants' prior knowledge was experimentally manipulated. One half of the participants received domain related information before the learning phase, while the other half of the participants received non-related information. Contrary to our findings in Experiment 1, the results indicated that all learners benefited from EMME irrespective of the learners' prior knowledge or their social comparison orientation.

Eye See What You Are Doing: Inferring Task Performance from Eye Movement Data

Presenting Author:Margot van Wermeskerken, Utrecht University, Netherlands; **Co-Author:**Damien Litchfield, Edge Hill University, United Kingdom; **Co-Author:**Tamara Van Gog, Utrecht University, Netherlands

Eye movements provide a window into the mind: they show the center of people's visual attention, which is usually (though not always) what they are thinking about. However, inferring from a display of someone's eye movements what they must be thinking, requires substantial interpretation, and little is known about how people make sense of visualizations of other people's eye movements. Recently, we showed that observers were able to interpret which relatively simple task instruction was reflected in static or dynamic displays of eye movements. In the present study we take this line of inquiry a step further, using more complex tasks to investigate whether observers are able to infer the (in)accuracy of other people's task performance from their eye movement patterns. Observers were presented with dynamic and static eye movement displays of another person solving relational reasoning tasks and were to judge, based on this display, which option was chosen. Findings suggest that observers are able to judge above chance whether someone chose the right or a wrong answer based on their eye movements. However, judgment accuracy was affected by the distinctiveness of eye movement patterns, with high distinctive patterns (majority of fixations on one answer option) resulting in higher judgment accuracy than low distinctive patterns (fixations distributed more evenly across answer options). Dynamic displays yielded higher judgment accuracy for low distinctive patterns than static displays. Findings are promising for developing instructions (e.g., EMME, see other contributions) or providing personalized feedback based on visualizations of eye movements.

Session Q 21

2 September 2017 10:30 - 12:00

Main Building A - A4

Symposium

Cognitive Science, Motivational, Social and Affective Processes

Modeling key factors of students' writing performance

Keywords: Achievement, Attitudes and beliefs, Cognitive development, Cognitive skills, Higher education, Motivation, Self-efficacy, Writing / Literacy

Interest group: SIG 12 - Writing

Chairperson: Teresa Limpo, University of Porto, Portugal

Organiser: Gert Rijlaarsdam, University of Amsterdam, Netherlands

Discussant: Vince Connelly, Oxford Brookes University, United Kingdom

In contemporary society, effective writing skills are increasingly essential to communicate in professional contexts, as well as in one's private life. Writing is, however, a complex activity requiring not only (meta)cognitive but also motivational processes. Due to the complex nature of writing, effective writing instruction is a prerequisite for students to develop these essential writing skills. In this respect, more insight in key factors related to students' writing performance is needed to provide optimal and differentiated writing instruction. Therefore, the aim of this symposium is to analyze not only cognitive but also motivational key factors related to students' writing performance. The four studies addressed either cognitive, motivational, or a combination of cognitive and motivational key factors. Limpo, Alves, and Connelly focused on the cognitive writing challenges by investigating the relationship between transcription, high-level writing processes, and middle school students' writing performance. The study of Parr and Brown aimed at modeling motivational factors. More particularly, they investigated the interactions among secondary students' perceptions of having been taught task specific aspects of writing, their specific and as well as general sense of self-efficacy and interest in writing, and their writing performance. In the third study, Errázuriz focused on the motivational perspective by investigating the relationship between teacher training students' and teachers' implicit theories of writing and their writing performance. Finally, De Smedt and colleagues combined cognitive and motivational writing challenges by relating primary school students' self-efficacy for writing, writing motivation and cognitive writing strategies to their writing performance.

Modelling the transcription-writing link: The mediating role of planning and translating

Presenting Author: Teresa Limpo, University of Porto, Portugal; **Co-Author:** Rui Alexandre Alves, University of Porto, Portugal; **Co-Author:** Vince Connelly, Oxford Brookes University, United Kingdom

Transcription, which draws on spelling and handwriting, is one of the first writing processes that children need to master. Mastering transcription is important because, once it gets sufficiently fast and accurate, writers are able to simultaneously activate key high-level writing processes, such as planning or translating. This study examined the relationships between transcription, high-level writing processes, and writing performance in Grades 7-8 ($N = 196$). Structural equation modelling was used to test the direct effects of handwriting fluency and spelling accuracy on planning and translating, and of these latter on writing performance, as well as the indirect effects of handwriting fluency and spelling accuracy on writing performance, via planning and translating. Results showed that the proposed model fitted the data extremely well, explaining 46% of the variability in writing performance. We found that higher handwriting fluency was associated with better planning skills ($\beta = .50$), higher spelling accuracy was associated with better translating skills ($\beta = .59$), and better planning and translating skills were associated with greater writing performance ($\beta = .61$ and $\beta = .22$, respectively). We found indirect effects of handwriting fluency and spelling accuracy on writing performance, respectively, via planning ($\beta = .31$) and translating ($\beta = .12$). These results suggest that transcription continues to impact on writing during teenage school years, by constraining high-level writing processes. Therefore, as a building block of writing development, transcription should be taught and practiced from very early on, so that the acquisition of high-level writing processes is not compromised later.

Student Perceptions of Efficacy and of Being Taught in Writing

Presenting Author: Gavin Brown, University of Auckland, New Zealand; **Co-Author:** Judy M. Parr, University of Auckland, New Zealand

Self-efficacy is involved in controlling and regulating the writing process in order to communicate intent. Self-efficacy was measured specifically in relation to either dimensions of, or different communicative purposes for, writing. Parallel items measured perceived extent of receipt of instruction. Self-efficacy and criterion measures were matched. Additionally, generic self-efficacy and liking were included in the model. A random sub-set of the sample involved in a national standardization exercise completed either part, dimensions or purposes, of the study (N 's = 1626, 1271, 1317, 2385, respectively for Years 9–12). Structural equation modelling yielded a good fit model of self-efficacy for different dimensions of writing in relation to writing performance and an acceptable fit model for writing for different purposes. The proportion of variance in performance accounted for was modest. Importantly, self-efficacy increased with perception of having been taught the dimensions of a quality performance, or how to write for a particular purpose.

Implicit theories about writing of initial teacher training program students and professors

Presenting Author: Constanza Errázuriz, Pontificia Universidad Católica de Chile, Chile

Academic writing is a key skill for quality learning development in initial teacher training and in the future teacher profession; nonetheless, according to the evidence, Chilean students have a poor writing performance (INICIA Test, 2013). Based on the foregoing, this work presents the results of a research aimed at analysing the implicit theories of writing of teacher training students and professors and their relationship with writing performance, because conceptions may affect the quality of writing (Baaijen, Galbraith & Glopper, 2014; Neely, 2014; White & Bruning, 2005).

With regard to implicit theories of writing, the transmission or transactional typology was considered. Transmission' beliefs refer to the reproduction of knowledge and transactional beliefs refer to building of knowledge (White & Bruning, 2005). Regarding the methodology, we used a quantitative methodology that included the participation of a representative sample of teacher training students and professors ($n = 300$ & $n = 100$) in the Araucanía and Los Ríos Regions. A writing questionnaire to measure writing beliefs and a rubric to evaluate an essay were designed in order to review the theories and assess writing performance. Were also conducted the following statistical tests: Anova, Kruskal-Wallis and the Pearson test, to assess the correlation of the different types of conceptions and the student's performance. Finally, it was

proved that students showed both conceptions simultaneously and that, compared to first year students, the conceptions of fourth year students had not changed. Likewise, it was confirmed that students with a higher level of transactional theories show better performance in writing.

Cognitive and motivational key factors of late primary students' writing performance

Presenting Author:Fien De Smedt, Ghent University, Belgium; **Co-Author:**Emmelien Merchie, Ghent University, Belgium; **Co-Author:**Mariska Barendse, Ghent University, Belgium; **Co-Author:**Yves Rosseel, Ghent University, Belgium; **Co-Author:**Jessie De Naeghel, Ghent University, Belgium; **Co-Author:**Hilde Van Keer, Ghent University, Belgium

Participating in our contemporary society increasingly requires the capability to write effectively. However, the complexity of writing is a challenge for students in this respect. Therefore, more insight is needed into both cognitive and motivational challenges of writing. Especially in-depth insight is wanted in: (a) how cognitive and motivational challenges mediate and correlate with writing performance and (b) whether and how these relationships vary for boys and girls and for writers of different achievement levels. In the present study, 799 fifth and sixth-grade students completed questionnaires regarding their self-efficacy for writing, writing motivation, and writing strategies and completed two writing tests, respectively focusing on the informational and narrative text genre. Based on multiple group structural equation modeling (MG-SEM) two models were put forward: (a) a MG-SEM model for boys and girls and (b) a MG-SEM model for high, average, and low achievers. The results underline the importance of studying writing models for different groups of students to get more refined insight on the complex interplay between motivational and cognitive challenges related to students' writing performance.

Session Q 22

2 September 2017 10:30 - 12:00

Main Building E - E301

Symposium

Motivational, Social and Affective Processes

Stimulating and Sustaining Interest: The profits and pitfalls of technology in education

Keywords: Cognitive skills, Computer-assisted learning, E-learning / Online learning, Educational Psychology, Educational Technology, Instructional design, Language (Foreign and second), Learning Technologies, Motivation, Motivation and emotion, Technology

Interest group: SIG 08 - Motivation and Emotion

Chairperson: K. Ann Renninger, Swarthmore College, United States

Organiser: Luke K. Fryer, The University of Hong Kong, Hong Kong

Organiser: Niels Dohn, Aarhus University, Denmark

Discussant: Jason Chen, College of William and Mary, United States

Few fields of human endeavor feel the steady march of technology more than education. From primary to tertiary and lifelong learning, it fulfills a broad range of functions. Technology offers substantial opportunity to support structure, choice, flexibility and even student interest for learning. At the same time, however, learning management systems are ignored, MOOCs are left unfinished and innovative technologies quickly lose their shine. This symposium examines how technologies stimulate and sustain interest, or fail thereto. Four papers examine interest development across four areas, from learning to make webpages and code, to MOOC experiences and practicing a language with an AI. Paper-1 tracked university students' progress creating interactive web pages, testing the effect of a utility-value intervention on student interest, tracking students' exploratory engagement with examples and exercises. Paper-2 examined the stimulation/maintenance of student interest, coding participant observations of the classroom, informal interviews, video recording (using video glasses), and questionnaire (pretest-posttest). Paper-3 explored patterns of interest development during Massive Open Online Courses, and using intentions to take another course as a proxy for interest. Paper-4 examined the difference between students' interest in classroom speaking tasks under conditions of Chatbot- (AI) and Human-partners. A counter-balanced experimental design across one semester tested the effect of these conditions on students' interest (in tasks and the course). The discussant will bring these papers together into a consistent whole and then open the floor for an active discussion of this critical issue.

Opportunities for Exploratory Learning Online: Good for Interest (but Constrained by Utility Value)

Presenting Author:Carol Sansone, University of Utah, United States; **Co-Author:**Tamra Fraughton, University of Utah, United States

Experiencing interest while learning is important for persistence, learning, and re-engagement over time (Renninger, Nieswandt & Hidi, 2015). When an activity is not interesting but the value of persistence is high, individuals may strategically engage with the activity in ways that create an interesting experience if provided the opportunities (Sansone & Thoman, 2005). We examined this process within the context of an online college class in creating interactive web pages. We tracked students' exploratory engagement with examples and exercises (i.e., degree to which they explored and experimented with codes in examples/exercises). We examined whether students differentially engaged in these behaviors as a function of a utility value intervention (to which students were randomly assigned) and their prior programming experience. We also tracked self-reports of interest over the semester. Students' degree of exploratory engagement over the semester predicted greater interest. However, the utility value intervention predicted lower degree of exploratory

engagement with the examples and exercises. This pattern did not differ as a function of prior experience with web page creation. These data suggest that constructing opportunities for exploration and experimentation with the material when learning online was good for interest, but the context of learning (e.g., emphasizing the usefulness of learning) can unintentionally lead to less experimentation and exploration.

Students' interest in Scratch coding

Presenting Author:Niels Dohn, Aarhus University, Denmark

The ability to code computer programs is an important part of literacy in today's society. This presentation reports from a case study in two sixth grade classes where Scratch coding was implemented in teaching of mathematics. The aim of the study was to investigate how students' interest was triggered and maintained during this course. Data were collected by participant observations of the classroom, informal interviews, video recording by use of video recording glasses, and questionnaire (pretest-posttest design). The results show that students' average interest in coding mathematical tasks decreased through the lessons, as the effect size was slight negative. However, video and interview data show that situational interest was triggered in many coding situations. These situations were not related to the mathematical coding tasks but to re-use of existing games and animations, posted on Scratch. It appears clear that Scratch coding as an educational activity does not itself increase interest. Thus, the integration of non-curricular self-directed coding practices on Scratch into a formal educational setting is not a straightforward matter.

Interest development across a Massive Open Online Course (MOOC)

Presenting Author:Jason Lodge, The University of Melbourne, Australia; **Co-Author:**Paula De Barba, The University of Melbourne, Australia; **Co-Author:**Mary Ainley, University of Melbourne, Australia; **Co-Author:**Gregor Kennedy, University of Melbourne, Australia

In this research we explore patterns of interest development in one of the latest forms of online learning: Massive Open Online Courses or MOOCs. In particular we examine trajectories of interest development taking into account individual interest at the domain level, situational interest for the course at the outset and as maintained across the course, and interest in the domain at the end of the course expressed as intention to undertake future courses in the domain. Different trajectories of interest development were identified using Two-Step cluster procedures. Results showed three distinct trajectories, which we have been labelled as High-Decreasing, Low-Increasing, and High-Maintained. Findings suggest that differences in these trajectories were closely related to changes in students' situational interest across the course. In addition, significant differences between trajectory groups were found for antecedents variables of general achievement motivation and autonomous learning skills as well as for the outcome variable of course performance. These findings will be discussed in terms of what they demonstrate concerning the association between different levels of interest in the domain and in the course, and how MOOC design may take this into account thereby providing better support for student learning.

Stimulating and sustaining interest: An experimental comparison of AI and Human task partners

Presenting Author:Luke K. Fryer, The University of Hong Kong, Hong Kong; **Co-Author:**Mary Ainley, University of Melbourne, Australia; **Co-Author:**Andrew Thompson, Kyushu Sangyo University, Japan; **Co-Author:**Aaron Gibson, Kyushu Sangyo University, Japan; **Co-Author:**Linda Sherlock, Kyushu Sangyo University, Japan

Novel technology can be a powerful tool for enhancing students' interest in many learning domains. However, the sustainability and overall impact of such interest is unclear. This study tests the longer-term effects of technology on students' task and course interest. The experimental study was conducted with students in foreign language classes ($n=122$): a 12-week experimental trial that included pre- and post-course interest, and a sequence of task interest measures. Employing a counterbalanced design, at three week intervals students engaged in separate speaking tasks with each of a Human and "Chatbot" partner. Students' interest in successive tasks and in the course (pre-post), were used to assess differential partner effects and course interest development trajectories. Comparisons of task interest under different partner conditions over time indicated a significant drop in students' task interest with the Chatbot but not Human partner. After accounting for initial course interest, SEM indicated that only task interest with the Human partner contributed to developing course interest. While Human partner task interest predicted future course interest, task interest under Chatbot partner conditions did not. Under Chatbot partner conditions there was a drop in task interest after the first task: a novelty effect. Implications for theory and practice are discussed.

Session Q 23

2 September 2017 10:30 - 12:00

Pinni A - Paavo Koli

Symposium

Learning and Social Interaction

Participation and agency in instructional settings: perspectives of diagnosed children

Keywords: Conversation / Discourse analysis, Ethnography, Learning disabilities, Parental involvement in learning, Social interaction, Teaching / instruction

Interest group: SIG 10 - Social Interaction in Learning and Instruction

Chairperson: Michèle Grossen, University of Lausanne, Switzerland

Discussant: Peter David Renshaw, The University of Queensland, Australia

As the theme of the conference, *Education in the crossroads of economy and politics – Role of research in the advancement of public good*, indicates, the organization of learning and instruction can be understood against the backdrop of political, economic and educational considerations. The purpose of the present symposium is to inquire into the tension between inclusion and exclusion with students who have been diagnosed with a learning disability. In recent decades an increasing number of students have been assigned neuropsychiatric diagnoses such as the diagnosis ADHD. This development has several consequences, for instance increasing medication of children and a pressure towards segregation, where diagnosed children sometimes are placed in special educational groups. The political and policy agenda behind these developments is often for such placements to be temporary, and that the special educational arrangements would make it possible for students to return to the regular classroom. However, little is known about the pedagogical realities of teaching situations for diagnosed children. In this symposium we report on empirical research of the daily lives within classrooms and the experiences of children. The questions asked concern how teaching and learning are organized, what types of social interaction between teachers and students and between students that evolve, what the nature of learning is, what are the experiences of the children and what agency the students exert. These findings are used to discuss the issue of to what extent the instructional experiences directed towards diagnosed children prepare students for a good life in the future.

One teacher – one child: Agency of the diagnosed child in a learning context

Presenting Author: Eva Hjorne, University of Gothenburg, Sweden; **Presenting Author:** Roger Säljö, University of Gothenburg, Sweden

This presentation concentrates on the teaching-learning processes developed in special classrooms organised for children assigned with the diagnosis ADHD. There is a general assumption that children's learning will increase through a placement in a special class with few pupils and more than one teacher. The issues explored in this study concern what educational practices unfold in these settings, what are the children learning and how do they become participants in the classroom community? The empirical study is based on video-recorded classroom interaction in eight ADHD-classes during a period of seven years, in total about 200 hrs from all kinds of subjects. The results show that the general features of the instructional practices appearing in these settings are teaching and learning situations where one teacher instructs one child at a time. Another interesting finding is that these situations usually seem to follow the well-known and classical structure of I-R-F (Initiative-Response-Feedback) (cf. Mehan, 1979) that have been found to characterise regular classroom instruction. It is obvious that the teacher follows the institutional order of doing what is expected and which implies giving a lesson on a certain subject. The contributions from the children are generally minimal, and there is no indication that the student role in such dyads is more active. Thus, from a sociocultural perspective, which views learning as an emergent property of social interaction, there is little evidence that children become more active or assume a more participatory role.

Classroom participation and Identity Formations in a Special Support Classroom

Presenting Author: Ann-Carita Evaldsson, Uppsala University, Sweden; **Presenting Author:** Johanna Svahn, Uppsala University, Sweden

This study takes its point of departure in a longitudinal video-ethnographic study in a special support school in Sweden analyzing how an individual student's everyday classroom participation evolves during one school year. We are interested in how individuals follow unique "trajectories of participation" across social contexts, sometimes in unexpected ways, and how this contributes to emergent identity formations (Dreier 2003; Wortham, 2004). For this purpose we explore unfolding trajectories of participation for an individual student with long-term school difficulties, Mariam, a 13-year-old girl diagnosed with ADHD, during her first year in a seven to nine grade class. In this evolving school context Mariam encounters specific instructional practices where she faces numerous emotional challenges and often, implicit expectations from the teachers regarding how the instructional practices may be conducted. We will show how the focal student by engaging (and disengaging) with the instructional practices moves from disruptive and affectively charged student conduct to gradually gain access to the communicative skills needed for managing her school life. The analysis is based on integrated levels of descriptions combining socio-cultural approaches to identity formation with micro-sociological approaches to participation and identities as locally accomplished in interaction. By investigating unfolding trajectories of participation for an individual student this study addresses the situatedness of identity formations and thus, destabilizes the seemingly static notion of 'learning disabilities' as a set of behaviors and attributes of individuals.

The ADHD category and family narrative on the child's adverse school trajectory

Presenting Author: Juho Honkasilta, University of Helsinki, Finland; **Co-Author:** Tanja Vehkakoski, University of Jyväskylä, Finland

In this study we focus on how the 'normal' and 'other' as well as the paradox between inclusive education ideology and special education practice are construed by Susan, a 16 years old Finnish adolescent diagnosed with Attention Deficit Hyperactivity Disorder (ADHD), one of the most commonly diagnosed neuropsychiatric disorders among 'poorly' behaving and performing students, and her parents. The study explores how the membership in ADHD category is negotiated by Susan and her parents when they co-narrate Susan's experiences of unfortunate and broken compulsory school trajectory characterized by various school placements, alternations between mainstream and special education classes, and different attempts to 'treat' her and her ADHD. This study questions educational policies and practices that uncritically rush to

explain perceived problems in 'normal' achievement by individual characteristics and psychopathology, special educational needs, and the use of the language of deficit, disability and disorder. This paper asks whether we have become so obsessed with categorizing students in accordance with the ideals of 'normal' achievement that we are blind to structures, conventions, ideologies and related teaching and learning practices in school that *form* the education unattainable and unachievable for students deemed deviant and disabled in the first place.

ADHD as lived Experience in School Contexts: Exploring Instruction and Participation

Presenting Author: Thyge Tegtmejer, University of Southern Denmark, Denmark

The ambition of this paper is to study the in situ practices that emerge in inclusive classrooms in Denmark where children diagnosed with ADHD are participating and, as a part of this, to examine the situated experiences of the diagnosed children. By analyzing sequences of instructional practice, the paper aims at contributing to shedding light upon the complex contextual factors of instructional approaches and learning for all in inclusive schools. A background for this interest is the many claims in literature and public debate regarding the impact of the presence of this group of children in mainstream classrooms, recently accentuated as a large number of children diagnosed with ADHD formerly referred to special education are now, as a result of the overall inclusion strategy in Denmark, attending mainstream schools. The sociocultural analysis of this paper focuses on processes of participation in school activities and on how the participation of diagnosed children is mediated by both instructional approaches and by the diagnosed children's intentional agency. Findings show that the capacity of participation in learning activities of diagnosed children can change several times during a day relative to teachers' instructional approaches, and that problems with peer interplay have consequences on motivation and concentration for the diagnosed children. The implications for both instructional approaches and inclusion policy are discussed.

Session Q 24

2 September 2017 10:30 - 12:00

Linna - K103

Symposium

Motivational, Social and Affective Processes

Engagement from infants to secondary school: The effect of relationship with teachers and peers

Keywords: Achievement, Early childhood education, Meta-analysis, Motivation, Motivation and emotion, Peer interaction, Quantitative methods, Secondary education, Social aspects of learning and teaching, Social interaction

Interest group: SIG 05 - Learning and Development in Early Childhood , SIG 08 - Motivation and Emotion

Chairperson: Marja-Kristiina Lerkkanen, University of Jyväskylä, Finland

Discussant: Lars-Erik Malmberg, University of Oxford, United Kingdom

Increasing evidence shows that engagement plays a significant role in children's learning and development. Engagement is a multidimensional concept including three major dimensions: behavioral, emotional, and cognitive engagement. However, most of the previous studies have investigated engagement using self-ratings at school age. The present symposium will present studies which have assessed children's engagement with a variety of methods in different age groups. In addition, the effect of relationships with teachers and peers will be examined. The first paper examines levels of infant engagement in 90 Portuguese childcare centers, and its associations with teacher-child relationship quality. The second paper takes a meta-analytic approach to investigate whether students' engagement acts as a mediator in the association between affective teacher-student relationships and students' achievement, and examines whether results differ for primary and secondary schools. The third paper expands current knowledge on lower secondary school students' engagement by examining variation in students' situational engagement. The aim is to explore the extent of which variation in students' situational engagement is associated with the quality of teacher-student interactions, and whether the effects are different depending on students' gender. Finally, the fourth paper investigates whether students select friends based on their level of behavioral and emotional engagement and whether friends become more similar over time in their behavioral and emotional engagement. Implications will be discussed in terms of how to better support teachers in fostering children's engagement as a part of high-quality daily experiences at day care and school classrooms.

Infant engagement in childcare centers: Associations with teacher-child relationship quality

Presenting Author: Joana Cadima, University of Porto, Portugal; **Co-Author:** Ana Isabel Mota e Costa Pinto, University of Porto - Portugal, Portugal; **Co-Author:** Sílvia de Barros, Politécnico do Porto, Portugal; **Co-Author:** Vera Coelho, University of Porto, Faculty of Psychology and Educational Sciences, Portugal; **Co-Author:** Donna Bryant, University of North Carolina at Chapel Hill, United States; **Co-Author:** Manuela Pessanha, Instituto Politécnico do Porto, Escola Superior de Educação, Portugal; **Co-Author:** Carla Peixoto, Polytechnic Institute of Porto, Portugal

In this study, we examine levels of infant engagement in Portuguese childcare centers, and its associations with teacher-child relationship quality. Participants were 90 infants, their mothers and their teachers. Data was collected in two moments. In the first moment, observers conducted observations at home to assess home quality, infant temperament and

development. In the second moment, observers conducted observations in childcare to assess teacher-child relationship quality and infant engagement. A set of multiple regression models were conducted to determine whether classroom quality contributed to infant engagement in classrooms, controlling for developmental age, child temperament, mother's education, and home quality. Results showed that, in higher quality classrooms, infants spent more time actively engaged and less time non-engaged. Implications will be discussed in terms of how to better support teachers in fostering infant active engagement as part of high-quality daily experiences in childcare.

Teacher-Student Relationships and Achievement: A Meta-Analysis on the Mediating Role of Engagement

Presenting Author: Debora Roorda, University of Amsterdam, Netherlands; **Co-Author:** Suzanne Jak, Research Institute of Child Development and Education, University of Amsterdam, Netherlands; **Co-Author:** Marjolein Zee, University of Amsterdam, Netherlands; **Co-Author:** Frans Oort, Research Institute of Child Development and Education, University of Amsterdam, Netherlands; **Co-Author:** Helma Koomen, Research Institute of Child Development and Education, University of Amsterdam, Netherlands

The present study took a meta-analytic approach to investigate whether students' engagement acts as a mediator in the association between affective teacher-student relationships and students' achievement. Furthermore, we examined whether results differed for primary and secondary schools and whether similar results were found in a longitudinal subsample. Our updated sample consisted of 190 studies (251,162 students in total), including students from preschool to high school. A distinction was made between positive relationship aspects (e.g., closeness) and negative relationship aspects (e.g., conflict). Meta-analytic structural equation modelling showed that, overall, the associations between both positive relationships and achievement and negative relationships and achievement were partially mediated by student engagement. Subsequent analyses revealed that mediation is applicable to both primary and secondary school. Only the direct association between positive relationships and engagement was stronger in secondary school than in primary school. Finally, partial mediation was also found in the longitudinal subsample.

Quality of Teacher-student Interaction Contributes to Students' Situational Engagement

Presenting Author: Sanni Pöysä, University of Jyväskylä, Finland; **Co-Author:** Kati Vasalampi, University of Jyväskylä, Finland; **Co-Author:** Joona Muotka, University of Jyväskylä, Finland; **Co-Author:** Marja-Kristiina Lerkkanen, University of Jyväskylä, Finland; **Co-Author:** Anna-Maija Poikkeus, University of Jyväskylä, Finland; **Co-Author:** Jari-Erik Nurmi, University of Jyväskylä, Finland

The purpose of present study is to expand current knowledge on lower secondary school students' engagement by examining variation in students' situational engagement. The aim is to explore the extent of which variation in students' situational engagement is associated with the quality of teacher-student interactions (i.e., emotional support, instructional support, and classroom organization), and whether the effects are different depending on students' gender. Participants were 709 seventh grade students (47.7% girls, 13-14 years). A total of 155 lessons (90 literacy and 65 mathematics lessons) were video-recorded during 11 weeks at spring 2014. At the end of each of the video-recorded lesson students reported their situation-specific engagement with the mobile-based InSitu instrument. The data of 1,647 time-stamped ratings of students' situation-specific engagement, and the codings of teacher-student interaction from 155 lessons were analyzed with hierarchical modelling (Bayes estimation). The results showed that students' self-reported situation-specific engagement was positively related to the quality of teacher-student interaction in the domains of emotional support and classroom organization. Furthermore, the results indicated that situational engagement of girls was significantly higher than that of boys, and girls appeared to benefit more from the classroom interaction with high-quality emotional support than boys. Overall, the results indicated that students' situation-specific engagement in lessons can be fostered by supportive teacher-student interactions.

Peer Selection and Influence in Adolescents' School Engagement Trajectories

Presenting Author: Maaïke Engels, KU Leuven, Belgium; **Co-Author:** Mariola C. Gremmen, University of Groningen, Department of Sociology, Netherlands; **Co-Author:** Jan Dijkstra, University of Groningen, Netherlands; **Co-Author:** Karen Phaet, KU Leuven, Department of Social and Cultural Psychology, Belgium; **Co-Author:** Karine Verschueren, KU Leuven, Belgium

Friendships become increasingly important during adolescence and play a critical role in adolescents' academic development. However, it remains unclear how friendships affects adolescents' trajectories of behavioral and emotional engagement. This study examined whether students select friends based on their level of behavioral and emotional engagement (selection effect) and whether friends become more similar over time in their behavioral and emotional engagement (influence effect). Data were derived from the LEUVEN Children of Immigrants Longitudinal Study (CILS) in which an ethnically diverse sample of adolescents was followed from Grade 9 to 10 ($N = 467$; 58.4% boys; $M_{age} = 15.56$ at Wave 1). Longitudinal social network analysis (RSiena) revealed similar effects for behavioral and emotional engagement. Students avoided to nominate arbitrary other students in order to increase his or her attractiveness. Moreover, students had a tendency to reciprocate friendships and were likely to become friends with friends' friends. Furthermore, school engagement was not significantly affected by the tendency to give or receive friendship nominations. Moreover, friends did not select each other based on similar levels of school engagement, or influence each other in their school engagement over time. These preliminary results call for further research on the conditions under which friends influence each other's engagement trajectories.

Session R 1

2 September 2017 13:00 - 14:30

Pinni B - B3116

Single Paper

Higher Education

Higher Education and Instruction

Keywords: E-learning / Online learning, Educational Psychology, Educational Technology, Higher education, Instructional design, Peer interaction, Quantitative methods, Reflection, Teacher Effectiveness, Teacher Professional Development, Teaching / instruction

Interest group: SIG 04 - Higher Education

Chairperson: Idit Katz, Ben-Gurion University of the Negev, Israel

Curricular space: Defining it, studying it, and assessing its impact on learning

Keywords: Educational Psychology, Higher education, Instructional design, Reflection

Presenting Author: Maribel Blasco, Copenhagen Business School, Denmark; **Co-Author:** Emmanuel Manalo, Kyoto University, Japan

Curricular space pertains to spaces generated or foreclosed by the curriculum as experienced by students, including *cognitive, autonomy, and reflective spaces*. Despite space being known to be important in learning, it is generally neglected in curriculum design: there are very few authors who have referred to it, and often it is in relation to physical space or curricular organization to achieve certain objectives, rather than in relation to thinking processes and the promotion of learning. Moreover, in many countries, curricula in higher education are becoming increasingly compressed, content-heavy, and teacher-steered, thus further reducing whatever little space students may have for learning-related thought processes. In this presentation, we will report on ongoing research aimed at building a conceptual framework and methodology for studying curricular space and its impact on learning. In an initial, exploratory study, we gathered data from 10 undergraduate students through focus group interviews (employing both open-ended and semi-structured questioning) and a visual representation task. The student responses indicate that curricular space is a meaningful concept to them, and that the methods we used were effective in soliciting useful representations of student experiences of curricula. One important finding is that perceptions of lack of space were linked to negative experiences and negative impacts on learning.

Students' engagement with digital microscopy: Pedagogical implications in distance learning

Keywords: E-learning / Online learning, Educational Technology, Higher education, Instructional design

Presenting Author: Christothea Herodotou, Open University, United Kingdom; **Co-Author:** Maria Aristeidou, The Open University, United Kingdom; **Co-Author:** Simon Kelley, The Open University, United Kingdom; **Co-Author:** Eileen Scanlon, OU, United Kingdom

Virtual microscopes (VMs) enable samples (e.g., biology images) to be viewed by many students, reused and repurposed individually, used in assessment and continue access outside the laboratory. They have been embedded in the design of online modules to facilitate learning when a physical microscope cannot be used. No studies have yet examined students' perceptions about VMs and usage patterns, in particular, whether VM activities are pedagogically effective. In this study, we used the VM in activities in which students are asked to recognise samples. Learning analytics from 430 undergraduate students in an earth science and biology distance learning modules and survey responses revealed that students would like to use the VM in meaningful investigations and systematically across a module. This raises the need to modify existing pedagogy and integrate the tool in meaningful activities such as crowd sourcing investigations.

Peer observation as a faculty professional development strategy: a research review

Keywords: Higher education, Peer interaction, Teacher Professional Development, Teaching / instruction

Presenting Author: Luis Tinoca, University of Lisbon, Portugal; **Co-Author:** Ernesto López Gómez, Universidad Nacional de Educación a Distancia (UNED), Spain

Evermore, Higher Education institutions worldwide develop programs allowing academic staff to undergo peer observation of teaching each academic year. In fact, several authors (Peel, 2005; Bernstein, 2008) emphasize that peer observation is a powerful tool to help instructors improve their practices. This review sets out to map recent (post 2010) research relating to the concept of peer observation when university instructors have the opportunity to observe lessons of another colleague. This review builds on journal papers included in the Web of Science, ERIC and EBSCO databases. The study uses documents analysis where the units of analysis are concepts of peer observation, research aims, methods, and main conclusions/implications of the studies. The review aims to answer the following questions: What are the main objectives of studies focusing in peer observation as a professional development strategy? Which methods/instruments are used? What are the main findings/implications resulting from these studies? A total of 28 articles were analysed. From the analysed studies it is clear that there are a number of research instruments and methods for investigating peer observation using a qualitative and or mixed-methods approach, but there is also a clear challenge to develop quantitative research designs. The discussion of the analysis emphasis the strong support for this practice from the participating faculty, identifying some of the key features contributing to the success of peer observation strategies including their valuing of this experience to support their professional development and classroom teaching practice.

Effects of different kinds of teaching methods in higher education –a longitudinal multimethod study

Keywords: Higher education, Quantitative methods, Teacher Effectiveness, Teaching / instruction

Presenting Author: Elisabeth Fischer, University of Kassel, Germany; **Co-Author:** Martin Haenze, University of Kassel, Germany

To investigate the effect of different kinds of teaching methods in higher education, observations of 80 university courses were combined with self-report data from 1716 students attending these courses. The trained observers documented the applied teaching methods, which were subsequently grouped to four clusters (teacher-guided methods, teacher-student-interaction, student activities, student-guided methods). Self-reports of students were measured in the beginning (interest, self-efficacy, general study habits) and in the end (cognitive involvement, interest, learning achievement) of the semester. Multi-level regression analyses were conducted controlling for course format and subject discipline on course level and the students' preconditions measured in the beginning of the semester on individual level. The analyses show that teacher-guided methods increased, whereas teacher-student-interactions and student activities decreased the students' cognitive involvement and interest. The variety of teaching methods negatively influenced these criteria as well. Self-reported learning achievement could not be predicted by any of the teaching methods. The effectiveness of teacher-guided methods challenges previous research that promoted the use of interactive and activating methods and raises questions about the quality of the student activating methods used in higher education teaching in Germany.

Session R 2

2 September 2017 13:00 - 14:30

Pinni B - B1100

Single Paper

Teaching and Teacher Education

Teaching and Teacher Education - B

Keywords: Attitudes and beliefs, Conversation / Discourse analysis, Instructional design, Mathematics, Pre-service teacher education, Problem solving, Qualitative methods, Reflection, Secondary education, Teacher Professional Development, Teaching / instruction

Interest group: SIG 11 - Teaching and Teacher Education

Chairperson: Laura Page, University of Kentucky, United States

Developing Student Teachers' Pedagogical Content Knowledge and Agentic Identities Through Reflection

Keywords: Conversation / Discourse analysis, Pre-service teacher education, Qualitative methods, Reflection

Presenting Author: Andrea Gelfuso, University of Central Florida, United States

Developing Student Teachers' Pedagogical Content Knowledge *and* Agentic Identities Through Reflection If our aim as societies is to improve student learning, then we need to cultivate the Pedagogical Content Knowledge (PCK), *and* the agentic capacity of our teachers. This study examined the development of student teachers' PCK and agentic identities. The questions guiding this study were (1) What discursive practices create spaces for student teachers to rehearse/develop both PCK and agentic identities? (2) What particular phrases does a teacher educator use to create such spaces? Positive Discourse Analyses revealed three distinct dialogic patterns that created opportunities for student teachers to rehearse/develop both PCK and agentic identities.

Pre-University Teachers' Knowledge, Beliefs and Practices Regarding University Preparation

Keywords: Attitudes and beliefs, Qualitative methods, Secondary education, Teaching / instruction

Presenting Author: Els van Rooij, University of Groningen, Netherlands; **Co-Author:** Ellen Jansen, University of Groningen, Netherlands

For many students, the transition from secondary school to university is difficult and may even lead to drop-out or study delay. Pre-university teachers could ease this transition by preparing their students better for university. This study investigated pre-university teachers' classroom practices that contribute to university preparedness and how these practices are shaped by teacher knowledge, beliefs, attitudes and background factors. Data of 50 interviews with Dutch pre-university teachers were analyzed using framework analysis. Results showed that knowledge about the current university environment, having a strong role perception regarding university preparation, and specific personal background factors led to the conscious integration of university preparation into everyday secondary school classroom practice, which mainly consisted of teachers sharing their own experiences in university, talking about degree programmes in their subject, and teaching self-regulatory skills. Reasons for teachers not to pay attention to university preparation were a lack of knowledge on the current university environment and a lack of time. Therefore, in order to increase university preparation practices in secondary school, it is important to provide teachers with knowledge about the current academic environment at universities and about what knowledge, skills, and attitude universities expect from their incoming students. Furthermore, it would be fruitful to investigate ways in which university preparation can be efficiently integrated into regular lessons.

Pre-service teachers as designers? Unravelling decision making in advertising literacy education.

Keywords: Instructional design, Pre-service teacher education, Qualitative methods, Teacher Professional Development

Presenting Author:Britt Adams, Ghent University, Belgium; **Co-Author:**Tammy Schellens, Ghent University, Belgium; **Co-Author:**Martin Valcke, Ghent University, Belgium

Nowadays, children are often confronted with new advertising formats, such as advertising in games. Compared to rather traditional formats, young consumers have difficulties with recognizing these new advertising formats because of their integrated and interactive character. Scholars have repeatedly stressed the role of education to raise children's awareness of advertising. Although a few advertising literacy programmes have already been developed during the past decades, new advertising formats are rarely highlighted. Therefore, in the context of this study, three teacher design teams (TDT) in pre-service primary education were set up to develop up-to-date and innovative learning material. Whereas it can be assumed that conversations in such teams offer opportunities for teachers' professional development, the study's aim is revealing which decisions pre-service teachers make when developing learning material about advertising. For that reason, this study combines a pretest on participants' previous design experiences and expectations about TDT's, with an analysis of the team discussions and pre-service teachers' reflections about the design process. Preliminary pretest results show that the majority of the participants already had initial experience with designing learning material. Regarding professionalization, the participants believed that TDT's would especially be interesting to gain insight into how to develop learning material, rather than a method for acquiring knowledge about advertising or getting inspired by didactic suggestions of team members. The analysis of the conversations taking place within the several TDT's as well as implications for practice and further research will be presented at the conference.

Preservice teachers' use of representations and visual-spatial abilities in problem solving

Keywords: Mathematics, Pre-service teacher education, Problem solving, Teacher Professional Development

Presenting Author:Beyza Olgun, Middle East Technical University, Turkey; **Co-Author:**Engin Ader, Bogazici University, Turkey

This study aimed to investigate preservice teachers' use of representations, visual-spatial abilities, and their relationships with word problem solving performances. The sample of the study consisted of 113 preservice mathematics teachers in a private and four public universities. The results showed that there was no significant relationship between problem solving performance and visual-spatial abilities. Preservice teachers' visual-spatial abilities only had a weak relationship with use of schematic representations among all the variables. While most of the solutions including schematic representations were correct, more than half of the solutions involving pictorial representations were incorrect. The findings suggested that the influence of representations on performance significantly differed in terms of the types of representations and visual-spatial abilities did not have an influence on preferences for problem solving methods. Preservice teachers' learning experiences and aims for easy and quick solutions could be more decisive in their use of representations. Keywords: Use of representations, visual-spatial abilities, problem solving.

Session R 3

2 September 2017 13:00 - 14:30

Main Building C - C8

Single Paper

Motivational, Social and Affective Processes

Motivation and Emotion - C

Keywords: Attitudes and beliefs, Citizenship education, Emotion and affect, Motivation, Motivation and emotion, Pre-service teacher education, Primary education, Psychometrics, Quantitative methods, Reflective society, Science education, Student learning, Survey Research, Vocational education

Interest group: SIG 08 - Motivation and Emotion

Chairperson: X. Christine Wang, United States

Does passion matter in education? Benefits and promoters

Keywords: Motivation, Student learning, Vocational education, Motivation and emotion

Presenting Author:Zuleica Ruiz Alfonso, University of Las Palmas de Gran Canaria, Spain; **Co-Author:**Jaime Leon, University of Las Palmas de Gran Canaria, Spain

Does passion matter in education? What are the benefits of passion and how can teachers promote it? The aim of this study was to answer these questions by a systematic review of studies within the educational context. We conducted a search in major electronic databases and summarized the results. Articles reviewed revealed a great variety of passion's consequences, such as students' wellbeing, dedication or competence, and a diversity of promoters, such as positive relations, supportive context or autonomy support, among others. We conclude by revealing the educational significance of this research and with theoretical and methodological suggestions for future research.

Measuring pupils' attitudes towards socio-scientific issues.

Keywords: Attitudes and beliefs, Citizenship education, Reflective society, Survey Research

Presenting Author:Juliette Walma van der Molen, University of Twente, Netherlands; **Co-Author:**Kim Evers, University of Twente, Netherlands

This paper presents the results of a large-scale study to validate a questionnaire that measures pupils' attitudes towards

socio-scientific issues (the PASSI questionnaire). We define socio-scientific issues (SSI) as those topics that are about complex societal or technological developments that may induce ethical dilemmas. Although such topics will have an increasing impact on our future lives, most primary and secondary curricula hardly focus on engaging youth with SSI in a meaningful, multi-disciplinary manner. To fill that void, in a large intervention study, a number of Dutch primary and secondary schools are currently participating in projects that engage pupils with SSI. Apart from measuring changes in pupils' knowledge and ways of debating SSI, the study also measures pupils' engagement with and attitudes towards SSI. In order to measure these attitudes validly and reliably over time, we developed and tested a new measurement instrument. Based on a literature review within social and educational psychology and sociology, on topics such as attitude development, scientific citizenship, and social or civic engagement, we developed a framework that describes three dimensions with eight underlying components of pupils' attitudes towards SSI. These eight components were translated into eight scales that comprise the PASSI. Results of a validation study among 1386 pupils (age 8-15), using both exploratory and confirmatory factor analyses, confirmed the eight-factor structure and showed good convergent and discriminant validity. These results will be presented, as well as some results of a correlational study that investigated potential differences between subgroups of pupils in the sample.

Evolution of pre-service teachers' motivational/affective profiles during a science learning unit

Keywords: Emotion and affect, Motivation, Pre-service teacher education, Science education

Presenting Author: Deborah Pino-Pasternak, Murdoch University, Australia; **Co-Author:** Simone Volet, Murdoch University, Australia

Empirical evidence worldwide indicates that, despite primary teachers playing a critical role in triggering interest in science, they lack confidence and have negative attitudes towards teaching science with this trend starting during initial teacher training. In order to advance our understanding in this area this study mapped the entry and the evolution of motivational/affective profiles of a cohort of 108 primary education pre-service teachers undertaking a first-year unit aimed at enhancing their understanding of science concepts. All completed an online survey tapping on self-determination, grade motivation, self-efficacy, difficulty in science, interest, enjoyment and anxiety before the commencement and at the end of the unit. Clustering methods were used to group students into homogenous motivational/affective science learning profiles. Subsequently, cluster profile analysis (Quinnell et al, 2012) was used to determine students' migration and evolution of patterns between entry and final profiles. Four distinct profiles were identified (Optimal, Promising, Vulnerable, and Disengaged) with nearly half of the students exhibiting the least favourable profiles prior to the unit. Student migration after the unit accounted for 60% of the total cohort with migration occurring from a more to a less favourable (24%) profile and vice versa (17.6%). Implications for teacher education programmes in Science are discussed.

Children's beliefs about causes of success and failure at school Adapting the Causal Dimension Scale

Keywords: Attitudes and beliefs, Primary education, Psychometrics, Quantitative methods

Presenting Author: Laurent Brun, Université Grenoble Alpes, France; **Co-Author:** Benoit Dompnier, Institut des Sciences Sociales et Pédagogiques, Switzerland; **Co-Author:** Pascal Pansu, Université Grenoble Alpes, France

Research on causal attribution suggests that causal perception is essential for individuals, especially in learning contexts. The present research aimed to adapt and validate the Revised Causal Dimension Scale (CDSII) for children. As the original scale, this adapted version of the CDSII includes 4 subscales (3 items per subscale) corresponding to the 4 causal dimensions of locus of causality, stability, personal control and external control. Results of exploratory factorial analysis (Oblimin rotation) revealed that the scale was structured by four factors corresponding to the CDSII four causal dimensions. Confirmatory factorial analyses revealed that a four factor model fitted the data to a satisfactory extent was better than unidimensional or three factor models. To conclude, results obtained in both studies support the reliability and the internal validity of the four dimensional scale of the Causal Dimension Scale (CDSII) adapted for children. This scale seems relevant for understanding the structure of causal attributions of children in elementary school.

Session R 4

2 September 2017 13:00 - 14:30

Pinni B - B3107

Single Paper

Learning and Special Education, Teaching and Teacher Education

Teaching and Teacher Education

Keywords: Attitudes and beliefs, Communities of learners, Competencies, E-learning / Online learning, Educational policy, Mathematics, Mixed-method research, Pre-service teacher education, Primary education, Problem-based learning, Social interaction, Special education, Teacher Professional Development, Video analysis

Interest group: SIG 11 - Teaching and Teacher Education

Chairperson: Haim Eshach, Ben-Gurion University of the Negev, Israel

How Pre-service Teachers Internalize the Link between Research Literacy and Pedagogy

Keywords: Communities of learners, E-learning / Online learning, Pre-service teacher education, Problem-based learning

Presenting Author: Mary Gutman, Efrata College, Israel; **Co-Author:** Lynne Genser, Efrata College of Education, Israel

Enabling pre-service teachers to develop a critical view of their practice and to acquire the higher order inquiry skills necessary for pedagogic research has been and continues to be a challenge. The present study presents a unique intervention in the training of pre-service teachers in research skills (research literacy) using a Problem Based Learning (PBL) approach. The intervention is implemented in two different Learning Communities (LC), one online and the other blended. Both immediate and long-term effects of PBL are investigated as are the effects of social and direct scaffolding within the LCs. The study focuses on transmitting the following Research Literacy (RL) skills: identifying and defining a problem, formulating a research question, and designing a research method. The findings indicate an immediate effect upon all RL skills in both LCs. The long-term effect appears only in the online LC and only for two RL skills: identifying and defining problems. Additionally, there is greater use of social scaffolding in formulating and designing a research study in the online LC than in the blended learning community. Those findings are then interpreted in terms of retention capacity and scaffolding in blended and online LCs.

Prototypical educational settings from special education teachers in inclusive classes

Keywords: Primary education, Social interaction, Special education, Video analysis

Presenting Author: Jeannette Wick, University of Zurich, Switzerland

Following the Salamanca Statement of 1994, children with special needs are being increasingly taught in inclusive classes. This results in additional pedagogical personnel who compliment the work of regular teachers. Empirical research on educational activities by special education teachers in inclusive settings is scarce (e.g., Moser, 2013). This contribution is part of a descriptive multi-method study which meets this need for research and aims at describing activities and role perceptions of special education teachers and regular teachers in inclusive primary schools in Switzerland. The present study describes how inclusive teaching is realised in practice and characterises those arrangements on a superficial and deeper level. Special education teachers (N = 30) were asked to define prototypical inclusive educational settings in classes and to record them on video. These prototypes of inclusive educational settings were categorised and analysed with respect to both their superficial and deeper structure. Firstly, five prototypes of educational settings could be identified: (1) group setting outside class, (2) group setting within class, (3) one-to-one setting outside class, (4) one-to-one setting within class and (5) mixed setting (combination of group respectively one-to-one setting outside and within class). The second step of analysis focused on group settings within and outside class and the mixed settings. For these a low-inference coding system was developed based on the coding system for scaffolding by van de Pol (2012, 2013) and the classroom-discourse model by Bak (1996) and applied to the analysis of them on a superficial and on a deeper level.

Relations between mathematics teachers' professional knowledge and their lesson planning skills

Keywords: Competencies, Mathematics, Mixed-method research, Teacher Professional Development

Presenting Author: Stefan Ufer, Ludwig-Maximilians-Universität (LMU), Germany; **Co-Author:** Sabine Hammer, Technical University of Munich, TUM School of Education, Germany

In mathematics instruction, the didactical quality of instructional tasks is an important predictor for effective learning processes (e.g. Baumert et al., 2010). Therefore, it is essential that teachers are able to identify high-quality tasks for instruction and prepare their enactment. Understanding the chain of effects from teachers' professional knowledge to their actions in lesson preparation and implementation is of importance for the design of teacher training. Blömeke et al. (2015) propose to analyse the processes which mediate the relation between professional knowledge and teachers' observable behaviour. Within task selection processes, teachers must attend to and make use of features of instructional tasks, which might stimulate sustainable learning. This requires the ability to notice and justify effective teaching elements which are usually described under the term „professional vision“ (Van Es & Sherin, 2002). The analysis of these processes should offer a more comprehensive assessment and holistic understanding of the latent competence construct than only considering the resources that contribute to observable behaviour. Following this approach, we analysed the connection between mathematical teachers' professional knowledge, their task-selection processes during lesson planning, and the planning products concerning the selected tasks. In a questionnaire study with N=119 future and active teachers of the secondary level, we found that teachers' professional knowledge affects the planning products and that this influence can be explained to a certain extent by the planning process, in particular by task-related noticing and reasoning processes during task selection.

Preservice teachers' beliefs about high-stakes testing: Implications for policy and practice

Keywords: Attitudes and beliefs, Educational policy, Pre-service teacher education, Teacher Professional Development

Presenting Author: Sharon Nichols, University of Texas at San Antonio, United States

The purpose of this exploratory study was to examine preservice teachers' attitudes toward their own high-stakes testing experiences and to examine the ways in which those experiences might relate to their subsequent views about the role and efficacy of high-stakes testing systems in education. Conducted in 2010 in Texas, this study offered a window into how preservice teachers' experiences with high-stakes testing may relate to their subsequent understanding of and beliefs about high-stakes testing in their future professional practice. Data are based on a four-part survey with 380 preservice teachers. Descriptive analyses suggest that males and females have different views when it comes to high-stakes testing both in terms of how they view its purposes as well as what it was like personally to take these tests. Older preservice teacher candidates were more likely to have read about accountability and to understand it than younger candidates. And correlations suggest that candidates with higher test anxiety have more negative views of the roles and purposes of high

stakes testing. Vignette data show that teachers most prefer teaching contexts with highly motivated students and least prefer contexts with high pressures to pass tests. Qualitative analysis of responses to vignettes show that preservice teachers see a causal connection between pressure to pass test and student motivation. Implications for policy and practice are discussed.

Session R 5

2 September 2017 13:00 - 14:30

Main Building C - C5

Single Paper

Learning and Special Education

Special Educational Needs - B

Keywords: Achievement, Educational policy, Mathematics, Meta-analysis, Mixed-method research, Peer interaction, Primary education, Quantitative methods, School effectiveness, Secondary education, Social interaction, Special education, Values education

Interest group: SIG 15 - Special Educational Needs

Chairperson: Crista Weise, Autonomous University of Barcelona, Spain

A character strength intervention in four inclusive Finnish classrooms

Keywords: Mixed-method research, Primary education, Special education, Values education

Presenting Author:Lotta Uusitalo-Malmivaara, University of Helsinki, Finland; **Co-Author:**Kaisa Vuorinen, University of Helsinki, Finland

A character strength intervention in four inclusive Finnish classrooms This paper presents one of the few structured positive pedagogy interventions in inclusive classrooms with students with a variety of special needs. A controlled 16-week character strength intervention was conducted for Finnish 5th and 6th graders (age 11-12 years, $N=135$) aiming to promote student well-being, self-esteem and social acceptance. Seven quantitative well-being measures (Schoolwork Engagement, Global happiness, School-related happiness, Social competence, Self-esteem, Grit and Self-rated Social Skills) comprised the pre-test – post-test battery. In addition, qualitative observation material was collected. The intervention group made progress over the control group in almost all measures. Qualitative data revealed increased joy of learning and school attending, appreciation of diversity and tightened social bonding. In particular, students with special needs expressed improved love of learning and also teachers informed of greater enjoyment of instruction. This paper discusses a need for explicit teaching of well-being promoting, non-cognitive skills that support also cognitive learning.

Examining the social outcomes of students with autism spectrum disorder in 'inclusive schools'

Keywords: Meta-analysis, Peer interaction, Social interaction, Special education

Presenting Author:Christoforos Mamas, University of California, San Diego, United States; **Co-Author:**Shana Cohen, University of California, San Diego, United States; **Co-Author:**Gabrielle Jones, University of California, San Diego, United States

Students with autism spectrum disorder (ASD) represent an ever-expanding group of students within general education settings or so-called inclusive schools. These students have particular challenges with social interaction and communication with others. Their inclusion in general education schools has been met with ambivalence, partly due to insufficient empirical evidence as to the effectiveness of inclusion. As a result, some have argued that the trend for more inclusive education should be encouraged, as these students gain social benefits from being educated alongside their peers. Others have argued that inclusion may lead to further social isolation, bullying and marginalization due to their inherent difficulties with social interaction or inability of school to deal with their complex needs. This paper addresses the social outcomes of students with ASD in general education settings. We have reviewed 31 empirical studies conducted from 2005 to 2015 aiming to begin deciphering the complex nature of social inclusion of ASD students. The review revealed some encouraging findings with regards to social outcomes but, overall, students with ASD appear to be at higher risk of social isolation in 'inclusive schools'. It has also been found that the concept of inclusion is highly contentious and is being loosely described, in some of the studies, as mere placement of ASD students in general education settings. It is therefore not surprising that intervention studies yielded the most positive findings in terms of favorable social outcomes, as these studies included elements of transformative and alternative instructional practice.

Mathematics Intervention for Low Achieving Middle School Students: Reversing the Trend

Keywords: Achievement, Mathematics, Quantitative methods, Secondary education

Presenting Author:Shirley Yates, Tatachilla Lutheran College, Australia; **Co-Author:**Michelle Coop, Tatachilla Lutheran College, Australia

The Trends in International Mathematics and Science Study (TIMSS, 2011) and Programme for International Student Assessment (2012) have highlighted a significant trend towards a decline in mathematics achievement in Australian students in the middle school years. In common with many countries, TIMSS results also show a substantial 'tail' of under-performance in mathematics. While low achievement can be partially attributed to student factors, curriculum and pedagogical issues, there is considerable evidence that lack of procedural knowledge of basic addition, subtraction,

multiplication and division operations is the most obvious obstacle to academic success in mathematics. A research-based QuickSmart (QS) intervention, focused on automaticity, was trialed with low achieving Grade 7 and 8 students, matched with a control group of similar underachieving classmates. QS students evidenced statistically significant improvements in fluency, accuracy and mathematics achievement after the QS Multiplication section and at the end of the year long intervention. Over the same time-frame, the control group's achievement and performance in Subtraction and Multiplication deteriorated significantly. However, this performance trend was reversed after the administration of the Multiplication section of the QS intervention to the control students over the following six months. However, the smaller number of sessions the Controls received was insufficient to extend the reversal to their subsequent mathematics achievement. The increase in efficient and effective cognitive processing evident in both groups following the QS intervention affirms the place of intervention in contemporary pedagogy for middle school students with low achievement in mathematics.

The detection of plot structures and their relation to formal requirements

Keywords: Educational policy, Mixed-method research, School effectiveness, Special education

Presenting Author: Mathias Mejeu, University of Zurich, Switzerland

Inclusive education is also controversially discussed in Switzerland, in particular since the Swiss cantons had to elaborate concepts of inclusion. In this context the canton of Soleure initiated a project to design, implement and evaluate a concept of inclusive education that includes rapports between existing formal and empirical structures regarding the development of competence centres. For this purpose psychological, but also neo-institutionalistic and ecological systems theories founded research which is mainly dedicated to the extent stakeholders complete or compete given legal and institutional rooms. Analyses are based on legal and administrative documents and on a survey of 136 persons concerned with special education. Parametrisation of extracted structures (e.g. Degree-, Closeness-Centrality) and data analysis are based on topological network-models and sampling methods. Results revealed a good quality of instruments and high relevance of teachers within the process of inclusion.

Session R 6

2 September 2017 13:00 - 14:30

Linna - K109

Single Paper

Higher Education, Learning and Instructional Technology, Learning and Social Interaction, Motivational, Social and Affective Processes

Metacognition - C

Keywords: Cognitive skills, Collaborative Learning, Doctoral education, Educational Psychology, Higher education, Metacognition, Motivation and emotion, Peer interaction, Self-efficacy, Self-regulation, Social interaction, Student learning, Survey Research

Interest group: SIG 16 - Metacognition

Chairperson: Julia Kosinar, University of Applied Sciences and Arts Northwestern Switzerland, Switzerland

Development of a doctoral student well being questionnaire

Keywords: Doctoral education, Educational Psychology, Higher education, Survey Research

Presenting Author: Jill Scevak, University of Newcastle, Australia

Development of a Doctoral Student Well-being Questionnaire Previous studies examining the well being of university students have targeted undergraduate populations or international students and have used mental health measures (Berwick et al 2008). Measures of mental health (e.g. Mental Health Inventory Five - MHI5), however, do not capture the personal, emotional and social as well as the cognitive, technical and institutional impacts on the research student experience. This study describes the development of a doctoral student well-being questionnaire. Doctoral students (n=136) were drawn from a larger study (n=1790) and were interviewed about those aspects of doctoral students' research study that were personally important to them. Thematic analysis of the interview data informed the construction of items for the questionnaire and was trialled with 333 students from four Australian universities. Students were asked how important each item was to their well being. A Principal Components factor analysis identified seven dimensions that had an impact on doctoral student well being: university, supervision, research task, my research self-efficacy, social-personal, work/life balance and future career opportunities. The questionnaire demonstrated good content validity and internal reliability. Identifying those areas of concern for a student represents the first step towards addressing them. Importantly there are implications for research student completion rates and their career options.

How modeling and feedback impact self-regulation during a laparoscopic knot tying simulation task

Keywords: Metacognition, Self-efficacy, Self-regulation, Motivation and emotion

Presenting Author: Michael Dempsey, Boston University, United States; **Co-Author:** Douglas Kauffman, Boston University, United States

During the third year general surgery clerkship, medical students are required to develop laparoscopic knot tying skills. Research in laparoscopic knot tying skills often relies on objective variables (e.g., time, materials used, number of

iterations) that lend themselves to pre- and post-intervention correlational analyses. The current study differs by examining how instructional interventions—role modeling and feedback—affect medical students' skill acquisition, self-efficacy, and self-regulation during a laparoscopic surgical simulation training session. Seventy-eight surgical clerkship students were assigned randomly to one cell of a 2X2 factorial design. Participants observed one of two types of role modeling (expert vs. coping) and received either process-oriented or outcome-oriented feedback during a 30-minute laparoscopic training session. Participants also completed several surveys that assessed their interest in surgery, self-efficacy for laparoscopic knot tying and self-regulation. Both modeling and feedback types showed a significant influence on efficiency of students' learning, their satisfaction with their performance, and their self-efficacy for laparoscopic knot tying. Qualitative interview data supplementing the quantitative results revealed that both modeling and feedback influenced students' self-regulated learning. Our findings suggest that even in high-stakes learning environments, such as medical training, how training and feedback are given is an important consideration for skill development.

Which students review their failures effectively? : The quality of "Lesson Induction".

Keywords: Cognitive skills, Educational Psychology, Metacognition, Student learning

Presenting Author: Satomi Shiba, University of Tokyo, Japan

It is effective in learning to review failures after problem solving. Although students review their own failure during study, all of them do not use good failure utilization strategies and therefore, do not learn from failures. This study focused on "Lesson Induction", which is a metacognitive or failure utilization learning strategy. The purpose was to examine which students usually review their failure and can induce good-quality lessons after problem solving from two aspects: student's characteristics and teacher's instruction. 7th and 8th-grade students in Japanese public schools completed a questionnaire (n = 687) and lesson induction test (n = 187). First, a high school teacher and an undergraduate student made an evaluation criterion to score the quality of lessons. Then hierarchical multiple regression was conducted. The results showed that appropriate students' characteristics and teacher's instruction was a significant predictor for the quantity of review, and a main effect of appropriate learning belief and an interaction with frequency of explaining during study and teachers' instruction was significant for the quality of lessons. The findings indicate that in order to induce good-quality lessons after problem solving, it is important for students to have appropriate beliefs for learning, explain to others what they learn and be instructed by teachers how to review their failures. In future study, teacher's instruction should be examined because this study could not do so clearly, and factors of enhancing the quality of lesson induction should be considered for practical studies.

Socially shared regulation of learning: Relation with engagement, exploratory talk and performance

Keywords: Collaborative Learning, Metacognition, Peer interaction, Social interaction

Presenting Author: Valeska Grau, Pontificia Universidad Católica de Chile, Chile; **Co-Author:** Amaya Lorca, Pontificia Universidad Católica de Chile, Chile; **Co-Author:** Carolina Araya, Pontificia Universidad Católica de Chile, Chile

There has been an increasing interest in the processes of socially-shared regulation of learning (SSRL) within collaborative activities in the classroom. The present paper aims to advance in the knowledge of different aspects of the literature that have not been sufficiently developed: (a) the development of a methodological framework to analyse SSRL including individual and group levels of the phenomenon, (b) the relationship of SSRL with other constructs such as quality of talk and attention and engagement and (c) the relationship between SSRL and group performance. 231 video-recordings of children working together in groups of 3 students were collected from 45 different schools. The groups were asked to solve a problem in collaboration that lasted between 15-20 minutes. Two types of analysis were developed to assess SSRL. The first analysis was conducted through a coding scheme focusing on the regulatory activity, considering individual utterances as the unit of analysis. The second analysis ranked the collective activity in terms of symmetry and reciprocity. Assessment of quality of talk, attention and engagement and performance were also collected. The main results of the study show that the groups exhibiting high levels of SSRL were significantly higher in exploratory talk, attention and engagement and achievement on the task. Theoretical, methodological and practical relevance are discussed.

Session R 7

2 September 2017 13:00 - 14:30

Virta - 112

Single Paper

Assessment and Evaluation, Cognitive Science

Comprehension of Text and Graphics - H

Keywords: Cognitive skills, Competencies, Comprehension of text and graphics, Experimental studies, Mathematics, Multimedia learning, Quantitative methods, Reading comprehension, Self-regulation

Interest group: SIG 02 - Comprehension of Text and Graphics

Chairperson: Pablo Pirnay-Dummer, Germany

The Interplay between Verbal and Visual Cueing

Keywords: Comprehension of text and graphics, Experimental studies, Quantitative methods, Multimedia learning

Presenting Author: Manuela Glaser, Leibniz-Institut für Wissensmedien, Germany; **Co-Author:** Stephan Schwan, Leibniz-

The present study complements existing research on the extended multimedia and cueing principle of multimedia learning by examining in more detail the interaction between verbal and visual cueing strategies with regard to retention and localization of particular contents. Furthermore, the study compares classical multimedia cueing and filmic cueing which is, until now, rather neglected in multimedia research. Three film clips, each introducing a famous painting, were presented in one of three different forms: (1) the whole picture was presented continuously in long shot (no cueing), (2) named pictorial elements were highlighted in the picture with red-colored frames and lines (classic multimedia cueing), (3) named pictorial elements were highlighted in the picture by camera zooms and pans (filmic cueing). Retention and localization accuracy of unnamed and named pictorial elements were measured. The results confirm the extended multimedia effect for retention, however, the effect seems to occur to the disadvantage of localization processes. Filmic cueing was not effective with regard to retention, but showed a tendency to foster localization of unnamed pictorial elements.

Pathways to integration – contrasting a text-centered vs. a multiple-representations perspective

Keywords: Competencies, Comprehension of text and graphics, Reading comprehension, Multimedia learning

Presenting Author:Ulrich Ludewig, University of Tübingen, Germany; **Co-Author:**Katharina Scheiter, Leibniz-Institut für Wissensmedien (IWM), Germany

Text-graph integration has been viewed from text-centered and multiple-representations perspectives. For both perspectives, text-graph integration is the result of multiple cognitive sub-processes: (a) Understanding the visual-special array of the graph, (b) graph interpretation, (c) sentence comprehension, (d) mapping text onto the graph, and (e) mapping graph onto text. However, the text-centered and multiple-representations perspective make different predictions about prerequisite relationships between these five cognitive sub-processes of integration. To investigate these predictions, we first developed two hypothetical knowledge structures that represent the prerequisite relationships from either a text-centered or multiple-representations perspective. Secondly, we assessed individuals' ability to perform the five mentioned integration processes using five task types and three illustrated science texts. Thirdly, we compared the fit between hypothesized knowledge structures and empirical response patterns of 50 adult individuals. Our results show that the knowledge structure developed from a text-centered perspective revealed a better fit with the empirical response pattern, due to fewer violations of assumed prerequisite relationships. This result suggests that text-graph integration does not require the ability to comprehend graph and text separately. Text comprehension is a prerequisite, whereas graph comprehension is a result of integration and not a prerequisite of integration. Our results help to develop instructional support for text-graph integration processes. Furthermore, the proposed assessment can be used to assess an individual's strengths and weaknesses in text-graph integration.

The influence of text coherence and inference making on solving mathematical word problems

Keywords: Cognitive skills, Comprehension of text and graphics, Mathematics, Reading comprehension

Presenting Author:Sabine Stephany, University of Cologne, Germany

Research shows that there is a huge mismatch between solving numerical tasks and tasks in written form in math classes. Although it is widely accepted that language plays an important part in solving word problems, it is still vague which linguistic aspects affect this process. Unlike previous research that concentrated on lexical and syntactical features, the present study assumed that language related difficulties are mainly caused by local and global inferences necessary to construct a coherent mental representation, a situation model. The key question is whether the construction of a situation model during reading a word problem can be supported by high coherent texts, so that there are less inferences to draw. This should facilitate the solving of word problems. To address this issue an experiment was carried out. Participants included 312 4th graders. A test consisting of four specifically designed word problems was created. Coherence level served as the independent variable. For each word problem a high and a low coherent text was generated. The construction of a situation model, measured by evaluating pictures and sentences matching the word problem, served as dependent variable. Results showed highly significant differences between high and low coherent word problems. Furthermore high coherent texts led to a higher frequency of correct solutions. In the paper this main finding will be further differentiated for different groups of participants and linked to working memory, reading competence and reading monitoring. The paper will also discuss the modifications of the word problems in detail.

Performance and Perception Across Multiple Text Task Conditions

Keywords: Cognitive skills, Comprehension of text and graphics, Reading comprehension, Self-regulation

Presenting Author:Alexandra List, Ball State University, United States

A consistent finding in the multiple text use literature has been that students assigned to write arguments perform better on multiple text tasks than do students asked to write summaries, narratives, or opinions. However, little is known about why argument-based tasks may facilitate multiple text task performance. In this study, we compare performance when students respond to two different types of tasks: one asking them to construct an argument and the other asking them to write a research report for an external audience. Students are further asked to self-evaluate their responses, to determine the criteria they think about when presented with different tasks. Students performed significantly better when writing a research report for an external audience than when asked to compose an argument. While the criteria students cited when self-evaluating their responses were found to differ across task conditions only to a limited extent, self-evaluation criteria were significantly associated with differences in response quality.

Session R 8

2 September 2017 13:00 - 14:30

Pinni B - B4116

Single Paper

Cognitive Science, Instructional Design, Learning and Instructional Technology, Learning and Social Interaction

Metacognition and Self-regulation

Keywords: Achievement, Attitudes and beliefs, Collaborative Learning, Computer-supported collaborative learning, Conceptual change, E-learning / Online learning, Instructional design, Learning analytics, Motivation, Primary education, Psychometrics, Quantitative methods, Self-regulation, Synergies between learning - teaching and research

Interest group: SIG 16 - Metacognition

Chairperson: Valentina Caruso, Swiss Federal Institute for Vocational Education and Training, Switzerland

Resolving scientific controversies to promote epistemic change: Testing an intervention concept

Keywords: Attitudes and beliefs, Conceptual change, Instructional design, Synergies between learning - teaching and research

Presenting Author: Tom Rosman, Leibniz Institute for Psychology Information, Germany; **Co-Author:** Anne-Kathrin Mayer, ZPID - Leibniz Institute for Psychology Information, Germany; **Co-Author:** Günter Krampen, ZPID - Leibniz Institute for Psychology Information, Germany

An intervention concept to foster students' epistemic beliefs (beliefs about the nature of knowledge and knowing) is presented. The concept is based on a multiple-texts approach. Students were presented short texts containing controversial scientific evidence on gender stereotyping in secondary schools. In contrast to more "traditional" approaches using controversial evidence, all contradictions may be integrated by identifying the contextual factors that a certain type of stereotype discrimination occurs in ("resolvable controversies"). We expected this approach to reduce absolute and multiplistic epistemic beliefs and to foster evaluativism. The intervention concept was tested in a pilot study (15 fourth semester psychology undergraduates) followed by an intervention study (86 sixth psychology undergraduates). A randomised field-experimental intervention study using a pre-post 3*2 design (3 intervention groups, 2 measurement points) was conducted. Data were analysed through t-tests and analyses of variance. In sum, the intervention proved suitable in reducing topic-specific absolute beliefs as well as in enhancing topic-specific and domain-specific evaluativistic beliefs. Our data thus show that the presentation of resolvable controversies is well-suited to reduce topic-specific absolutism through an increase in evaluativism and without the risk of fostering multiplism.

Measuring Collaboration Challenges and We-I Dimension using a Collaborative Assessment Tool

Keywords: Collaborative Learning, Computer-supported collaborative learning, Psychometrics, Self-regulation

Presenting Author: Aishah Bakhtiar, University of Victoria, Canada; **Co-Author:** Allyson Hadwin, University of Victoria, Canada; **Co-Author:** Todd Milford, University of Victoria, Canada; **Co-Author:** Rebecca Edwards, University of Victoria, Canada

Given its complex structure, group work or collaboration is posed with multitudes of challenges (e.g., Barron, 2003). However, methods of assessing and identifying those varied challenges are still underdeveloped, consequently reducing the effectiveness of efforts at supporting learners' regulation of those challenges. The purpose of this study was to (a) explore the types of challenges learners encountered in a collaborative task by (b) identifying activities that were perceived as either performed more collectively (WE-focused) or more individually (I-focused). A Collaborative Assessment Tool was used as a contemporary method for tapping into challenge areas in collaboration, and its validity and reliability will be analyzed in this paper. Findings, thus far, indicate that learners were more successful at harnessing group effort in communication, followed by motivation and socio-emotional climate. Activities pertaining to planning, strategic engagement, and using appropriate task knowledge were less WE-focused. Implications for supporting regulation in collaboration are discussed

Motivation, SRL and learner behaviour in MOOCs

Keywords: E-learning / Online learning, Learning analytics, Motivation, Self-regulation

Presenting Author: Renee Jansen, Utrecht University, Netherlands; **Co-Author:** Anouschka van Leeuwen, Utrecht University, Netherlands; **Co-Author:** Jeroen Janssen, Utrecht University, Netherlands; **Co-Author:** Liesbeth Kester, Utrecht University, Netherlands

Self-regulated learners actively plan, monitor and reflect on their learning and strategies. SRL is very important and in online forms of education, it is even more important than in traditional education, as students are provided with more autonomy online. In traditional education, it is known that motivation is related to self-regulated learning (SRL). In this study, the relation between motivation and SRL is investigated in a fully online, MOOC, context. Log data is collected of all learner behaviour in the MOOC to obtain insight in the nature of this relationship. Learners were clustered on their reported SRL, and it was explored if different self-reported SRL is related to different patterns in behaviour in the MOOC. Data on our motivation survey have been collected and the results show that learners are highly intrinsically motivated. During the EARLI conference findings will be presented of the relation between motivation and SRL, and of the sequential analyses of the SRL clusters. If students indeed behave differently in a MOOC dependent on their SRL, then learner behaviour

patterns may in the future be a method for determining learners' SRL.

Capturing SRL in upper primary school children: A data triangulation approach

Keywords: Achievement, Primary education, Quantitative methods, Self-regulation

Presenting Author: Sofie Heirweg, Ghent University, Belgium; **Co-Author:** Mona De Smul, University of Ghent, Belgium;

Co-Author: Geert Devos, Ghent University, Belgium; **Co-Author:** Hilde Van Keer, Ghent University, Belgium

Recently, research on self-regulated learning (SRL) demonstrated that even young students are capable of regulating their learning. This resulted in increased attention for the measurement of SRL skills in primary school students. However, in this respect a debate is going on how to accurately assess SRL. As all existing measurement instruments and approaches have their advantages and restrictions, there is a current call for the use of data triangulation. In line with this, the present study measures the SRL competencies of fifth and sixth-grade primary school children, combining a general self-report questionnaire, a task-specific self-report questionnaire, and think-aloud protocols. More particularly, the results for the different measurement approaches are presented, as well as compared and contrasted. Further, attention is given to presenting differences in SRL skills of students with different achievement levels.

Session R 9

2 September 2017 13:00 - 14:30

Main Building A - A4

Single Paper

Educational Policy and Systems, Learning and Social Interaction, Learning and Special Education

School and Teacher Effectiveness

Keywords: Assessment methods and tools, At-risk students, Attitudes and beliefs, Cultural diversity in school, Educational policy, Ethnography, Psychometrics, Qualitative methods, Quantitative methods, School effectiveness, Social aspects of learning and teaching, Teacher Effectiveness

Interest group: SIG 21 - Learning and Teaching in Culturally Diverse Settings, SIG 23 - Educational Evaluation, Accountability and School Improvement

Chairperson: Jonathan Groff, France

School Leadership and Intercultural Understanding

Keywords: Cultural diversity in school, Ethnography, Qualitative methods, School effectiveness

Presenting Author: Julianne Moss, Deakin University, Australia; **Co-Author:** Joanne O'Mara, Deakin University, Australia;

Co-Author: Trevor McCandless, Deakin University, Australia

Our research is set in Australia and was conducted between 2012-2015. Data were collected as part of larger, multi-method study: 'Doing diversity: Intercultural understanding in primary and secondary schools'. The study was funded by the Australia Research Council [ARCLP 120200319] in partnership with the Victorian Department of Education and Training (DET), the Victorian Curriculum and Assessment Authority (VCAA), and the Together for Humanity Foundation (THF). The project aim was to identify factors 'that facilitate and impede intercultural capabilities in students, teachers and schools' (Authors 2015, p. 8). The project uses a mixed method design and has multiple data sources. The key research question of this large research project is 'What inhibits and what enables intercultural understanding (ICU) in primary and secondary schools?' (Authors 2012). Our paper is focused on the second aim of the project, that is to 'Generate essential knowledge of the processes and principles for improving ICU outcomes through an in-depth, longitudinal study of the impact of students and teachers' ICU of teacher professional learning, ICU interventions with students, and research-led redesign of the cultural architecture of schools i.e.: policies, processes, practices' (Authors 2012, p. 6). The research and this paper speaks to the achievement of positive social change, excellence and equity, issues which are characterized by Deppeler and Ainscow (2016) in their introduction to a recently published special issue *Using inquiry-based approaches for equitable school improvement* as 'the greatest challenge for those who are involved with school effectiveness and improvement' (p.1).

Teacher Commitment to Poor Students: Self-interest and Ethic of Service in the Face of Adversity

Keywords: At-risk students, Attitudes and beliefs, Educational policy, Teacher Effectiveness

Presenting Author: Miguel Ordenes, University of California at Berkeley, United States

This study aims to understand how teachers maintain commitment to students under trenchant conditions of adversity and high pressure to perform under competitive accountability and market conditions. Teachers dealing with students, who are unable or unwilling to concentrate on learning or to abide by school or classroom norms, may challenge teachers in their core competencies and needs for well-being. These adverse conditions may put a great strain on teacher commitment to marginalized students. Education systems regulated by a combination of accountability and market incentives may put additional strain on educators, or perhaps may function as a sort of organizational guardrail that helps educators maintain commitment when 'blaming the victim.' Understanding teacher commitment to students facing adversity is central; however, the literature on this phenomenon is surprisingly underdeveloped. This study makes two contributions. First, based on the literature of teacher commitment, beliefs of deservingness, and incentives for teachers this study advanced a theoretical framework to understand teacher commitment to students under socioeconomic adversity and the pressure of extrinsic incentives. Second, by conducting an in depth multi-case study of five schools, it shed lights on how teachers maintain

commitment to students in Chile, a country where the convergence of accountability pressure, market competition, and socioeconomic adversity is dramatic. The findings are expected to be relevant for a broad spectrum of education systems where schools labor under extreme conditions of poverty and exclusion and where external accountability and market pressure co-exist for regulating schools.

Psychometric properties of a Swedish instrument measuring pedagogical leadership – a Rasch analysis

Keywords: Assessment methods and tools, Psychometrics, Quantitative methods, School effectiveness

Presenting Author: Lisa Hellström, Malmö University, Sweden

The Swedish Pedagogical and Social Climate in School (PESOC) instrument is intended for studies on school effectiveness. Based on the theoretical framework from the early stages of international school effectiveness research, the instrument has been widely used for school improvement efforts using teachers as respondents. The aim of the current study is to analyze whether the PESOC-PLP scale shows sound psychometric properties for measuring pedagogical leadership, using Rasch analysis. The study included 344 teachers. The Rasch analysis indicated two subdimensions and qualitative analysis of the content of the items in these subdimensions revealed two types of leadership: direct pedagogical leadership and indirect pedagogical leadership. Additional Rasch analysis of these subdimensions showed sound psychometric properties for measuring pedagogical leadership. Considering the global need for new measurement instruments that assess effective and successful leadership, researchers and educators outside Sweden may have interest in adapting this scale.

Learning is like...what? Metaphors of Learning in Germany, China, USA and France

Keywords: Assessment methods and tools, Attitudes and beliefs, School effectiveness, Social aspects of learning and teaching

Presenting Author: Elisabeth Wegner, University of Freiburg, Germany; **Co-Author:** Matthias Nückles, University of Freiburg, Germany

Metaphors of learning can be an indicator for how students experience learning. Therefore, goal of the study was to compare metaphors of learning between different countries and different kinds of schools. N= 886 high school students from four countries were asked to write down their metaphors of learning (Germany: 489, France: 123, China: 220, USA: 55). In the USA and in Germany, the most frequent sources were moving forward or upward, seeing something new or doing sports. In China, the metaphor of moving was also very frequent, however, students expressed more often than in other countries that learning is a duty. In contrast, most of the French students described learning as receiving something. Also, we found large differences within different kinds of German schools. Students following the vocational track of high schools were more likely to describe learning as unnecessary suffering or hard work than students following the academic track. Generally, metaphors of learning highlight the way high school students experience learning and they give insights into how differences in educational systems as well as in culture and language might influence these experiences. However, further research is needed to clarify how these differences arise.

Session R 10

2 September 2017 13:00 - 14:30

Virta - 109

Single Paper

Assessment and Evaluation, Lifelong Learning

Assessment Methods and Tools - B

Keywords: Assessment methods and tools, Cognitive skills, Competencies, Educational attainment, Lifelong learning, Mathematics, Meta-analysis, Pre-service teacher education, Secondary data analysis, Self-regulation, Student learning, Teacher Effectiveness, Teaching / instruction, Video analysis

Interest group: SIG 01 - Assessment and Evaluation

Chairperson: Jennifer Lambrecht, University of Potsdam, Germany

The Quality of Feedback: Instructional effectiveness captured in video recorded classrooms

Keywords: Assessment methods and tools, Teacher Effectiveness, Teaching / instruction, Video analysis

Presenting Author: Lisbeth M Brevik, University of Oslo, Norway; **Co-Author:** Kirsti Klette, University of Oslo, Norway; **Co-Author:** Marte Blikstad-Balas, University of Oslo, Norway

Internationally, little evidence of supporting purposes of classroom assessment exists. In the present study, we investigate feedback practices in language arts classrooms. By comparing video observations from 184 recorded language arts lessons across 46 secondary classrooms in Norway, this study considers the quality of feedback given orally by teachers to students, as well as from students to other students, and students' self-assessment. The findings suggest that there are substantial differences in the quality of feedback across classrooms, with the majority of teachers providing feedback that is either absent or low. The present study contributes with systematic findings on the quality of feedback in the classroom, and enables an analysis within and across a large number of classrooms and lower secondary schools.

Pre-service teachers analyse classroom situations: Assessing a key aspect of professional competence

Keywords: Assessment methods and tools, Competencies, Mathematics, Pre-service teacher education

Presenting Author:Marita Friesen, Ludwigsburg University of Education, Germany; **Co-Author:**Sebastian Kuntze, Ludwigsburg University of Education, Germany

The competence of analysing classroom situations in the sense of identifying and interpreting events that are relevant for student learning is an essential prerequisite for making informed teacher decisions. In line with the high relevance of how representations are dealt with in the mathematics classroom, we designed a test instrument for assessing pre-service teachers' competence of analysing the use of representations. Although the format in which classroom situations are presented might play a role when assessing this competence, evidence about the role of different formats such as text, comic and video is still scarce. Consequently, we developed in this study a vignette-based test with six classroom situations and designed each situation in the three formats text, comic and video. Answering open-ended questions, N=162 pre-service teachers were asked to analyse the use of representations in the six vignettes. The results suggest that the investigated competence of analysing conforms empirically to a one-dimensional Rasch model and that there is a non-significant main effect of the vignette format on the item difficulties. Texts, comics and video-based vignettes appear to be comparably effective for the assessment of pre-service teachers' competence of analysing the use of representations in mathematics classrooms.

A developmental progression of self-regulated learning

Keywords: Assessment methods and tools, Self-regulation, Student learning, Lifelong learning

Presenting Author:Narelle English, Melbourne Graduate School of Education, Australia; **Co-Author:**Susan-Marie Harding, The University of Melbourne, Australia; **Co-Author:**Nives Nibali, Melbourne Graduate School of Education, Australia; **Co-Author:**Monjurul Alom, The University of Melbourne, Australia; **Co-Author:**Lorraine Graham, University of Melbourne, Australia; **Co-Author:**Patrick Griffin, University of Melbourne, Australia

A developmental progression of self-regulated learning Abstract Student ability to learn how to learn, and in particular their ability to self-regulate their learning, will be a key skill in the knowledge economy. Given the range of student ability to regulate aspects of their thinking, behaviour and motivation during classroom tasks, a developmental progression of self-regulated learning (SRL) behaviour is an effective way to support teacher capacity to assess student SRL competence in order to make targeted interventions for students. This research focuses on the design of a questionnaire and the analysis of items for their facility to determine hierarchically ordered elements of SRL. Griffin's (2007) structure of developmental assessment was used to develop capabilities, indicators and criteria to build a framework to inform questionnaire items that assess student self-regulation. The tool was piloted and adjusted for a larger sample of students to assess the reliability of the items in order to determine whether items were a fit for the Rasch model. The questionnaire was completed by 3741 students from 42 schools in Victoria, Australia. It was determined that the tool was a good fit and the order of items and thresholds of difficulty were used to determine a progression of self-regulated learning.

How consistent are male and female variances in reading and mathematics?

Keywords: Cognitive skills, Educational attainment, Meta-analysis, Secondary data analysis

Presenting Author:Sue Stothard, Durham University, United Kingdom; **Co-Author:**Helen Gray, Durham University, United Kingdom; **Co-Author:**Peter Tymms, Durham University, United Kingdom; **Co-Author:**Andrew Lyth, Durham University, United Kingdom; **Co-Author:**Lee Copping, Durham University, United Kingdom

While the male-female attainment gap has decreased in magnitude on average (Lietz, 2006), the difference in variability appears to remain. Recent international research (Baye & Monseur, 2016) suggests that the "greater male variability hypothesis" may be a reality, with males being over-represented in the top and bottom tails of the ability distribution, particularly in reading. This may at least partially explain the paradox of why similar mean scores of males and females do not explain the tendency towards males being more represented in special needs groups as well as being overrepresented in high achieving groups. In our study, we examine differences in the variance ratios of male and female test results across a range of national and international data sets. We meta-analyse these results to determine the magnitude of this difference, and whether it is consistent over time, age ranges, nations and assessments. Our results suggest that while the mean differences may be similar, male scores are consistently more varied than females in the domains of literacy and numeracy. We therefore extend the findings of Baye & Monseur to provide additional evidence to support the "greater male variability hypothesis".

Session R 11

2 September 2017 13:00 - 14:30

Virta - 114

Single Paper

Instructional Design, Learning and Instructional Technology

Learning and Instruction with Computers and Instructional Design

Keywords: Achievement, Case studies, E-learning / Online learning, Educational Technology, Experimental studies, Instructional design, Interdisciplinary, Learning analytics, Lifelong learning, Motivation, Multimedia learning, Primary education

Interest group: SIG 07 - Learning and Instruction with Computers

Chairperson: Tibor Vidákovich, University of Szeged, Hungary

A Motivational Perspective on the Effects of Alternating Example Study and Problem Solving

Keywords: Experimental studies, Instructional design, Motivation, Multimedia learning

Presenting Author: Milou van Harsel, Avans University of Applied Sciences / Utrecht University, Netherlands; **Co-Author:** Vincent Hoogerheide, Utrecht University, Netherlands; **Co-Author:** Peter Verkoeijen, Avans University of Applied Sciences / Erasmus University Rotterdam, Netherlands; **Co-Author:** Tamara Van Gog, Utrecht University, Netherlands

Research on example-based learning has demonstrated that instruction, consisting of example study or example study alternated with practice problem solving, is a more effective and efficient instructional strategy than practice problem solving only. However, it is as yet unclear how example study (E) and practice problem solving (P) should be sequenced to be most optimal in terms of student motivation and learning outcomes. We addressed this question in two experiments that had the same design, but a different student population: one for whom the tasks were in their chosen domain of study (Experiment 1) and one for whom the tasks were outside their domain of study (Experiment 2). In *Experiment 1*, students in higher technical education engaged in learning to solve integration problems in one of four instructional sequences: EEEE, EPEP, PEPE, or PPPP. There were significant differences between EEEE and PPPP on learning outcomes (EEEE > PPPP), but –in contrast to prior research– there was no significant difference between EPEP and PEPE. Self-efficacy and perceived competence were higher in the example-study conditions (i.e., EEEE, EPEP, PEPE > PPPP). Experiment 2 is an exact replication of *Experiment 1* but with first year primary education teacher training students. We expect for those students that –in line with prior research– starting with an example (EEEE & EPEP) will be more motivating and effective than starting with a problem (PEPE & PPPP). Results of *Experiment 2* will be available before the conference.

A longitudinal study on 38 learning designs within and between disciplines

Keywords: E-learning / Online learning, Instructional design, Interdisciplinary, Learning analytics

Presenting Author: Quan Nguyen, Open University, United Kingdom; **Co-Author:** Bart Rienties, Open University, United Kingdom; **Co-Author:** Lisette Toetenel, The Open University, United Kingdom, United Kingdom

Learning analytics (LA) seeks to support learning processes through systematic measurements of learning-related data and to provide informative feedback to learners and educators. LA has the power to provide just-in-time support, especially when predictive analytics is married with the way teachers have designed their course, or so-called learning design (LD). Although recently substantial progress has been made in aligning LA with LD, there is still a shortage of empirical evidence of how teachers actually design their courses, and how this influences how students learn. This study investigated how LD was configured over time and its impact on student activities by analyzing longitudinal data of 38 modules with a total of 43,099 registered students over 30 weeks at the Open University UK, using social network analysis (SNA) and panel data analysis. Our analysis unpacked dynamic configurations of LD between modules over time, which allowed teachers to reflect on their practice in order to anticipate problems and make informed interventions. Furthermore, by controlling for the heterogeneity between modules, our results indicated that LD features were able to explain up to 60% of the variability in student online activities, which reinforced the importance of pedagogical context in LA.

Introductory Computational Thinking through Scratch Programming: A K-12 Classroom Perspective

Keywords: Achievement, Case studies, Educational Technology, Primary education

Presenting Author: Janne Fagerlund, University of Jyväskylä, Finland

Programming has arrived in the Finnish national primary school core curriculum. One key educational expectation is the development in computational thinking (CT), which comprises understanding of algorithms and computational concepts in the context of programming among other domains. These issues have been studied relatively little in primary education while the support that educators may require has increased. The purpose of this study is to investigate the learning of introductory CT through programming among students practicing Scratch programming in primary education. The research questions are: (1) What are the learning results in algorithms and CT concepts? (2) How are programming and computing perceived? (3) What are the dispositions towards learning programming? The study will be conducted by accompanying programming courses in formal primary education. Data will be collected with class-wide pre- and post-tests, interviews, programming projects, and video and audio recordings of students engaging in individual and pair programming. Learning results will be examined based on answers provided in the tests. Abilities to understand, apply, and create algorithms in addition to understanding of CT concepts are evaluated. Student projects provide insight into experiences in using concepts in programming work. Perceptions of programming and computing in addition to dispositions towards learning programming will be analyzed based on answers provided in the tests and interviews. Student experiences attained in interviews will be reflected alongside discovered results. The connections between learning results, perceptions, and dispositions in addition to variance among students will be explored and discussed. Pedagogical implications towards classroom practice will be drawn.

Motivational changes of distance learning students – a study over the course of one semester

Keywords: E-learning / Online learning, Instructional design, Motivation, Lifelong learning

Presenting Author: Nadja Müller, University of Ulm, Germany; **Co-Author:** Rebecca Pientka, University of Ulm, Germany; **Co-Author:** Tina Seufert, University of Ulm, Germany

As distance learners have to highly self-regulate themselves, keeping motivated is important for successfully completing the

course and also for learning success. To prevent distance learning dropout, it is important to investigate whether distance learners are able to keep their motivation on a constant level or whether motivational deteriorations occur. Therefore, we investigated first year distance learner's motivation over one semester. Additionally, the relation between motivation and learning success (course grade) was investigated. Based on the model of current motivation, interest, probability of success, anxiety, and challenge were examined and students were surveyed four times during the semester. Results indicate deteriorations in distance learners' interest and probability of success during the semester. Probability of success at the two measure points before the exam was positively associated with learning success.

Session R 12

2 September 2017 13:00 - 14:30

Main Building A - A2B

Single Paper

Learning and Instructional Technology

Learning and Instruction with Computers - D

Keywords: Case studies, Computer-supported collaborative learning, Content analysis, Cooperative / collaborative learning, Design based research, E-learning / Online learning, Educational Technology, Higher education, Language (Foreign and second), Multicultural education, Peer interaction, Qualitative methods, Quasi-experimental research

Interest group: SIG 07 - Learning and Instruction with Computers

Chairperson: Erica de Vries, Université Grenoble Alpes, France

Investigating the role of self-regulated learning in students' approaches to open-ended online tasks

Keywords: Case studies, E-learning / Online learning, Educational Technology, Higher education

Presenting Author:Sue Bennett, University of Wollongong, Australia; **Co-Author:**Lori Lockyer, University of Technology Sydney, Australia; **Co-Author:**Gregor Kennedy, University of Melbourne, Australia; **Co-Author:**Barney Dalgarno, Charles Sturt University, Australia

Many students adopt ineffective approaches to learning at university. This is despite the introduction of student-centred online approaches intended to improve educational quality and access in higher education. These approaches require students to interpret open-ended tasks and independently self-regulate their learning. High quality task design and supportive teaching are critical to effective student-centred online learning, but are particularly challenging in an era when students entering higher education come from increasingly diverse backgrounds. Prominent conceptual models of university student learning have guided good teaching and design for the past 40 years, but there is a compelling need to extend theory to better account for how students learn when supported through online technologies, particularly to investigate and better understand the role of self-regulation. We will present five key findings from a mixed method collective case study which reveal how online task design and teaching organisation can support or hinder students' task interpretation, and how students develop their ideas about open-ended online tasks, set goals and manage their study environments. We support each finding with data from the cases and suggest implications for practice and theory.

How collaboration scripts influence contribution quality in Wiki-based learning environments

Keywords: Computer-supported collaborative learning, Content analysis, Cooperative / collaborative learning, Qualitative methods

Presenting Author:Sven Heimbuch, University of Duisburg-Essen, Germany; **Co-Author:**Lisa Ollesch, University of Duisburg-Essen, Germany; **Co-Author:**Daniel Bodemer, University of Duisburg-Essen, Germany

@page { margin: 2cm } p { margin-bottom: 0.25cm; direction: ltr; line-height: 120%; text-align: left; orphans: 2; widows: 2 } p.western { font-size: 12pt; so-language: en-US } p.cjk { font-family: ; font-size: 12pt } p.cit { font-size: 12pt } Knowledge construction assignments with Wikis can be found in various educational settings. However, Wikis are not inevitably suited to facilitate learning and thus requires additional guidance. Large Wikis such as Wikipedia have an inherent proposal on how to create and revise articles. This work-flow promotes a high frequency of individual article edits without the need further coordination (Be Bold, Revert, Discuss = *BRD*). As an alternative we propose a different script approach that is more in line with current research findings of the learning sciences. We aimed this alternative script at promoting participants to discuss any planned article edits and revisions upfront (Discuss, Deliberate, Revise = *DDR*). Therefore, in an experimental study we investigated the effects of these two collaboration scripts with different objectives during a two-week Wiki editing assignment supplementing our lectures about descriptive statistics. Results indicate that the *DDR* script encouraged students to actively participate in discussions, while the *BRD* script has mainly fostered pure editing activities and virtually no communication whatsoever. The quality of randomly sampled articles differed between scripted groups, in favour of the *DDR* script leading to less redundant and more coherent articles. Overall, it showed that collaboration scripts affect learning-related activities in Wiki-based knowledge construction.

PILL-VR Simulation Learning Environment for Teaching Medication Administration to Nursing Students

Keywords: Design based research, Educational Technology, Higher education, Quasi-experimental research

Presenting Author:Ilana Dubovi, University of Haifa, Israel; **Co-Author:**Sharona T. Levy, University of Haifa, Faculty of

Education, Israel; **Co-Author:**Efrat Dagan, University of Haifa, Israel

The purpose of this study was to evaluate the effectiveness of Pharmacology Inter-Leaved Learning-Virtual-Reality (PILL-VR) simulation when applied to nursing education, as a tool for learning medication administration procedures in a three-dimensional virtual ward. A quasi-experimental controlled pre-test-intervention-post-test- design study was conducted. Participants consisted of nursing students who either learned with a PILL-VR simulation (experimental group; n=82) or who learned according to the traditional lecture-based curriculum (control group; n=47). The results revealed significantly higher conceptual and procedural knowledge learning gains following activity with the PILL-VR simulation compared to studying via traditional lecture-based curriculum. These results suggest that using VR simulations may provide affordable and flexible access to necessary practical skills in higher education, which is crucial to developing students' expertise.

Multimodal, interactive, gameful e-learning concepts for the foreign language classroom

Keywords: Computer-supported collaborative learning, Language (Foreign and second), Peer interaction, Multicultural education

Presenting Author:Laura Pihkala-Posti, University of Tampere, Finland

In this paper central results of my cumulative interdisciplinary PhD project are presented. The approach is based on ideas of action and design based research. Material and method triangulation was realized. Multimodal, collaborative, experiential, action-based and authentic web-supported concepts were developed for foreign language education. A central issue is to support the development of learner autonomy, agency and skills for intercultural communication. Different kinds of web2.0 tools and platforms, videoconferencing, the informal web game world *Minecraft* and the embodied, collaborative language learning environment *Berlin Kompass* were used in different kinds of interventions on different school levels, mainly upper secondary school and university level, as well as in international cooperation projects. The goal was to find out, what kind of elements would work and should be included in order to reach a pedagogically meaningful whole. The first results are promising, although also critical issues emerged. A multi-faceted, pedagogically sketched approach offering different modality and media combinations seem to support the skill development of learners with different cognitive styles, but also the whole learning community.

Session R 13

2 September 2017 13:00 - 14:30

Pinni B - B4117

Single Paper

Lifelong Learning

Arts and Music Education

Keywords: Arts, Assessment methods and tools, Collaborative Learning, Competencies, Conversation / Discourse analysis, Informal learning, Lifelong learning, Self-regulation, Teaching / instruction

Interest group: SIG 14 - Learning and Professional Development

Chairperson: Bernhard Ertl, Germany

Sight-reading by cellists: The role of positional knowledge and tonal strategies

Keywords: Arts, Assessment methods and tools, Competencies, Teaching / instruction

Presenting Author:Zyxcban Wolfs, Open University of the Netherlands, Netherlands; **Co-Author:**Els Boshuizen, Open University of the Netherlands, Netherlands; **Co-Author:**Johan van Strien, Open University of the Netherlands, Netherlands

The aim of this study is to answer these questions: Does position knowledge lead to better sight-reading by cellists? And how is technical level of musicians related to use of both tonal and positional strategies? In this study 79 amateur cello students participated, ranging in age (7 to 70), technical level (low, moderate, high), defined by the number of positions on the neck of the instruments the player masters, and experience – years of having followed cello lessons (1 to 20). The project yielded valid measurement instruments and shows that both tonal and positional strategies play a role in sight-reading for cellists; they are not mutually exclusive. Furthermore, a paradoxical effect was found: pitch errors (playing wrong notes) are more affected by position knowledge and skill, while fluency errors (unintended long and short pauses) are more affected by tonal strategies and experience. The findings form a first step towards a cognitive theory on musical production, and seek to promote use of different strategies to improve sight-reading by string instruments players in music education. Can tonal knowledge and strategies indeed be discovered as the missing link in fluency during the process of mental goal imaging and psychomotor production while sight-reading?

Expert music educators as promoters of group-level regulation

Keywords: Arts, Collaborative Learning, Conversation / Discourse analysis, Teaching / instruction

Presenting Author:Tarja-Riitta Hurme, University of Turku, Finland; **Co-Author:**Marjaana Puurtinen, University of Turku, Finland; **Co-Author:**Hans Gruber, University of Regensburg, Germany

This study focuses on the regulatory processes of professional music educators while they guide teacher students through a given musical task. The aim is to identify the role the educators' play in these collaborative tasks through detailed analyses of (1) the expert's and students' musical activities and verbal interaction and (2) the expert's allocation of attention

towards the students and the musical score. Two groups of one music educator and two pre-service teachers met twice in 45-minute sessions. In one session, the group's task was to familiarize themselves with a given song, prepare an arrangement suitable for a group of nine-year-olds, and make notes about their arrangement. The sessions were video-recorded by using three cameras covering the whole classroom area. In the qualitative analysis of video data, first, the participants' musical activities and verbal interaction were categorized. Second, episodes depicting self-, co- and socially shared regulation were identified. In addition, the eye-movement analysis was used to examine the music educators' allocation of attention to the group members and the musical score. Based on the observations, we propose that in collaborative music-making, an expert seems to have a central role in initiating co- and shared regulation in collaborative music-making: Expert's co-regulation and positive emotional support seemed to steer the group's working, and her musical contribution allowed shared regulation to emerge.

How guitarists perceive support for expertise development from different 'persons in the shadow'

Keywords: Arts, Informal learning, Teaching / instruction, Lifelong learning

Presenting Author:Manuel Laengler, University of Regensburg, Germany; **Co-Author:**Markus Nivala, University of Gothenburg, Sweden; **Co-Author:**Hans Gruber, University of Regensburg, Germany

'Persons in the shadow' may substantially affect how an individual acquires expertise, such as through guiding deliberate practice. In the domain of popular music, such persons in the shadow might be peers, parents and teachers. Little research exists on how individuals perceive the impact of persons in the shadow on expertise development, particularly in fields like popular music. This study investigates the perceived impact exerted by peers, parents and teachers on the expertise development of guitarists in the domain of popular music. Interviews were used to analyze nine case studies of guitarists at different levels of expertise (experts, sub-experts, amateurs). The main focus was on the roles of persons in the shadow concerning practicing, learning and motivation. The results show that experts differ from sub-experts and amateurs in the perception of support from persons in the shadow. In particular, peers and the formation of bands were perceived as strongly affective for practicing, learning, and motivation. The impact of parents and teachers on the expertise development in guitar playing was perceived as more ambiguous, and they were less important for the expert group.

Crossing educational and cultural boundaries in improvisational expertise development

Keywords: Arts, Self-regulation, Teaching / instruction, Lifelong learning

Presenting Author:Iwan Wopereis, Open University of the Netherlands, Netherlands; **Co-Author:**Els Boshuizen, Open University of the Netherlands, Netherlands; **Co-Author:**Saskia Brand-Gruwel, Open University of the Netherlands, Netherlands

This study aims to reveal environmental factors that affect successful and less successful improvisational expertise development. It explicitly focusses on boundary crossing in multiple musical contexts. The study compared improvisational skill development of a group of six elite musical improvisers to a group of five semi-elite musical improvisers by means of a multiple site, structured case study design. A biographical research method was used to collect data for cross case analyses. Data were analyzed using a combination of a theory-based categorization system and open coding searching for actors and factors that affected vicious and virtuous cycles of learning. Findings on learning during pre-conservatory, conservatory, and post-conservatory phases revealed distinct differences in boundary crossing activities between the elite and semi-elite improvisers. In order to develop musically the elite improvisers started to cross educational boundaries early in their musical careers and intensified this during and after the conservatory period (e.g., attending jam sessions on a regular basis). Semi-elite hardly mentioned engagement in such self-directed boundary crossing practice. This pattern was even more visible for cultural boundary crossing. Only the elite improvisers explicitly cited activities such as the participation in pluralistic musical (i.e., multicultural) and artistic projects (e.g., those that aim to synergize music and dance). Based on these findings we hypothesize that self-directed educational and cultural boundary crossing positively effect improvisational expertise, especially the development of a personal musical 'voice', a feature of musical professionalism that is imperative to survive in contemporary musical practice.

Session R 14

2 September 2017 13:00 - 14:30

Pinni B - B1097

Single Paper

Higher Education, Motivational, Social and Affective Processes

Higher Education and Achievement

Keywords: Achievement, Attitudes and beliefs, Collaborative Learning, Communities of learners, E-learning / Online learning, Educational Psychology, Higher education, Learning approaches, Learning Technologies, Mixed-method research, Psychometrics, Self-efficacy

Interest group: SIG 04 - Higher Education

Chairperson: Hans Gruber, University of Regensburg, Germany

Cognitive, affective, and behavioral engagement in small-scale teaching

Keywords: Achievement, Communities of learners, Higher education, Mixed-method research

Presenting Author:Jasperina Brouwer, University of Groningen, Netherlands; **Co-Author:**Ellen Jansen, University of Groningen, Netherlands; **Co-Author:**Adriaan Hofman, University of Groningen, Netherlands; **Co-Author:**Andreas Flache, University of Groningen, Netherlands

Small-scale teaching is increasingly implemented in university education. It is expected that this contributes to engagement and academic performance. The University of Groningen (UoG) in the Netherlands implemented learning communities (LCs) for improving performance rates and the quality of education and replaced the so-called mentor groups gradually. The difference is that the learning community is a group of 12 students who attend all courses together during the first semester, whereas students in mentor groups meet only once a week. This comparative survey study addresses the following research questions: (1) To what extent are different dimensions of engagement, self-efficacy and study success related in small groups of first-year students, i.e. LCs and mentor groups? (2) How do first-year students experience the different dimensions of engagement in their LC or mentor group? (3) Do these experiences differ for students in LCs and mentor groups? For answering these research questions, we used a mixed method design in a sample of 407 students. The path analysis showed that all dimension of engagement are related to self-efficacy and study success. The multilevel analysis did not reveal any differences between these relationships for LCs and mentor groups. The preliminary qualitative data-analysis showed that all students were satisfied with the teaching in groups regardless of the number of contact hours, but in LCs the students were more affectively engaged, whereas in mentor groups the students were more behaviourally engaged.

Constructing instrument assessing students approaches to learning: Considering context

Keywords: Achievement, Higher education, Learning approaches, Psychometrics

Presenting Author:Madeleine Kapinga Mutatayi, KU Leuven, Belgium; **Co-Author:**Pierre Mukendi wa Mpoyi, Université de Kinshasa, Congo, the Democratic Republic of the; **Co-Author:**Jan Elen, KU Leuven/Faculty of Psychology and Educational Sciences, Belgium

Students approaches to learning (SAL) are considered to be one of the most important factor in determining students learning outcomes in higher education. Instruments have been developed to assess SAL. Few studies in the literature have been done in an African context and no context-specific instruments -to our knowledge- are available. So, research in this specific context faces the challenge of importing and or developing adequate tools. This paper is mainly based on the development of a new instrument assessing SAL. SAL have been assessed by the means of study processes questionnaire two factors version (R-SPQ-2F) at the early step of this study. The results have shown poor reliability before removing items. So, this process resulted in the new version of 8 items assessing surface and 6 items evaluating deep approach to learning. Their alpha of Cronbach values are respectively .64 and .65. Given those poor values on the one hand and also the differences between the original and the target context on the other hand, it has been decided to construct a robust and contextual instrument starting from interviews with students. The semi structural interviews supported the elaboration of items, cognitive interviews led to the adaptation of statements on the basis of students interpretations. The instrument was then piloted in a group of 153 first year students from psychology and education. The reliability as well as the validity of the new instrument are examined in this paper. **Key words:** Higher education - learning approaches

Course performance feedback as a source of university students' sense of self-efficacy

Keywords: Attitudes and beliefs, Educational Psychology, Higher education, Self-efficacy

Presenting Author:Jeffrey Smith, University of Otago, New Zealand; **Co-Author:**Nicola Beatson, University of Otago, New Zealand; **Co-Author:**David Berg, University of Otago, New Zealand

This paper presents the findings of a set of three samples of students looking at the impact of receiving midterm grades on the sense of self-efficacy of those students in introductory accounting courses. The studies were carried out in two major universities in New Zealand. Students were surveyed concerning their sense of self-efficacy in weeks 3 and 13 of the course. At roughly week 8, students received their scores on the midterm examination of the course. A series of designed stepwise multiple regressions were then employed to examine the influence of the midterm examination result on student self-efficacy in week 13. Sense of self-efficacy in week 3 was used as a controlling variable in the regressions. The self-efficacy measure had been factor analysed, yielding three factors, self-efficacy for overall achievement, ability to get organized for the course, and ability to seek help when needed. It was found that all three factors were significantly influenced by the score on the midterms examination. Positive mastery experiences are postulated by Bandura (1997) to be one of the four critical influences on self-efficacy. These results offer empirical support for Bandura's hypothesis, as well as providing findings of substantial interest to lecturers working to provide optimal educational experiences in large course instructional formats.

Physical and virtual spaces in higher education

Keywords: Collaborative Learning, E-learning / Online learning, Higher education, Learning Technologies

Presenting Author:Marie Leijon, Malmö University, Sweden; **Co-Author:**Björn Lundgren, Malmö University, Sweden

This paper highlights interaction in physical and virtual spaces in a higher education HyFlex learning environment. HyFlex (hybrid and flexible) course design combines physical and virtual spaces and face-to-face with online learning. In a HyFlex learning environment several different spaces are shaped and in this paper we discuss four spaces that are connected in this type of learning environment. Furthermore, we also present how three different teachers use strategies to design their

lectures in a complex HyFlex environment. The result implies that a HyFlex model requires an increased didactic awareness in designing for learning and in the paper we discuss the need for team teaching and co-design. The result also pinpoints the fact that when designing for online, the setting might constrain the movement and the physical interaction in the campus room. Activities in a HyFlex learning environment could preferably be co-designed by the lecturer and facilitator including the physical space and the on-line space.

Session R 15

2 September 2017 13:00 - 14:30

Pinni A - Paavo Koli

Single Paper

Learning and Instructional Technology

Online Measures of Learning Processes - B

Keywords: Assessment methods and tools, Cognitive skills, Communities of learners, Comprehension of text and graphics, Computer-assisted learning, Computer-supported collaborative learning, Conversation / Discourse analysis, E-learning / Online learning, Educational Technology, Experimental studies, Learning analytics, Learning Technologies, Professions and applied sciences

Interest group: SIG 27 - Online Measures of Learning Processes

Chairperson: Mona Weinhuber, University of Freiburg, Germany

Reading rhythms: Eye movements of expert musicians and novices-in-training

Keywords: Cognitive skills, Comprehension of text and graphics, Experimental studies, Professions and applied sciences

Presenting Author:Marjaana Puurtinen, University of Turku, Finland; **Co-Author:**Erkki Huovinen, Royal College of Music in Stockholm, Sweden; **Co-Author:**Anna-Kaisa Ylitalo, University of Jyväskylä, Finland

This study investigates the visual processing of musical rhythm notation. In the experiment, 37 (education) students performed simple sight-reading tasks prior and after a 6-month course on music didactics, while six professional music educators, who performed the task once, served as an expert reference group. In one session, each participant read four 16-bar long, simple passages of rhythm notation from a computer screen while tapping a rhythm pad. Eye movements during the reading were recorded. The analyses focused on (a) first-pass fixation durations, i.e., the time spent on the first inspection of symbols and (b) the eye-time span, i.e., the distance between the point of gaze and “concurrent point of musical time” in the score. Initial GEE analyses on the experts’ data revealed that even in these simple tasks, the first-pass fixation duration allocated to a musical symbol varied according to the type of the symbol, the location of the symbol in a musical bar, and the symbols following the target. Findings based on the whole data set and on the eye-time spans at the target symbols will be presented at the conference. We stress the importance of examining the very basic elements of music notation prior to attempting to explain the visual processing of this complex “language” as a whole, and, by studying the steps in learning to interpret and execute musical symbols, hope to support the development of evidence-based methods for the teaching of basic musical skills.

A Gaze-Enabled System for Tracking the Reading Progress of Second Year Children in a Primary School

Keywords: Assessment methods and tools, Computer-assisted learning, Educational Technology, Learning Technologies

Presenting Author:Kari-Jouko Räihä, University of Tampere, Finland; **Co-Author:**Howell Istance, University of Tampere, Finland; **Co-Author:**Oleg Spakov, University of Tampere, Finland; **Co-Author:**Harri Siirtola, University of Tampere, Finland

We have developed a system for monitoring reading progress of children in a school classroom using the child’s eye position. The data can be used to detect words that the child may be having difficulties reading. This allows automatic supportive action to be taken to help the reader with that word. The data can also be shared with the teacher in close to real-time, so that he or she has a summary of the individual words in the passage being read that are causing problems for several children. It also provides a summary of the children who are having multiple problems, so that the teacher could provide specific support for them.

Current State of Learning Management System Log Data Based Learning Analytics

Keywords: E-learning / Online learning, Educational Technology, Learning analytics, Learning Technologies

Presenting Author:Angel Hernandez-Garcia, Technical University of Madrid, Spain; **Co-Author:**Emiliano Acquila-Natale, Universidad Politecnica de Madrid, Spain; **Co-Author:**Julian Chaparro-Pelaez, Universidad Politecnica de Madrid, Spain

The application of learning analytics techniques to log data from Learning Management Systems (LMS) has raised increasing interest in the past years. Advances in this field include the selection of adequate indicators and development of research frameworks. However, log data-based analysis of courses still poses some obstacles and challenges for researchers and practitioners in order to effectively improve and optimize learning processes. This paper highlights the challenges, and presents approaches that can help complement log data-based learning analytics. These approaches may be especially effective in collaborative settings, and include analysis of information flows, social interactions, and content analysis. This conceptual work aims to promote the debate surrounding the need for comprehensive and comparable studies and frameworks, and to foster advances in log data-based learning analytics.

Conceptual Ground and Findings Overview of the Polyphonic Analysis of Knowledge Building Dialogs

Keywords: Communities of learners, Computer-supported collaborative learning, Conversation / Discourse analysis, Learning analytics

Presenting Author:Nicolae Nistor, Ludwig-Maximilians-Universität (LMU), Germany; **Co-Author:**Stefan Trausan-Matu, "Politehnica" University Bucharest, Romania; **Co-Author:**Mihai Dascalu, "Politehnica" University Bucharest, Romania; **Co-Author:**Philippe Dessus, Université Grenoble Alpes, France

Dialog plays a central role in learning processes, particularly in shared understanding and social knowledge construction. Based on the socio-cultural paradigm, the polyphonic model of dialog considers social knowledge-building as inter-animation of voices in an analogy with polyphonic music, where novelty, creativity and coherence are assured by an interplay of dissonances and consonances, evolving towards a harmonious whole. In this analogy, voices are participants' newly introduced concepts and points of view. Automated tools implementing the polyphonic model cope with the high volume and complexity of data by relying on Cohesion Network Analysis, and applying advanced Natural Language Processing techniques. Corresponding tools were successfully used for automated dialog analysis in a wide variety of educational settings, ranging from formal philosophical discussions in text-based discussion forums to informal online blog discussions. Although the presented methods are proven to reliably predict comprehension of contents and further participation in discussions, they are limited by the nature of text-based communication. Further development of the polyphonic model will be extended to gestures and body language, both in individual and group settings.

Session R 16

2 September 2017 13:00 - 14:30

Pinni B - B3111

Single Paper

Learning and Social Interaction

Social Interaction in Learning and Instruction - E

Keywords: Arts, At-risk students, Communities of learners, Emotion and affect, Knowledge creation, Quantitative methods, Social aspects of learning and teaching, Social development, Social interaction, Survey Research, Teacher Professional Development, Video analysis

Interest group: SIG 10 - Social Interaction in Learning and Instruction

Chairperson: Crina Damsa, University of Oslo, Norway

Adolescents' school engagement: Selection and influence effects of friendship and digital networks

Keywords: Communities of learners, Social development, Social interaction, Survey Research

Presenting Author:Shupin Li, University of Turku, Finland; **Co-Author:**Tuire Palonen, University of Turku, Department of Teacher Education, Finland; **Co-Author:**Noona Kiuru, University of Jyväskylä, Finland; **Co-Author:**Katariina Salmela-Aro, Helsinki Collegium for Advanced Studies, Finland; **Co-Author:**Kai Hakkarainen, University of Helsinki, Finland

This study investigated peer selection and peer influence effects on adolescents' emotional (i.e., flow in schoolwork), behavioral (i.e., truancy) and cognitive (i.e., persistence) engagement in a high school in urban area of Southern Finland. Social network analysis was used in the study. Students of the same grade (N=145, mean age=16) were asked to describe their own school engagement and nominate all their peers of the same grade to generate peer friendship network (i.e. with whom they spent time) and digital network (i.e. with whom they do interesting things together on Internet) at two time points (one year apart). Network analyses revealed that the degree to which peer selection and influence effects occurred varied by dimension of school engagement. Adolescents had a tendency to choose new peers in friendship network based on earlier similarity in emotional engagement, but choose new peers based on dissimilarity in cognitive engagement. Over time, adolescents became more similar to their grade peers in terms of behavioral engagement in digital network, but not emotional or cognitive engagement.

Keywords: adolescents, school engagement, peer selection, peer influence

Production and Perception of Classroom Disturbances

Keywords: At-risk students, Emotion and affect, Quantitative methods, Social aspects of learning and teaching

Presenting Author:Boris Eckstein, University of Zurich, Switzerland; **Co-Author:**Urs W. Grob, University of Zurich, Switzerland; **Co-Author:**Kurt Reusser, University of Zurich, Switzerland

Norm violating behaviors produced by students during lessons, are often perceived as classroom disturbances by teachers as well as classmates. However, the degree of disturbance they perceive underlies several influences other than the behavior itself. Taking up research desiderata on this issue, the present study focuses (1) on *forms and degrees of classroom deviance* and (2) on the *degree of disturbance as perceived by teachers and students*— taking into account the respective instructional setting as the context of the production and perception of classroom disturbances. 85 teachers and their 1'412 students answered a broad questionnaire. They rated the frequency of deviant behaviors shown by individual students, and they reported the degree of disturbance those students cause in their eyes. Moreover, the respondents reported their general sensitivity to disturbances based on a case vignettes. Descriptive results indicate that the overall situation is not very alarming. An ANOVA reveals minor to moderate differences between the different rater groups.

Unsurprisingly, correlations indicate that the more students behave deviantly, the more they are perceived as disturbing. Yet, further correlations indicate that the more a rater is sensitive to disturbances, the more troublesome he/she perceives children of their class. These preliminary results fit previous research and complement it to some extent. Further analyses, e.g. focusing on the presumed preventive effect of differentiation, will be conducted and presented at the conference.

Interaction quality and differential associations on children's social and emotional skills in Norway

Keywords: Quantitative methods, Social aspects of learning and teaching, Social development, Social interaction

Presenting Author: Thomas Moser, University College of Southeast Norway, Norway; **Co-Author:** Ingrid Midteide Løkken, University College of Southeast Norway, Norway; **Co-Author:** Martine Broekhuizen, Utrecht University, Netherlands; **Co-Author:** Elisabeth Bjørnstad, University College of Oslo and Akershus, Norway

This study investigates the relation between interaction quality and social and emotional behavior related to children's gender. The sample consist of 890 children from age 2:8 to 3:2. Data come from the baseline measurement in a longitudinal study including 190 Kindergarten departments in Norway measured with the Infant/ Toddler Environment Rating Scale Revised (ITERS-R; Harms, Cryer & Clifford, 2006). Staff-child interaction quality was assessed by four items from ITERS-R (Supervision of play and learning; Peer interaction; Staff-child interaction; Discipline) (Harms, Cryer & Clifford, 2006). Children's social and emotional skills were rated by the staff using the Norwegian the Lamer Social Competence in Preschool (LSCIP; Lamer and Hauge, 2006), an instrument inspired by the work of Gresham and Elliot (1990), consisting 6 subscales: Prosocial behavior, Self- control, Assertiveness, Adjustment, Empathy, and Moral behavior (Løkken et al., submitted). Regression analyses revealed different findings for girls and boys. For the girls item Supervision of play and learning and Peer interaction was associated respectively with Prosocial behavior, Self-control, and Empathy, Self- control and Adjustment. For the boys, the item Staff-child interaction and Discipline associate respectively with Prosocial behavior and Assertiveness. These results emphasize the importance of considering differential gender effects to understand the particular importance of different aspects of interaction quality. High differential interaction-quality can be important for strengthen children's social and emotional behavior.

Embodied dialogues, creative intersubjectivities

Keywords: Arts, Teacher Professional Development, Video analysis, Knowledge creation

Presenting Author: Eva Vass, Western Sydney University, Australia; **Co-Author:** Gabriella Deszpot, Liszt Ferenc Academy of Music, Hungary

Education experts remind us of the growing pedagogic urgency to cultivate exploratory, creative habits of mind. As contemporary scientific inquiry has revealed, a major obstacle in this process is the predominant view of creativity as powered by the intellect. We address this concern by looking at embodied forms of creative connectivity. Our study focuses on the Kokas pedagogy: an experiential extension of the Kodaly principle of music education combining music and movement. Our overarching aim is to explore the adaptability and the transformative potentials of this pedagogy in the context of music teacher education. Our earlier work looked at the key tensions and challenges, as formulated by students enrolled in an introductory elective unit on this pedagogy, as part of their Master's degree. This paper shifts the discussion to the evolution and scope of creative intersubjectivities in the observed sessions. The data include observation notes and video recordings of all sessions of the focal student cohort (9 3-hour sessions in total, with 10 students), visual documentation of creative products (paintings, drawings), records of email-based dialogues between tutors and students, and students' self-reflective compositions (the main assessment task). Our analysis captures the infinitude of creative connectivity in the focal student cohort. It reveals the importance (and inseparability) of physical and inner opening up. The physical dimensions of this pedagogy were the fountain of new, creative forms of learning, knowing and relating. Embodied dialogue – collectively enacted responses to music – was seen as the catalyst of deep cohesion, creative connectivity and pedagogic metamorphosis.

Session R 17

2 September 2017 13:00 - 14:30

Virta - 113

Single Paper

Developmental Aspects of Instruction, Instructional Design, Learning and Special Education

Learning and Development in Early Childhood - F

Keywords: Achievement, At-risk students, Cognitive development, Comprehension of text and graphics, Early childhood education, Instructional design, Language (L1/Standard Language), Learning approaches, Primary education, Secondary data analysis, Self-efficacy, Special education

Interest group: SIG 05 - Learning and Development in Early Childhood

Chairperson: Marije van Amelsvoort, Tilburg University, Netherlands

The effect of mind mapping on listening comprehension and vocabulary in early childhood education

Keywords: Comprehension of text and graphics, Early childhood education, Instructional design, Language (L1/Standard Language)

Presenting Author: Chiel vander Veen, VU University Amsterdam, Netherlands; **Co-Author:** Monica Koster, VU University

Amsterdam, Netherlands; **Co-Author:**Femke van der Wilt, VU Amsterdam, Netherlands; **Co-Author:**Claudia van Kruistum, Vrije Universiteit Amsterdam, Netherlands

In a quasi-experimental study with a pre-posttest design we examined the effect of a mind mapping intervention on listening comprehension and vocabulary of preschoolers (aged 4-6) in the Netherlands. Two classes ($n=39$) participated in the study. In the intervention condition ($n=17$) the teacher applied repeated interactive book reading, accompanied with co-constructing a visual representation of the story in the form of a mind map. In the comparison condition ($n=22$) interactive joint book reading was applied. Results showed significant positive effects of mind mapping on both vocabulary $F(1,36) = 18.70, p < .001$ and listening comprehension $F(1,36) = 5.88, p = .02$, compared to the comparison condition. Hence, mind mapping seems a promising approach to improve preschoolers' listening comprehension and vocabulary. This is an important finding, as listening comprehension and vocabulary are essential for the development of future reading skills and reading comprehension. Furthermore, adequate language skills are a necessity to be able to participate fully in today's society.

Developments in teacher-child relationships and 2-6 year olds' academic adjustment

Keywords: Achievement, Cognitive development, Early childhood education, Primary education

Presenting Author:Ineke van der veen, Kohnstamm Institute, University of Amsterdam, Netherlands; **Co-Author:**Annemiek Veen, University of Amsterdam, Netherlands

The present study focuses on relations between developments in teacher-child relationships and academic adjustment for 2-6 year olds. High quality teacher-child relationships have been systematically found to contribute to children's school engagement and academic adjustment. The present study adds to previous research by studying relationship trajectories starting already in pre-school and by focusing on similarities between children in these trajectories. Data from four measurements of the ongoing national cohort study pre-Cool were used. In pre-Cool children are followed from the age of two. Assessments took place every school year, the first in 2010/2011 and the fourth in 2014/15. In the first two school years the children were in pre-school and in the third and fourth year of study they attended primary school. Data were used on the 1725 children for which pre-school teachers filled out questionnaires on the quality of the relationship with the child. Half of the children were female and over a quarter had a non-Western background. Results showed that for dependency two classes of students were found, one smaller group with low and increasing dependency (15%) and a larger group (85%) with higher and decreasing dependency. For closeness and conflict one class of students was found. The degree of teacher-child conflict as reported by the teacher at age two was negatively related to the level of maths achievement. Dependency at the age of two was positively related to the level of maths achievement and negatively with the degree of growth in maths achievement.

Quality in kindergarten and children's academic outcomes in kindergarten and grade 1 and 3

Keywords: At-risk students, Early childhood education, Primary education, Secondary data analysis

Presenting Author:Annemiek Veen, University of Amsterdam, Netherlands; **Co-Author:**Ineke van der veen, Kohnstamm Institute, University of Amsterdam, Netherlands; **Co-Author:**Merlijn Karssen, Kohnstamm Institute, University of Amsterdam, Netherlands

Summary (209 words) At the entrance of kindergarten at the age of 4 in the Netherlands, achievement differences between pupils at risk and not at risk are large. In particular, children of parents with a non-Western background start their school careers with large delays in both the areas of language and — to a lesser degree — math. Special ECEC-programms were introduced to help raise the educational quality in pre-schools and kindergarten. The performance gap has been found to decrease. The present study is aimed at answering the question whether the quality of education in kindergarten can contribute to narrow the gap between groups of pupils with different socio-economic and ethnic backgrounds. Data from four measurements of the 'four-year' cohort of the ongoing national cohort study pre-COOL were used. In this cohort 1289 children from the age of four until the end of primary school were followed. To measure the quality in kindergarten a structured questionnaire for teachers was used to assess twice (in year 1 and 2) the developmental and educational activities provided in the kindergarten classes. Attention for math in kindergarten promoted language development. More language and social emotional stimulation in kindergarten however seemed to go at the expense of math achievement for at-risk students ('non-Western and low educated') in grade 3.

Influence of Child Characteristics on Teacher Self-Efficacy in Early Childhood Special Education

Keywords: Early childhood education, Learning approaches, Self-efficacy, Special education

Presenting Author:Brook Sawyer, Lehigh University, United States; **Co-Author:**Ann O'Connell, The Ohio State University, United States; **Co-Author:**Nivedita Bhaktha, The Ohio State University, United States; **Co-Author:**Laura Justice, The Ohio State University, United States; **Co-Author:**Julie Santoro, Lehigh University, United States

This study extends previous research on teacher self-efficacy (TSE) by examining the relations among TSE and student characteristics, namely disability status and learning behaviors. This investigation is of particular interest in the context of inclusive early childhood special education classrooms (ECSE) where teachers are challenged to provide differentiated learning opportunities to both children with disabilities and those who are typically developing. The study also examined the degree to which the relations between student characteristics and TSE remained consistent from fall to spring of the academic year. 38 teachers of inclusive ECSE participated in the study. In both the fall and spring, teachers completed the

Student Specific Teacher Self Efficacy Scale (Zee & Koomen, 2015) and Preschool Learning Behaviors Scale (McDermott, Green, Stott, & Francis, 2000) on a randomly selected 2-4 students in their classrooms who represented students with disabilities ($n = 51$) and students who are typically developing ($n = 58$). Findings indicate that TSE was influenced by a variety of children's characteristics, particularly children's attention and persistence. A greater number of child-level variables showed significant relations with SSTSE in the spring than the fall. Implications for professional development will be discussed.

Session R 18

2 September 2017 13:00 - 14:30

Main Building C - C6

Symposium

Learning and Instructional Technology, Teaching and Teacher Education

Integrating Domains of Teacher Professional Knowledge in Teacher Education

Keywords: Biology, Cognitive skills, Computer-assisted learning, Educational Technology, Experimental studies, Integrated learning, Knowledge creation, Language (Foreign and second), Mathematics, Pre-service teacher education, Teaching / instruction

Interest group: SIG 11 - Teaching and Teacher Education

Chairperson: Jan Elen, KU LEUVEN, Belgium

Discussant: Jan van Driel, The University of Melbourne, Australia

In most teacher education institutions domains of teacher professional knowledge (e.g., content-specific and general pedagogical knowledge) are taught in separate courses. This situation has been criticized because teaching requires a complex interaction between various knowledge types. This compartmentalization assumes that the integration of different types of teacher professional knowledge automatically happens in teachers' heads. However, simultaneously using different types of knowledge requires a considerable amount of effort from teachers. The present symposium brings together research on the effectiveness of integrating different domains of teacher knowledge in teacher education. To improve the generalizability of research findings, the studies that are part of the symposium differ on various aspects, such as (1) a focus on different disciplinary domains (biology, mathematics, French and history) in both primary and secondary education, (2) the integration of several knowledge domains (pedagogical content knowledge, pedagogical knowledge, content knowledge, knowledge of technology), (3) the use several outcome measures (quantitative tests and performance assessments), with distinct underlying research designs (cross-sectional studies and intervention studies), and (4) the educational level in which they are situated (i.e. primary or secondary education). The included studies provide important insights for the organization of teacher education.

Does Pedagogical Knowledge Foster the Acquisition of Pedagogical Content Knowledge?

Presenting Author: Steffen Troebst, Leibniz Institute for Science and Mathematics Education (IPN), Germany; **Co-**

Author: Judith Pollmeier, Kiel University, Educational Science, Germany; **Co-Author:** Thilo Kleickmann, Kiel University, Educational Science, Germany

Teachers' professional knowledge is a central determinant of instructional quality and student outcomes. Within the taxonomy of teachers' professional knowledge, both pedagogical knowledge and pedagogical content knowledge cover knowledge about teaching and learning. However, pedagogical knowledge comprises understanding of domain-general principles of teaching and learning, whereas pedagogical content knowledge contains command of domain-specific approaches to make subject matter accessible to students. In pre-service teacher education at German universities pedagogical knowledge and pedagogical content knowledge are usually taught in separate courses and lectures. In this context, we explored if pre-service teachers' pedagogical knowledge positively moderates the utilization of learning opportunities for acquiring pedagogical content knowledge. We investigated two subsamples, 432 pre-service biology teachers and 505 pre-service mathematics teachers, from a cross-sectional study conducted with pre-service secondary school teachers at 12 German universities. Estimating structural equation models, we detected a statistically significant interaction between domain-general knowledge of learning and learning opportunities for pedagogical content knowledge for the subsample of pre-service mathematics teachers. For the subsample of pre-service biology teachers this interaction was statistically marginally significant. As in German pre-service teacher education instruction on pedagogical knowledge and on pedagogical content knowledge tends to be poorly coordinated with each other, our findings highlight the potential of closer alignment or integration of learning opportunities for pedagogical knowledge and pedagogical content knowledge for fostering pre-service teachers' pedagogical content knowledge.

Examining the Effects of Different Learning Environments on the Development of Teacher Knowledge

Presenting Author: Marie Evens, KU Leuven, Belgium; **Co-Author:** Charlotte Larmuseau, KU Leuven, Belgium; **Co-**

Author: Jan Elen, KU Leuven, Belgium; **Co-Author:** Fien Depaepe, KU Leuven, Belgium

How teacher education should be organized to induce optimal teacher professional knowledge development is unclear. Several models on teacher professional knowledge focus on the conceptualization of pedagogical content knowledge (PCK) and its relation with content knowledge (CK) and pedagogical knowledge (PK), each having different implications for knowledge development and teacher education. In a pretest-posttest-retention test design the present study investigates

the effects of systematically designed learning environments on the development of teacher professional knowledge. The study investigates whether a focus on CK and PK is sufficient for PCK development, whether a focus on PCK is sufficient for PK and CK development, and whether PCK development is affected by the integration of PCK, PK and CK. The findings show that PK and CK alone are insufficient for PCK development, that PCK instruction does not automatically develop PK and CK, and that integration of knowledge domains makes no difference for PCK development.

Supporting Pre-service Teachers' Integration of Technology, Pedagogy, and Content in Lesson Planning

Presenting Author:Noortje Janssen, University of Twente, Netherlands; **Co-Author:**Ard Lazonder, Radboud University, Netherlands

Lesson planning enables pre-service teachers to learn to purposefully integrate technology with pedagogy and content. This study compared two types of support that aimed to guide pre-service teachers in this integration process. Tech-embedded support contained integrated technological, pedagogical and content information. Tech-detached support contained integrated pedagogical and content information and separate technological information. Lesson plans of pre-service teachers who received the Tech-embedded support ($n = 34$) were compared to those of pre-service teachers from the Tech-detached support condition ($n = 35$). Consistent with expectations, the Tech-embedded support evoked more justifications in which technology was linked to pedagogy and content than the Tech-detached support. However, the quality of technology integration in the lesson plans was mediocre overall and comparable across conditions. Thus, embedded technological, pedagogical, and content support can promote pre-service teachers' thinking about technology integration in their lessons. To actually improve the quality of technology integration in lesson plans, prolonged practice or additional support is probably needed.

Supporting Knowledge Integration by Journal Writing in Teacher Education

Presenting Author:Martina Graichen, University of Freiburg, Germany; **Co-Author:**Matthias Nückles, University of Freiburg, Germany

Becoming a history teacher requires the interrelation of content knowledge (CK), pedagogical content knowledge (PCK), and pedagogical knowledge (PK). In many teacher education programs, students have to intertwine these domains by themselves. Journal writing is a method to support knowledge organization and integration. We investigated if journal writing can support advanced history teacher students in organizing and integrating information from a text about the Holocaust, a text about teaching the Holocaust, and a text about general instructional approaches. To support learning by journal writing we gave them different types of prompts: Prompts for organization and integration of the content *within* a particular text ($n = 22$), prompts that stimulated intertextual strategies, that is, constructing relations between the three texts ($n = 22$), or no prompts ($n = 22$). Teacher students first read the texts. Then they wrote a journal entry. Finally they evaluated a learning task for students. A content analysis showed that intertextual prompts increased the number of intertextual learning strategies in the journal entries. However the overall number of intertextual strategies was low. No group differences occurred regarding the amount of information taken from the journal entries to the evaluation task. Thus, intertextual prompts somewhat facilitated the self-guided organization and integration of information from different domains, but the extent and quality were not sufficient for creating applicable knowledge. Evidently, interrelating CK, PCK and PK in a self-guided manner is a very demanding task for future history teachers and therefore needs to be supported more comprehensively.

Session R 19

2 September 2017 13:00 - 14:30

Main Building A - A32

Symposium

Motivational, Social and Affective Processes

Understanding the learning mind through the body: physiology, emotions and motivation in classrooms

Keywords: Assessment methods and tools, Biology, Emotion and affect, Higher education, Interdisciplinary, Meta-analysis, Motivation, Motivation and emotion, Quantitative methods, Secondary education, Teaching / instruction

Interest group: SIG 08 - Motivation and Emotion

Chairperson: Lars-Erik Malmberg, University of Oxford, United Kingdom

Discussant: Susanne Lajoie, McGill University, Canada

Humans are biological, social and cognitive beings. Theories of learning imply motivation and emotion should be reflected in changes in physiology. Recent advances in tools to measure physiology (e.g., heart rate, galvanic skin response) have improved researchers' ability to test assumptions about the mind/body interaction in motivation for learning. In order to expand our knowledge of self-reported motivational processes and observed student-teacher interaction in classrooms, we need to understand the underlying biophysiological processes that operate there. However, there are several challenges for educational researchers to collect, analyze and make sense of such data, as the four studies in this symposium highlight. The first study, a systematic review, demonstrates a moderate positive relationship between self-reported test anxiety and objective measures of physiological arousal. The second study of two teachers' physiology (heart-rate) in the classroom showed differentiated patterns of real-time arousal during observed interaction (Agency and Communion) with their students. The third study, in a school-based laboratory, showed that personality dimensions were differentially related

to stress (galvanic skin response) during non-challenging and challenging tasks. The fourth study showed associations between hormonal biomarkers, electrodermal activity measures and emotional responses to authentic achievement situations. Overall the four studies demonstrate how physiological and biological responses allow novel insights into students' emotions, motivation for learning, and student-teacher interaction. The discussion will focus on how these findings relate to theory and elaborates on implications for the assessment of physiological data in future classroom-based research.

Test anxiety and physiological arousal: A systematic review

Presenting Author:Anna-Lena Roos, University of Konstanz, Germany; **Co-Author:**Thomas Goetz, Department of Empirical Educational Research, Germany; **Co-Author:**Madeleine Bieg, University of Konstanz, Germany; **Co-Author:**Amanda Jarrell, McGill University, Canada; **Co-Author:**Maike Krannich, University of Konstanz, Germany

Test anxiety is a widespread and detrimental emotion in the classroom. Thus, its measurement is an important issue for researchers. So far, test anxiety and its components (i.e. cognitive, affective, motivational and physiological components) have typically been assessed using self-report measures. However, physiological measures (e.g., heart rate or skin conductance level) have gained increasing attention in educational research as they allow for objective and continuous assessment of students' physiological arousal (i.e. the physiological component of test anxiety) in real life situations, such as a test. Although, theoretically one would assume convergence between traditional self-report measures of test anxiety (i.e. including the physiological component) and objective physiological measures, empirical evidence is rare and findings are mixed. To yield a more coherent picture of the relationship between these measures, the present systematic review investigates whether higher self-reported test anxiety is associated with objectively measurable higher physiological arousal. Results of a systematic literature review show that, in line with theoretical models, in 17 out of 24 studies there was a significant positive relationship between self-reported test anxiety and physiological arousal. The strengths of the correlations were low to medium (mean correlation: $r = .35$; range: .21 to .49). Moderating variables of the relation between these two measures will be discussed along with implications for the assessment of physiological data in future classroom-based research.

Teachers' physiology and emotions in the classroom

Presenting Author:Monika Donker, Utrecht University, Netherlands; **Co-Author:**Tim Mainhard, Utrecht University, Netherlands; **Co-Author:**Tamara Van Gog, Utrecht University, Netherlands

The relation between teacher and students is an important reason for many teachers to enter the profession, but can at the same time cause negative emotions and decreased wellbeing. Previous research on interpersonal teacher-student relationships and teacher emotions relied mainly on 1) teachers' self-report data, capturing cognitive and conscious processes, and 2) trait-level measures, summarizing entire lessons, days or even longer periods of time. These data do not allow inferences about emotional processes as they occur *during* teaching that could explain trait-level emotions or wellbeing. To tackle this problem, we focus on moment-to-moment measures during teaching of teachers' physiology (i.e., their affective response in terms of heart rate) as a proxy for emotions, combined with continuous coding of teacher-student interaction. We adopt this process-oriented approach to investigate how teacher physiology and interaction in the classroom are interrelated. Such an approach can clarify *how* teacher emotions emerge in the classroom social environment and can provide the fine-grained information needed to provide teachers with guidance. We present an in-depth investigation of physiological and interpersonal processes of two Dutch secondary school teachers who represent contrasting cases: their students viewed both as good teachers; however, the teachers reported divergent levels of emotions and wellbeing. Results highlight how the two teachers differ in the type and amount of interpersonal situations that are related to heightened physiological responses. For one teacher a heightened physiological response went together with more understanding teacher behavior, whereas for the other teacher imposing behavior was accompanied by a heightened physiological response

Adolescents' emotions and psychophysiological reactions in achievement situations

Presenting Author:Noona Kiuru, University of Jyväskylä, Finland; **Co-Author:**Anni Lehtikainen, University of Jyväskylä, Finland; **Co-Author:**Enna Vähäsöyrinki, University of Jyväskylä, Finland; **Co-Author:**Jarno Mikkonen, University of Jyväskylä, Finland; **Co-Author:**Jukka Kaartinen, University of Jyväskylä, Finland; **Co-Author:**Timo Ahonen, University of Jyväskylä, Finland

This study examined the role of early adolescents' temperament in their positive and negative emotions and psychophysiological reactions in achievement situations. The participants were 160 students. Parents rated their adolescents' temperament in fall in grade 6. Adolescents participated in an experiment of challenging and non-challenging tasks in spring in grade 6. Adolescents reported on their positive and negative emotions during the orientation period before the tasks and directly after challenging and non-challenging achievement tasks of which difficulty level was adapted to their own skill level. Adolescents' skin conductance was also recorded throughout the test session. The results showed that higher effortful control was related to lower level of negative emotions despite the task difficulty, after controlling for the effects of other temperament traits, gender, cognitive ability and order of the tasks. Higher effortful control was also related to higher levels of positive emotions during the orientation period. Furthermore, higher surgency/extraversion was related

to fewer negative emotions during challenging tasks, whereas higher affiliation was related to fewer negative emotions in non-challenging tasks. Finally, higher surgency/extraversion and lower negative affectivity were related to higher skin conductance during the orientation period.

A motivated look into students' affective response to an authentic examination experiences

Presenting Author:Idalis Villanueva, Utah State University, United States; **Co-Author:**Jenefer Husman, University of Oregon, United States; **Co-Author:**Katherine Cheng, Arizona State University, United States

Prior work in motivation and emotion provides researchers with a roadmap for the types of beliefs and appraisals that support students' management of their cognition and emotion. This research has focused on self-report as a way to identify the beliefs and thought processes the resulting optimal motivation. Self-report is a valuable tool; it has significant limitations which have impacted researchers' ability to test aspects of existing motivational theories. Social desirability and self-image influence students' responses, and cannot get at the processes and psychological states students do not understand or of which they are unaware. Advances in endocrinology and kinesiology provide an opportunity for researchers to observe students' stress response and recovery in authentic performance environments, and understand the relationship between those responses and the beliefs and appraisals students bring to those environments. . Findings from this work: (1) extend and build motivation and emotion theories of learning; and (2) create a foundation for the use of physiological and biological measures of arousal in studies of student performance.

Session R 20

2 September 2017 13:00 - 14:30

Main Building A - A2A

Symposium

Learning and Social Interaction, Motivational, Social and Affective Processes

Teacher-student relationships in different phases of schooling

Keywords: Educational Psychology, Motivation, Qualitative methods, Quantitative methods, Social aspects of learning and teaching, Social interaction, Teacher Professional Development, Teaching / instruction, Teaching approaches

Interest group: SIG 08 - Motivation and Emotion

Chairperson: Helen Watt, Monash University, Australia

Organiser: Rebecca Lazarides, University of Potsdam, Germany

Discussant: Kerstin Helker, RWTH Aachen University, Germany

The symposium aims to provide an overview on research on teacher-student relationships and their effects on students' cognitive and motivational development. The presented studies investigate teacher-student relationships by using a great variety of different methodological approaches such as interviews, questionnaire surveys, lesson observations, vignettes and group discussions. The scientific significance of the four international studies from Finland, Germany, Australia and Spain thereby is to provide a holistic perspective on teacher-student relationships by focusing on multiple perspectives using teacher and student data in primary and secondary schools. New measurements for teacher-student relationships as a classroom measure are introduced, the role of teacher-student relationships as mediators between students' characteristics and their academic development is examined and students' and teachers' perspectives on characteristics of emphatic or good teachers are explored. The educational significance is to expand the existing knowledge on teacher-student relationships by providing insights in the structure and functioning of teacher-student relationships in classrooms.

Teacher-class relationship – a new perspective on the relationship between teachers and students

Presenting Author:Julia Hölzl, Ludwig-Maximilians-Universität (LMU), Germany; **Co-Author:**Anne Christiane Frenzel, University of Munich, Germany

There is ample evidence that teacher-student relationships are highly relevant for the academic success and the personality development of students; while less is known about the relevance of teacher-student relationships for teachers' performance and well-being. Based on the existing knowledge and instruments focusing on teacher-student relationships as a dyadic phenomenon, we developed an instrument that measures the teacher's relationship with a whole class. The present study serves to validate this new instrument by the use of cognitive interviews with secondary teachers (so far n=8 out of targeted N=40) in Germany. Standard probes are used to elucidate possible difficulties in the question-answer process of the items and to explore teachers' associations with the given items. To capture the whole range of teachers' interpretations, answers are analysed by combining deductive and inductive approaches to the coding process. Preliminary results show that teachers can easily describe the relationship with their class and refer to different characteristics of the interaction. By developing this instrument on the relationship between teachers and their classes, we hope to inspire interventions targeting the improvement of the quality of relationships in schools.

Inhibited students' poorer math skills: the role of teachers' and students' ability judgements

Presenting Author:Jaana Viljaranta, University of Eastern Finland, Finland; **Co-Author:**Kaisa Aunola, University of Jyväskylä, Finland; **Co-Author:**Sari Mulla, University of Helsinki, Finland; **Co-Author:**Jari-Erik Nurmi, University of Jyväskylä, Finland

Even though there is a relatively well-known association between students' temperamental inhibition and poor math

performance, the mechanism behind this association is largely unknown. This study followed 156 Finnish children during the first grade of primary school to examine to what extent teachers' judgement of students' ability as a reason for their success, as well as students' own self-concept of ability, mediated the negative effect of temperamental inhibition to the math skill development during the first grade. The results showed, first, that the more inhibited the students are, the less teachers think their success is because of their ability. Second, students showing more temperamental inhibition feel that they are less capable and competent in mathematics than less inhibited students. The preliminary results showed some support for the mediating role of teachers' judgements of students' ability and students' own self-concept of ability in the association between inhibition and poorer math performance, measured by standardized tests. These kinds of negative effects of temperamental inhibition to teachers' judgements of students' ability and to students' self-concept and, via these, to students' performance level at this early stage of schooling can be seen as detrimental in relation to further skill development, because math performance has been found to show both high stability and increasing variance over time. Therefore, the importance of beliefs related to shy and inhibited students' abilities should be taken into account in everyday classroom interaction.

Manifestations of empathy: Teacher-student relationships among Australian Primary Teachers

Presenting Author:Paul Swan, Monash University, Australia; **Co-Author:**Philip Riley, Australian Catholic University, Australia

The aim was to explore how six Australian primary (elementary) teachers who were identified by their school principals as effective empathisers, draw on that quality to create supportive learning environments. Effective teacher empathy involves recognizing a student's mental state (intentions, beliefs, desires and emotions) and responding with an appropriate emotion based on care. Teacher reports of their relational goals and teaching style dimensions, together with student-rated parallel teaching style dimensions, complemented filmed classroom practice at two timepoints self-identified as positive "empathy interaction moments" for analysis. These filmed vignettes and two "live" lessons were coded for levels of emotional support using the Classroom Assessment Scoring System. Teachers' perspectives of their actions in the filmed vignettes were further explored at a subsequent interview, and then thematically analysed using an interpretative phenomenological approach. High correlations were identified between CLASS emotional support dimensions, lesson observations and vignettes, and there was strong alignment between teachers' and students' perceptions of the teaching style dimensions. These nominated empathic teachers were highly motivated to connect with students, took a personal interest in them beyond the curriculum demands, displayed high levels of support, and regulated their teaching style to meet student needs. A practical development grounded in this data is an empathic process observation protocol, which may be used as a platform to enhance teachers' empathic engagement among primary school teachers.

Teacher-student relationships from the perspective of secondary students

Presenting Author:Gloria Gratacos, C.U. Villanueva, Spain; **Co-Author:**Ernesto López Gómez, Universidad Nacional de Educación a Distancia (UNED), Spain; **Co-Author:**Guimar Nocito, C.U. Villanueva, Spain; **Co-Author:**Santiago SASTRE LLORENTE, C.U. Villanueva, Spain

Social prestige of the teaching profession is an important factor to attract the best students to the profession. Research shows that student engagement and student achievement are influenced by teacher-student relationships. The aim of this contribution is to explore the perceptions of secondary school students about the characteristics of a good teacher in the framework of the teacher-student relationship. Group discussions with 200 upper secondary students were conducted by a faculty member to make students reflect about these features from the perspective of dialogue and deliberation. Group discussions were recorded and transcribed. Further analysis showed the importance of teachers having domain in the subject and passion to teach, but they also emphasized the aspect of caring about the students. Different categories of meaning emerged from the secondary students' perspective. Learning is possible when a school climate of respect and confidence is created as a result of a teacher-student relationship based on a true interest on students; that is, when considering the other.

Session R 21

2 September 2017 13:00 - 14:30

Linna - Väinö Linna (K104)

Symposium

Learning and Social Interaction

Multiple Perspectives on Professional Development in ECEC

Keywords: At-risk students, Case studies, Collaborative Learning, E-learning / Online learning, Early childhood education, In-service teacher education, Mixed-method research, Qualitative methods, Teacher Professional Development

Interest group: SIG 05 - Learning and Development in Early Childhood

Chairperson: Lotte Henrichs, Utrecht University, Netherlands

Discussant: Miriam Leuchter, University of Koblenz - Landau, Germany

The competence of Early Childhood Education and Care (ECEC) professionals should be seen as the result of a dynamic and continuous reflective practice within the settings and the ECEC system in each country. Based on a review of research in early childhood teacher professional development (PD), Zaslow et al. (2010) conclude that in PD a focus on practice,

collective participation, and the use of child assessments to evaluate the effect of educational practice are particularly effective to improve the quality of staff in ECEC. The proposed symposium takes these results one step further by presenting various PD programs that have taken these features into account. The programs were conducted in a very diverse set of countries (Chile, Finland, the Netherlands, US, India and Colombia). Each presentation shows exemplary cases that explore effective approaches to in-service professional development and reflects upon relationships with various child outcomes. In the papers, both quantitative and qualitative methods are used. As a result, the symposium highlights multiple perspectives in thinking about the effectiveness of PD in ECEC settings. The discussant will draw together the findings from each of the four contributions, in an attempt to articulate what the key elements to effective PD in ECEC settings might be. We will thus attempt to contribute to the knowledge base upon PD that will inform future PD projects in ECEC settings.

Improving ECEC Quality in Chile: The Impact Results of A Model of Professional Development

Presenting Author:Diana Leyva, Davidson College, United States; **Co-Author:**Andrea Rolla, Harvard University, Chile; **Co-Author:**Ernesto Treviño, Pontificia Universidad Católica de Chile, Chile; **Co-Author:**Mary Catherine Arbour, Harvard University, United States; **Co-Author:**Marcela Marzolo, Fundación Educacional Oportunidad, Chile; **Co-Author:**Clara Barata, University of Lisbon, Portugal

Un Buen Comienzo (UBC) is a coaching-based professional development program for pre-kindergarten and kindergarten teachers in schools serving students from low-SES backgrounds in Chile. This study evaluates the effects of UBC implementation 2014-2015 on children's language, social and emotional outcomes using a quasi-experimental design. Nineteen intervention and 31 control schools participated in the study. Findings indicate that UBC had significant and positive effects on children's language, social and emotional skills. The results show that a professional development program that focuses on directly supporting teachers in their classroom practices for sustained periods of time can lead to important improvements in teaching quality and time on task, which in turn, translate into widespread positive effects on child development outcomes. Implications for professional development programs in Latin America and elsewhere will be discussed.

The Growth of Pedagogical Awareness of Teachers Attending a Professional Development Programme

Presenting Author:Anna-Maija Poikkeus, University of Jyväskylä, Finland; **Co-Author:**Jenni Salminen, University of Jyväskylä, Finland; **Co-Author:**Marja-Kristiina Lerkkanen, University of Jyväskylä, Finland; **Co-Author:**Kati Vasalampi, University of Jyväskylä, Finland

Becoming aware of the perspectives of classroom interactions and pedagogy can contribute beneficially to teachers' pedagogical practices (Even & Tirosh, 2002). Support and feedback on classroom practices via video-based observation provides a powerful way of increasing high-quality classroom practices (Pianta et al., 2008) possibly via growth in teachers' pedagogical awareness. Within this study we ask: What kinds of verbal accounts manifest growth in teachers' pedagogical awareness while attending a year-long PD programme? How does the growth of teachers' pedagogical awareness appear across the PD programme groups? Three teacher groups took part on the PD programme during the academic year 2014–2015. The six workshop meetings included watching and discussing clips of good pedagogical practices from videos that teachers had recorded independently in their classrooms. The transcribed group discussions were analyzed by utilizing thematic analysis (Braun & Clarke, 2006) along the spectrum of pedagogical awareness (Nardi et al., 2005). Results indicate that participants in both groups started to express emerging pedagogical awareness already during the second workshop meeting. Teachers in both groups showed pattern of deepening pedagogical awareness, but the pattern of change was not linear across time, nor similar for both groups. Changes in pedagogical awareness became apparent via more analytical (i.e., in depth) and more frequent reflections on their own practices. The results contribute to PD research and in-service training by emphasizing the benefits of a longer engagement to PD programmes. The results also apply to pre-service training where practical examples aid student teachers in reflecting their own practices.

Description and analysis of successful PD in pre-k and k programs from 5 different countries

Presenting Author:Diana Leyva, Davidson College, United States; **Co-Author:**Jimena Cosso, New York University, United States; **Co-Author:**Hiro Yoshikawa, New York University, United States

This paper will describe five different ECE interventions around the world that show positive impact on children's development taking. In describing these cases, we focus on two main themes: analysis of the process of teacher training and coaching system, and analysis of the strategies employed to design and implement curriculum. Especially the pre-kindergarten program *Boston Public School* (BPS) and the program *Un Buen Comienzo* from Chile provide good examples of effective PD in early childhood settings. The focus on PD is less prominent in the other three programs (*aeioTU* in Colombia; The Dharni Project in India; and the PATHS project in the US), but these programs carry other highly effective elements that positively impact child outcomes. Each case will be discussed in the paper.

Web-based professional development in early childhood settings: Benefits and limitations explored

Presenting Author:Lotte Henrichs, Utrecht University, Netherlands; **Co-Author:**Willemijn Schot, Utrecht University, Netherlands

Professional development in teachers has been put forward lately as a promising avenue to increase emotional and educational quality in early childhood settings. The rapid technological developments of our society provides new and exciting possibilities for innovative approaches to professional development. In this presentation, we present the result of a

web-based PD program in early childhood settings. Twenty preschool and kindergarten teachers were involved in the project. They recorded their own video clips of educational in particular settings, related to a self-determined learning objective. These video clips were then uploaded to an online platform where an educational consultant would provide feedback on their educational practices. The project was inspired by the My Teaching Partner program (cf. Downer, Kraft-Sayre, & Pianta, 2009). Teachers completed eight cycles of uploading a clip, receiving feedback, incorporating the feedback into their educational practices, and record a new clip. In the presentation we will elaborate upon 1) the perceived and observed effect of the PD on the teacher's educational practices. 2) the benefits and the limitation of using web-based coaching in early childhood settings.

Session R 22

2 September 2017 13:00 - 14:30

Pinni B - B3118

Symposium

Instructional Design

Improving cues used by students and teachers to enhance monitoring and learning

Keywords: Achievement, Cognitive development, Educational Psychology, Metacognition, Motivation, Quantitative methods, Reading comprehension, Secondary data analysis, Self-regulation, Teacher Effectiveness, Teacher Professional Development

Interest group: SIG 16 - Metacognition

Chairperson: Anique de Bruin, Maastricht University, Netherlands

Discussant: Mariette van Loon, University of Bern, Switzerland

The information (or 'cues') that students use to monitor their learning and that teachers use to monitor students' learning determine the accuracy of students' and teachers' monitoring judgments. Improving these cues is thus crucial for optimizing monitoring of learning. The aim of the symposium is to present novel insights regarding cues used by students and teachers when monitoring their learning, from the students' perspective (Presentation 1 and 2), the teachers' perspective (Presentation 3), and the interrelation between students' and teachers' perspectives (Presentation 4). Specific attention is paid to interventions to improve cues used. Presentation 1 outlines a laboratory setting with university students in which it was investigated whether a drawing task after learning generates effective cues to improve monitoring accuracy and control processes. Presentation 2 applied an interpersonal approach to disentangle the components of academic self-concept ratings and identify their associations with academic achievement by using a round-robin design of competence ratings. In Presentation 3 two field experiments are described where teachers' monitoring accuracy regarding the generative tasks of students were investigated with and without the knowledge of the students' name. Presentation 4 combines the student and teacher perspective by relating student and teacher judgments about the student cognitive and motivational-affective characteristics to each other with a person-centred approach. The presentations provide insight as to what cues support students' and teachers' monitoring, what differences in accuracy occur through self-monitoring or monitoring by others, and how students' and teachers' judgments relate. Furthermore, all presentations use different methodological approaches and educational settings.

Are Drawings More Effective than Summaries to Support Students' Monitoring and Control Processes?

Presenting Author: Katrin Schleinschok, Leibniz-Institut für Wissensmedien, Germany; **Co-Author:** Alexander Eitel, University of Freiburg, Germany; **Co-Author:** Katharina Scheiter, Leibniz-Institut für Wissensmedien, Germany

Accurate monitoring is essential for effective control of learning. Unfortunately, monitoring (as measured by judgments-of-learning; JoLs) is often inaccurate. However, it becomes more accurate when a task has to be performed after learning that requires retrieval and application of learnt information. Previous research used verbal tasks to show this. We investigated how drawing as a visuo-spatial task would affect monitoring and control during learning from text, and whether a drawing task is even more effective for monitoring and learning than a summary task. In this study, we compared a condition in which a drawing task had to be performed after learning each one of five text paragraphs with a condition in which a summary task, and no task (control) had to be performed after learning. All participants provided JoLs for each paragraph and selected paragraphs for restudying. Unlike expected, we could not find any differences regarding monitoring accuracy or control processes between conditions. In light of other research on metacognition, missing effects might have been due to the missing delay between either the learning phase and the generative task or the generative task and the JoL.

Using an Interpersonal Approach to Predict Achievement by Self- and Peer Ratings of Competence

Presenting Author: Thomas Lösch, University of Bamberg, Germany; **Co-Author:** Oliver Lüdtke, Leibniz Institute for Mathematics and Science Education, Germany; **Co-Author:** Alexander Robitzsch, Leibniz Institute for Mathematics and Science Education, Germany; **Co-Author:** Augustin Kelava, University of Tübingen, Germany; **Co-Author:** Benjamin Nagengast, Eberhard Karls Universität Tübingen, Germany; **Co-Author:** Ulrich Trautwein, University of Tübingen, Germany

Academic self-concept is influenced by students' actual competence but also by subjective perceptions like self-enhancement. Yet, which of these components is responsible for the positive effect of academic self-concept on achievement? In this study, an interpersonal approach was applied to disentangle the components of academic self-concept ratings and identify their associations with achievement by using a round-robin design of competence ratings. In

sum, 1,549 school students in 87 classes of two age cohorts rated their own and their classmates' math competence. The results indicate that subjective perceptions like self-enhancement are only slightly related to achievement. In contrast, the substantive core of self-ratings that was shared with peers seemed to be the driving force behind the positive effect of academic self-concept.

Teachers' Judgments of Students' Text Comprehension: Can Keywords and Summaries Improve Accuracy?

Presenting Author: Jan Engelen, Tilburg University, Netherlands; **Co-Author:** Gino Camp, Welten Institute, Netherlands; **Co-Author:** Janneke van de Pol, Utrecht University, Netherlands; **Co-Author:** Anique de Bruin, Maastricht University, Netherlands

Monitoring how well one has understood what one has read is an important skill in education, but it is also challenging, especially for primary school students. Thus, teachers could play an important role in supporting students in judging their own level of comprehension. This study investigated if teachers could accurately monitor intra-individual differences in text comprehension of 6th graders. In Experiment 1, teachers provided text-by-text judgments of their students' comprehension of six different texts. They did so after inspecting keywords or summaries which students had written at a short delay after reading the texts, or without receiving any such task-related information. Contrary to our expectations, monitoring accuracy was low overall and did not differ across conditions. In Experiment 2, teachers gave text-by-text judgments of comprehension for anonymous students, so that they could only use the keywords or summaries, and not their prior impressions of the students' aptitude, to inform their judgments. Monitoring accuracy was higher in the keyword condition than in the summary condition. We conclude that monitoring of intra-individual differences in text comprehension is challenging for students and teachers alike, and discuss these results in light of cue diagnosticity and utilization.

Comparing Teacher and Student Perspectives on the Interplay of Student Characteristics

Presenting Author: Maralena Pielmeier, Technical University of Munich (TUM), Germany; **Co-Author:** Sina Huber, Technische Universität München (TUM), Germany; **Co-Author:** Tina Seidel, Technische Universität München (TUM), Germany

For students, cognitive and motivational-affective characteristics are the most powerful prerequisites for successful learning. For teachers, judgments on their students' characteristics shape how they plan and implement instructional activities in order to offer individual learning support. On the student side, research is starting to find out more about the interplay of different characteristics within individual students. Teacher judgment studies, on the other hand, often regard single characteristics judgment accuracy. By taking a person-centered approach, regarding $N_S=503$ students and their $N_T=41$ mathematics and languages arts teachers, our study joined teacher and student perspectives on student characteristics interplay and suggests methodology to compare them. We found that student assessments suggested ample diversity regarding this interplay – and teachers did not perceive this. In their views, “homogeneous” sets of characteristics were dominant. Findings suggest addressing students' views and the diagnosis of their characteristics in teacher education to further enable teachers to offer individual support.

Session R 23

2 September 2017 13:00 - 14:30

Main Building A - A3

Symposium

Multilingualism and Education

Keywords: Achievement, Bilingual education, Collaborative Learning, Early childhood education, Educational policy, Interdisciplinary, Language (L1/Standard Language), Primary education, Quantitative methods, Reading comprehension, Teacher Professional Development

Interest group:

Chairperson: Dominique Rauch, German Institute for International Educational Research (DIPF), Germany

Discussant: Svenja Vieluf, German Institute for International Educational Research (DIPF), Germany

International large scale studies like PISA have shown that immigrant students, who are multilingual speakers of at least their heritage language and the language of schooling, perform worse than native students. As numbers of immigrant students grow over Europe, European school systems urgently need to find better ways to effectively educate these multilingual students. The symposium discusses recent studies from the fields of sociology, psychology and educational science, in order to gather interdisciplinary answers on the question how to deal with multilingualism in education. On the system-level Agirdag and colleagues analyze PISA 2012 data to find out how characteristics of educational systems determine the size of the multilingual-native-speaker-achievement gap. The achievement gap is smaller in centralized educational systems and slightly smaller in countries with standardized exams. On the institutional level Kratzman and colleagues conducted a study to implement current recommendations for the integration of linguistic diversity for 127 preschool teachers in 19 preschools. They find a significant improvement of preschool teachers' knowledge about bilingualism. On the individual level Rauch and colleagues conducted a peer-learning based reading comprehension training for 99 bilingual primary school children, that was found to significantly support students reading. Engel and colleagues developed an intervention to improve first language skills in preschool students. Their intervention for 186

bilingual children will provide evidence for the effectiveness of an early mother tongue-based oral language intervention. By assembling typical research from all three disciplines the symposium will help to identify interdisciplinary misunderstandings in order to encourage and foster interdisciplinary cooperation.

Linguistic inequalities in education: Explaining differences between countries

Presenting Author:Orhan Agirdag, KU Leuven, Belgium

Previous studies show that language minority students (LMS) perform worse than native-speaking (NS) students, even socioeconomic and immigrant background are taken into account. However, this LMS-NS achievement gap is not related to language use per se, as for LMS students the frequency of native language use is not related to academic performance. Hence, LMS-NS achievement gap is probably mediated by other factors than language use. For instance, the gap vary considerably across different countries, and in some countries, there is no inequality. However, up to day, it is not clear whether this international variation depends on certain characteristics of educational systems. In other words, the design of the educational system might increase or decrease the gap. In this study, we examine how characteristics of educational systems determine the size of the LMS-NS achievement gap. For this purpose, we use the PISA 2012 data and conduct three-level multilevel analysis. The preliminary results point out that characteristics of education systems are only marginally related to the LMS-NS achievement gap. The achievement gap is smaller in centralized educational systems and slightly smaller in countries with standardized exams. However, the significance and the strengths of the differences depends also on the given outcomes (math, science or reading). The implications are discussed.

Implementing linguistic diversity in preschool education in Germany.

Presenting Author:Jens Kratzmann, Catholic University of Eichstaett-Ingolstadt, Germany; **Co-Author:**Samuel Jahreiß, Catholic University of Eichstätt-Ingolstadt, Germany; **Co-Author:**Maren Frank, Catholic University of Eichstaett-Ingolstadt, Germany; **Co-Author:**Steffi Sachse, PH Heidelberg, Germany

The acquisition of two or more languages is a special challenge for Dual Language Learners (DLLs) in early childhood. Given a high linguistic diversity caused by migration processes, concepts of integrating linguistic diversity in preschools are discussed in Germany. Using intensive in-house training and coaching, current recommendations for the integration of linguistic diversity in preschools are implemented within an intervention study. The study included 127 preschool teachers in 19 preschools and 254 bilingual children between the ages of 3 and 5 from 19 preschools with a high percentage of DLLs. The paper reports results of the first (pre-test) and second (interim assessment) measurement point concerning effects of the training measures on institutional and child level using a professionalization model. On the child level, L1 and L2 language skills are assessed. On the institutional level, knowledge and attitudes of the preschool teachers as well as observations of pedagogical quality are included. Preliminary results indicate a significant improvement of preschool teachers' knowledge about bilingualism in the intervention group compared to the control group. Nevertheless, preschool teachers need help to transfer their knowledge into practice.

Facilitating German Reading in Bilingual Primary School Children Through Peer-Learning

Presenting Author:Dominique Rauch, German Institute for International Educational Research (DIPF), Germany; **Co-Author:**Jasmin Decristan, Goethe-University Frankfurt; IDeA-Research Center, Germany; **Co-Author:**Valentina Reitenbach, German Institute for International Educational Research, Germany; **Co-Author:**Martin Schastak, German Institute of International Educational Research (DIPF); IDeA-Research Center, Germany

This project explores ways of supporting German reading comprehension (RC) in Turkish-German bilingual primary school children using peer-learning. Turkish/German bilingual primary school students (mean age = 9,6 years; $n_{\text{female}} = 50$) were trained in 12 sessions in reading comprehension (50 students) or mathematics (49 students, control group). We postulate that the RC training will support German RC in bilingual children (hypothesis 1). We systematically varied the tandem composition with respect to the linguistic background (monolingual German and Turkish/German bilingual) and the language use during the trainings (German only vs. Turkish and German). A bilingual child who learns together with a monolingual child could benefit from the latter's larger vocabulary and this could prompt RC. We therefore expect German RC to improve more in monolingual-bilingual peer-tandems than in bilingual-bilingual tandems, who only speak German throughout the trainings (hypothesis 2). However, when allowed to use both common languages, two bilingual children might engage in code-switching and code-mixing. This could facilitate communication in PL and hence foster RC. We therefore expect that German RC within bilingual-bilingual tandems will improve more when the children communicate in Turkish and German (hypothesis 3). We found that our reading training enhanced RC in bilingual children. Hypotheses 2 and 3 could not yet be tested due to small subgroup sample sizes of the preliminary dataset. The descriptive results of all reading groups hint at best learning conditions when two bilinguals work together and speak German only, thus currently challenging the group differences stated in hypothesis 2 and 3.

Enhancing Learning of Multilingual Children from a Linguistic Minority

Presenting Author:Pascale Engel de Abreu, University of Luxembourg, Luxembourg; **Presenting Author:**Rute Tomás, University of Luxembourg, Luxembourg; **Co-Author:**ariana Ferreira Loff, University of Luxembourg, Luxembourg; **Co-Author:**Carolina Nikaedo, University of Luxembourg, Luxembourg; **Co-Author:**Rute Cordeiro, University of Luxembourg, Luxembourg; **Co-Author:**Romain Martin, University of Luxembourg, Luxembourg

Luxembourg has three official languages (Luxembourgish, German and French). Portuguese immigrant children represent 22% of Luxembourg's school population and are the most vulnerable group in terms of language and reading proficiency.

They present language weaknesses in their school languages as well as their mother tongue Portuguese. Research suggests that children who start school with a well-established mother tongue are likely to develop strong abilities in their second languages. The aim of this project is to develop and evaluate the effectiveness of a mother tongue-based preschool language intervention on oral language and literacy outcomes of Portuguese language-minority children. Within a randomised controlled study design, a 30-weeks long intervention was developed to target both oral language and phonological awareness skills. 186 Portuguese-speaking children from 16 preschools across Luxembourg were assessed in Portuguese and Luxembourgish and were randomly assigned to the intervention group or an active control condition. The question of how to implement a mother tongue oral language programme given existing socio-political and educational contexts will be discussed and preliminary data from the first 20 weeks of the intervention will be presented.

Session R 24

2 September 2017 13:00 - 14:30

Main Building D - D10B

Invited Symposium

Motivation, affect, and body in Instructional Design: Current theoretical approaches

Keywords: E-learning / Online learning, Educational Psychology, Educational Technology, Emotion and affect, Game-based learning, Instructional design, Learning Technologies, Multimedia learning, Science education, Self-regulation

Interest group: SIG 06 - Instructional Design

Chairperson: Björn de Koning, Erasmus University Rotterdam, Netherlands

Organiser: Björn de Koning, Erasmus University Rotterdam, Netherlands

Organiser: Jean-Michel Boucheix, University of Dijon, LEAD-CNRS, France

Discussant: Jean-Michel Boucheix, University of Dijon, LEAD-CNRS, France

Contemporary education and learning has developed from traditional teacher-directed instruction into student-centered, online, and technology-driven learning environments. Although this offers obvious advantages such as the possibility to create richer, multimodal, and adaptive learning experiences, at the same time it introduces novel challenges and questions for how to effectively design instructions and support student learning. To be able to keep up with these developments, it is important to expand the cognitive perspective typically adopted in instructional design models and theories with perspectives that help to (better) predict and/or explain learning in novel digital learning environments. This symposium, which is thematically aligned with the SIG 7 symposium "Motivation, affect, and body in Instructional Design: Current research on digital technologies and the assessment of learner states", aims at connecting instructional design models and theories with (recent) theoretical approaches dealing with affective, motivational, and embodied aspects of learning and instruction. By combining these approaches it becomes possible to develop a stronger and more solid foundation for investigating learning in technology-enhanced environments. With this symposium we intend to contribute to novel directions for further development and refinement of theoretical models that could inform contemporary instructional design research. The symposium is concluded with a discussion between the presenters and the audience to explore such future endeavors.

Emerging Embodied Technologies and Virtual Reality for Learning

Presenting Author: Mina Johnson-Glenberg, Arizona State University, United States

The first push to place educational content online amounted to little more than scanned textbooks. However, this next generation of content is being designed for multiple platforms and is taking embodied cognition seriously. The newest systems may engage learners more than ever before via immersiveness, new inputs (like gesture), and adapting to learners in real time. In this talk, we will explore how science education content and games can be better designed for some of the emerging learning technologies like motion capture sensors, mixed and augmented reality platforms, and the new head mounted displays for VR with hand controls. We will also discuss some relevant learning theories and end with a set of design principles.

Affective-Motivational Mediation in Learning from Complex Digital Simulations: Effects of Topic

Presenting Author: Cyril Brom, Charles University, Czech Republic; **Co-Author:** Filip Děchtěrenko, Faculty of Mathematics and Physics, Charles University in Prague, Czech Republic; **Co-Author:** Nikola Frollová, Faculty of Mathematics and Physics, Charles University in Prague, Czech Republic; **Co-Author:** Tereza Stárková, Faculty of Mathematics and Physics, Charles University in Prague, Czech Republic; **Co-Author:** Edita Bromová, Faculty of Mathematics and Physics, Charles University in Prague, Czech Republic; **Co-Author:** Sidney D' Mello, University of Notre Dame, Department of Psychology & Department of Computer Science, United States

There is increased interest in augmenting multimedia instructional materials to elevate positive, activating affective-motivational states of learners in order to improve learning. The hunt is still on; so far, efforts have been partly successful and meditational effects of affective-motivational states have not always been established. In the present study, university students ($N = 65$) from the Czech Republic, a country where beer brewing is a source of national pride, were informed that they would either study how to brew beer (high intrinsic motivation) or how to prepare a citrate substrate (low intrinsic motivation). The 90-minute learning simulation environment was about beer brewing in both cases, with superficial changes to instructions and graphics to disguise the topic manipulation. The high intrinsic motivation condition reported higher

generalized positive affect, enjoyment, flow levels, and learning involvement (Cohen's $d = 0.44 - 0.87$) and had better learning outcomes when measured immediately (retention: $d = 0.48$; transfer: $d = 0.46$) and a month later (retention: $d = 0.66$; transfer: $d = 0.62$). Yet, only learning involvement and flow positively mediated the influence of the topic manipulation on immediate learning outcomes. There was no mediation by any of the variables for the delayed tests after co-varying out initial learning. The findings indicate that affective-motivational mediation is one, but not the only, mechanism by which a topic-based intrinsic motivation manipulation influences learning and that resultant affective-motivational states can be differentially related to learning.

The Importance of Student Variables in Supporting Self-regulated Learning in Online Learning

Presenting Author: Jacqueline Wong, Erasmus University Rotterdam, Netherlands; **Co-Author:** Martine Baars, Erasmus University Rotterdam, Netherlands; **Co-Author:** Dan Davis, Delft University of Technology, Netherlands; **Co-Author:** Tim van der Zee, Leiden University, Netherlands; **Co-Author:** Geert-Jan Houben, Delft University of Technology, Netherlands; **Co-Author:** Fred Paas, Erasmus University Rotterdam/University of Wollongong, Netherlands

The proliferation of technology has provided more opportunities to learn. Massive Open Online Courses (MOOCs) push the notion of online learning environments further by delivering learning resources freely to anyone who is interested to learn. MOOC students are not bounded by time, location, and entry criteria. Thereby, creating a heterogeneous group of students who are expected to be able to self-regulate their learning to a certain extent towards the goal of successfully learning. In view of such heterogeneity and the importance of self-regulated learning (SRL), the authors conducted a systematic review of 35 studies on approaches to support SRL in online learning environments and studied how these approaches address student variables. The objective of the paper is twofold: (i) to inform researchers, designers and teachers about the state of the art of SRL support in online learning environments and MOOCs; (ii) to provide suggestions for taking into account student variables when supporting self-regulated learning support. Findings from the systematic review showed that prompting SRL is a simple and effective way in supporting SRL. In addition, student variables play an important role in the efficacy of SRL supports. Therefore, to provide SRL supports that best fit individual learners, a better understanding of learners at a fine-grained level is imperative. Future studies can employ learning analytics as one of the approaches to gather information on student characteristics to determine the SRL support needed and to provide the differentiated SRL support.

INTERACT: A Process Model of Interactivity integrating behavioral, affective and cognitive aspects

Presenting Author: Helmut M. Niegemann, Saarland University, Germany; **Co-Author:** Steffi Heidig (Domagk), TU Dresden, Germany; **Co-Author:** Ruth Schwartz, Quinnipiac University, United States; **Co-Author:** Jan L. Plass, New York University, United States

Since the introduction of computers as tools for learning, interactivity has been much discussed as holding strong promise for educational use (e.g., Hannafin & Peck, 1988; Bransford et al., 1999; Renkl & Atkinson, 2007). But does interactivity in fact improve the quality and effectiveness of learning environments? Empirical investigations to date have yielded mixed results (e.g., Moreno & Mayer, 2005; Moreno & Valdez, 2005; Schwan & Riempp, 2004). Two critical factors seem to have played a part in producing these inconsistencies. First, definitions and theoretical treatments of interactivity have not been consistent (e.g., Betrancourt, 2005; Kennedy, 2004; Sims, 1997; Moreno & Mayer 2007). Similarly, approaches to operationalizing this construct in research have varied widely (e.g., Moreno & Mayer, 2005; Schwan & Riempp, 2004). In response, we propose a standardized definition as well as a process approach for operationalizing interactivity. The Integrated Model of Multimedia Interactivity (INTERACT) describes a system of six interdependent components of interactivity (Domagk, Schwartz, & Plass, 2010). The relationships and feedback among these components comprise interactivity. Because the components can be individually considered and systematically varied, the application of INTERACT as a model for investigating interactivity can facilitate more rigorous empirical investigations, comparisons between studies, and the derivation of broad principles for the design of interactive learning environments. Additionally, constructs such as learner control, guidance, and feedback, commonly discussed with regard to interactivity, can be reconsidered using the INTERACT model.

Session R 25

2 September 2017 13:00 - 14:30

Pinni A - A1081

Invited Symposium

Teaching and Teacher Education

Science with and for societies in Horizon 2020: What are the implications for writing research?

Keywords: Design based research, Mixed-method research, Synergies between learning - teaching and research, Teacher Professional Development, Teaching / instruction, Teaching approaches, Writing / Literacy

Interest group: SIG 12 - Writing

Chairperson: Eva Lindgren, Umeå University, Sweden

Organiser: Montserrat Castelló, Ramon Llull University, Spain

Organiser: Eva Lindgren, Umeå University, Sweden

Discussant: Debra Myhill, University of Exeter, United Kingdom

For many years writing researchers have conducted research with the aim to contribute to writing instruction. Issues of inclusion and relevance of research are currently discussed on at least three different arenas. Firstly, the field of educational science discuss the relevance of educational research for practise. This discussion affects conceptual and epistemological issues related to what should be investigated and changed in schools as well as methodological decisions regarding how this research should be developed. Secondly, the indigenous research field is concerned with similar discussions about ethical approaches to research with people and communities. Issues of participation and decision-making are brought to the forefront and guidelines of how to organise research, who makes decisions about research questions and methodologies have been developed. Thirdly, the European Research Programs (Horizon 2020) include *Science with and for society* (SwafS) as one of the important strands. The aim is "to build effective cooperation between science and society". Taken together these three discussions illustrate a recent conceptual change in the way in which research is perceived of and understood. They also raise a number of questions regarding accountability and effectiveness of, in our case, writing research. In this symposium the concept of *Science with Society* will first be briefly introduced after which four studies are presented in order to lay the foundation for the final discussion about how moving to the *Science with Society* approach would impact on research foci, theoretical frameworks and methodologies in writing research.

Writing research with and for schools Perspectives from the Norm project

Presenting Author: Synnøve Matre, Norwegian University of Science and Technology, Norway; **Co-Author:** Randi Solheim, NTNU, Faculty of Social and Educational Sciences, Norway

This presentation reports from a large-scale intervention project on writing education and assessment, with extensive practitioner involvement. We focus on design and methodological elements relevant in discussions of teachers' professional development and students' learning within local learning ecologies – drawing lines between writing research and school practice. In the first stage of the project, norms for expected writing proficiency were developed in close cooperation between teachers and researchers. In the second stage, running over two years, teachers at 20 primary schools participated in a professional development program focusing on the project's functional construct of writing, the norms of expectation and analytical and formative assessment. Based on their new, shared knowledge, the teachers implemented various resources in their writing classrooms, adapted to work in different subjects. Writing tasks, student texts, teacher ratings and assessment discussions, teacher interviews and observation data were collected and analysed using quantitative and qualitative approaches. Findings indicates that the students altogether improved their writing competence considerably during the project period, while the teachers gained assessment competence. However, there is a great variation among schools, classes and individual students. The study does not primarily point to "what works", rather offering theoretical and practical perspectives. It highlights the importance of a defined and shared construct of writing (cf. construct validity) as a basis for both research and knowledge development among teachers. Further, it points to the teachers as active agents in their own professional development – and to the long perspectives of building knowledge and practice from below and over time.

The grammar-writing interplay: Exploring teachers' concepts for educational change

Presenting Author: Xavier Fontich, Autonomous University of Barcelona, Spain

GREAL research group has fruitfully developed a model for teaching grammar and writing in collaboration with teachers, with whom the basic tenets of a sociocultural approach are shared, specially with regards to the importance of fostering students' metalinguistic activity; these teachers have been involved in discussion groups for a number of years and are keen to bring interventions into the arena meant to be conjointly put under scrutiny. The current focus of interest is how to transfer the outcomes of this kind of research to teachers less familiar with a sociocultural approach to teaching grammar and writing. A study is conducted to explore teachers' concepts (n=6), after identifying 4 profiles in a cohort of 90 teachers with regards the role attributed to classroom interaction and the explicit/implicit approach to instruction. Concepts are seen as statements that guide classroom practices and therefore as a domain of utmost importance for fostering educational change. Exploring concepts may allow us disentangling how teachers can undergo a coherent evolution inspired by the outcomes of research. Oral data are collected through interviews, focus group sessions, and classroom observation over a span of 8 months. Results suggest that these teachers' concepts are clearly dominated by the explicit/implicit dichotomy, although teachers show increasing awareness of the importance to engaging students in processes of metalinguistic activity. Nonetheless, classroom intervention analysis shows the difficulties teachers encounter in promoting meaningful metalinguistic activity in the classroom. This suggests the necessity to implement programs that engage teachers in longer periods of sustained reflection.

Supporting elementary teachers in the implementation of Tekster, a strategy-focused writing program

Presenting Author: Renske Bouwer, University of Antwerp, Belgium; **Co-Author:** Monica Koster, Free University, Amsterdam, Netherlands

To improve students' writing performance at the end of elementary school, we developed *Tekster*, a comprehensive program targeting the focus of instruction (what is taught) and the mode of instruction (how it is taught). The effectiveness of *Tekster* was examined in a large-scale experiment with 1346 students and 68 teachers from 25 schools. The program was executed by teachers themselves, as we aimed to impact teachers' educational practice beyond the intervention. To ensure that teachers possessed the necessary skills and knowledge to implement *Tekster* as intended, they participated in

a professional development (PD) program. For this PD program we applied a teachers-training-teachers approach in which half of the teachers ($N=30$) were trained by experts, and subsequently these teacher-trainers trained one or more colleagues ($N=38$), which allowed us to examine the spillover effect and transferability of the PD program. Results show that the four-month writing program significantly improved students' writing in both teacher groups ($ES = 0.55$). Fidelity data from logbooks, classroom observations and interviews revealed that both trainers and trainees easily adapted the focus of instruction. The teachers-training-teachers approach appeared to be less suitable to change the mode of instruction: trainers devoted little attention to the mode of instruction during the collegial training sessions. This study shows that a teachers-training-teachers approach is a promising approach to change teachers' focus of instruction, but that to induce change in their mode of instruction teachers need more support.

Educational science approaches to solving problems of practice in writing in New Zealand

Presenting Author: Judy M. Parr, University of Auckland, New Zealand; **Co-Author:** Rebecca Jesson, University of Auckland, New Zealand

The idea of addressing and solving problems of practice, through various forms of collaborative partnerships of researchers and professionals, has featured in recent professional learning literature. Research-informed approaches to educational issues, using what might be broadly termed "educational science" (McNaughton, 2011), is a form of research that has operated for a significant time in New Zealand, arguably, in response to distinctive features of the local educational context. These features include autonomous/ self-governing schools; a broad, non-prescriptive curriculum; no mandated high stakes testing until the end of compulsory schooling and, perhaps most importantly, a view of teaching as inquiry. Teachers, as professionals, iteratively and collaboratively inquire into their practice in relation to the needs of their students, using systematic means to interrogate data around achievement and practice and research-informed means to devise and evaluate solutions to issues of practice. The partnering with research and researchers guides and complements such inquiry. The features and outcomes of two major instantiations of educational science are considered in relation to a significant and ongoing issue in literacy achievement, that of high performance, low equity outcomes in literacy whereby particular groups, notably, indigenous Maori and students from the Pacific, are disproportionately represented in the lower quartile of achievement. Further, writing achievement lags markedly behind that of reading and mathematics. In this paper, we analyse the features of the learning schools model and the inquiry learning model in relation to enhancing instruction and accelerating progress for students in writing.

Session R 26

2 September 2017 13:00 - 14:30

Pinni B - B1096

Invited Symposium

Different approaches to improve the home learning environment and child outcomes

Keywords: Attitudes and beliefs, Competencies, E-learning / Online learning, Early childhood education, Educational policy, Experimental studies, Literacy, Parental involvement in learning, Self-efficacy

Interest group: SIG 05 - Learning and Development in Early Childhood

Chairperson: Simone Lehl, University of Bamberg, Germany

Organiser: Yvonne Anders, Freie Universität Berlin, Germany

Discussant: Pamela Sammons, University of Oxford, United Kingdom

By the age of three, children already differ greatly in their developmental profiles. High quality preschool programmes have large beneficial effects on children's development, and seem to be helpful especially for the most disadvantaged children. But family influences on children's development, particularly the quality of the home learning environment, seem to be stronger than any institutional educational influence. Preschool programmes with moderate to high effects are often those that involve and work with parents. But the ECEC infrastructure differs greatly between countries with regard to children under three, and in many societies disadvantaged families tend to send their children later to preschool. Thus, there is a widespread need for different types of parenting support and home-based education programmes. In this symposium we shed light on the outcomes of different approaches to improving home learning environment and child outcomes, using studies from Portugal, England, Finland and Germany. Barata and colleagues investigate the impacts of a playgroup approach on the caregiving environment and child cognitive development in Portugal. Jelley and Sylva present research on the effects of a parent app on parenting self-efficacy and child self-regulation. Both studies are randomized trials, while the Finnish and German studies explore centre-based approaches to improving the home learning environment drawing on large-scale correlational data. Lerkkanen and Pakarinen show how maternal trust towards the preschool teacher is related to child's reading, arithmetics, and empathy, and Anders and colleagues establish successful ways that preschools involve parents in their children's literacy and language learning

Playgroups for inclusion: experimental impacts on caregiving environment and child development

Presenting Author: Vanessa Russo, University Institute of Lisbon (ISCTE - IUL), Portugal; **Co-Author:** M. Clara Barata, University of Coimbra, Portugal; **Co-Author:** Catarina Leitao, University of Coimbra, Portugal; **Co-Author:** Bruno de Sousa, University of Coimbra, Portugal; **Co-Author:** Joana Alexandre, University Institute of Lisbon (ISCTE-IUL), Portugal

The project Playgroups for Inclusion was an innovative educational policy for Early Childhood Education and Care (ECEC),

targeting children aged 0-4 and their families, not participating in the currently available ECEC services in Portugal. This policy aimed to increase access to high-quality ECEC, providing twice-weekly sessions to up to 10 children and caregivers dyads. Previous evidence about playgroups provided indication that such services improve a range of outcomes for children (Deutscher, Fewell, & Gross, 2006; Hackworth et al., 2013), and for parents (Evangelou, Brooks, & Smith, 2007). However, weaknesses in the design of these studies limited the internal and external validity of findings. To date, Playgroups for Inclusion is the first randomized controlled trial of a playgroups-only policy. Results of the experimental trial so far indicate positive but largely non-significant impacts of the intervention Playgroups for Inclusion on caregiving environment and child development. At EARLI, we will discuss these results in light of low attendance, high dropout and quality monitoring, and illustrate the moderation of impacts by attendance, presenting treatment-on-the-treated estimates of impact.

EasyPeasy app: the effect of parental engagement on school readiness skills of 3-6 year old children

Presenting Author:Kathy Sylva, University of Oxford, United Kingdom; **Co-Author:**Fiona Jelley, University of Oxford, United Kingdom

Self-regulation is important in children's readiness for school and future attainment. It is well-known that play has a vital role in the development of such skills, and that parents can make a valuable contribution in supporting children in the early years. The aim of this study was to investigate the effects on parents and children of the EasyPeasy app, which is designed to boost child development through encouraging parents to interact and play with their children at home. The app sends game ideas in the form of short video clips direct to parents' phones. An individual randomised controlled trial (RCT) was carried out with 144 families from 8 children's centres in a UK coastal town. Parents completed pre- and post-test measures on parenting self-efficacy, parenting stress, and their child's self-regulation. Parents in the intervention group had access to the app for 18 weeks. At post-test, there were significant differences in favour of the intervention group on parents' self-efficacy regarding discipline and boundaries, and parent-reported child cognitive self-regulation. Implications and future directions are discussed.

The associations between maternal trust towards preschool teacher and child outcomes

Presenting Author:Marja-Kristiina Lerkkanen, University of Jyväskylä, Finland; **Co-Author:**Eija Pakarinen, University of Jyväskylä, Finland

Preschool year is the optimal period to promote parent-teacher relationship which may enhance the development of child's academic skills and motivation to learn before school transition. This study investigated the associations between maternal trust in their child's teacher and child's academic and social outcomes at preschool. Finnish mothers (n = 1,558) filled in questionnaires measuring their trust in their child's preschool teacher. Children (896 girls, 984 boys) were tested twice on their pre-academic skills and were rated by their preschool teacher on their task-avoidant behavior and social skills. Children also rated their interest in reading and math at the end of preschool. The results of path analyses showed that maternal trust in their child's preschool teacher was positively associated with child's reading and arithmetic skills, with empathy and cooperative skills as well as with interest in reading. Mothers' higher trust in preschool teacher was also negatively associated with teacher-rated task-avoidant behavior, impulsivity and disruptiveness. These findings emphasize the importance of maternal trust in their child's preschool teacher for child's pre-academic skills, social skills and interest in learning before school transition.

Successful ways of preschools to involve parents in their children's learning

Presenting Author:Yvonne Anders, Freie Universität Berlin, Germany; **Co-Author:**Manja Flöter, PädQUIS gGmbH, Germany; **Co-Author:**Nadine Wieduwilt, Free University Berlin, Germany; **Co-Author:**Hans Guenther Rossbach, University of Bamberg, Germany

It is well known that high quality preschool programmes which are considering the influence of parents and families can have large and long-lasting beneficial effects on children's development. To date, only few studies exist that study in detail how regular preschool settings involve parents, and which involvement strategies improve the home environment or children's development. In this study different ways preschool settings use to involve parents in their children's literacy and language learning were explored. In addition, it was investigated which strategies have beneficial effects on the development of the home learning environment and children's language development. The analyses draw on data from the evaluation of the German federal programme 'Core Daycare Centres for Language & Integration' including 335 daycare centres and 1331 children and families. Professional support appeared to be crucial for effective strategies of involving parents. Multivariate regression analyses showed that tips parents receive from professionals for enriching the home environment have a net positive effect on the development of the quality of the home learning environment as well as on children's language development. This study provides a strong argument for concepts of preschool quality which stress the importance of preschool-parent partnership. Language-specific strategies rather than domain-general strategies are most beneficial to promote children's language learning.

Session R 27

2 September 2017 13:00 - 14:30

Virta - 120

Invited Symposium

Learning and Social Interaction

A rise in migration: Dialogue, language and intercultural communication challenges

Keywords: Communities of practice, Cultural diversity in school, Cultural psychology, Culture, E-learning / Online learning, Language (Foreign and second), Learning Technologies, Qualitative methods, Second language acquisition, Secondary education, Social interaction

Interest group: SIG 21 - Learning and Teaching in Culturally Diverse Settings

Chairperson: Sarah Crafter, Open University, United Kingdom

Organiser: Sarah Crafter, Open University, United Kingdom

Discussant: Charles Max, University of Luxembourg, Luxembourg

The last two years have seen the largest migration proportion ever recorded, with 244 million people living in countries other than where they were born. However, for schools in contexts of high migration the challenges are significant. This symposium brings together four presentations that examine how dialogue, the emergence of new concepts about diversity and communicative strategies in diverse educational settings are constructed and/or implemented in school practice and policy. Particularly, against a backdrop of socio-political, educational and pedagogical strategies that seek to try and find new ways of managing levels of diversity change. The first presentation aims to explore teachers' insecurities in meeting the demands of 'new diversity' by examining how diversity is constructed through communicative practices. The second presentation builds on this by tracing the pedagogical and policy implications for the use of conceptual language, such as "bi/multi/plurilingualism" and "trans/languageing in education. Dialogue and language also forms a central thread in presentation 3, as the authors discuss an educational intervention that seeks to enhance intercultural competencies in teachers through the exchange of ideas using digital platforms. Presentation 4 presents an intervention aimed at fostering cooperation and integration into the new environment. In this project an online platform is used to deliver modules that enable dialogue about the potential challenges and risks for newcomers. All the presentations share an interest in examining the implications for strategies towards pedagogy in light of increasing levels of migration and movement, including the use of different forms of digital media or technology.

Dive iN – Diversity as Normality

Presenting Author: Ylva Lindberg, Jönköping University, Sweden; **Co-Author:** Elisabet Sandblom, Jönköping University, Sweden

The paper presents a sub-study of the larger project Diversity as Normality, Dive iN. The aim of the project is to investigate how diversity is constructed through social interaction across different disciplines in upper secondary school. Recent international research and the current debate in Sweden (2014-2016) show that diversity is a fuzzy concept often used in order to highlight societal challenges connected to marginalised groups, such as minorities, immigrants, and disabled people. Concerning the Swedish school, diversity is conceived of in connection to the recent migration wave and low results in international testing. It turns out that teachers feel unprepared to meet this experienced "new diversity". Using decolonial and sociocultural lenses, this study aims to illustrate and problematize the ways in which the identity positions of marginalized groups get played out in the everyday lives of young adults in Sweden in the 21st century (Bagga-Gupta 2013). The project aims to describe the communicative practices in Swedish upper secondary school with a focus on cultural artifacts including digital media. The study presents results from the analysis of digitally-mediated interaction, addressing categories of interaction, content and form, in connection to time, space and place. Preliminary results show how diversity emerge and ways in which diversity is made (in)visible through communication. The findings will further guide the project towards pedagogical tools for inclusive practices.

Mobilization of nomenclature related to language and diversity in learning and instruction

Presenting Author: Sangeeta Bagga-Gupta, Jönköping University, Sweden

This paper aims to make visible a diversifying hegemony in how language and identity issues are currently framed in the educational sciences and the mismatch between this mobilization of nomenclature pluralism and human social practices. The paper traces the emergence of some central concepts in (i) language sciences ("bi/multi/plurilingualism" and "trans/languageing") and (ii) literature on migration studies and globalization ("super/hyper/diversity", and "immigrants/newly-arrived"), and illuminates the ways in which nomenclature shifts and "academic branding" contribute towards communication and diversity issues in the educational sector. By centre-staging analysis of both analogue and digital social practices where individuals in interaction with one another and tools are salient and where locality and spatiality are not always bounded to the four walls of institutional learning settings, we illustrate the "webs-of-understandings" that are normalized and that circulate within education. In addition to analysis of data from ethnographical projects at CCD research group (www.ju.se/ccd), we draw upon data that is constituted by (i) current scholarship inside and outside Sweden, and (ii) directives from Swedish national school authorities and teacher education. The study, theoretically framed at the crossroads of sociocultural and decolonial perspectives, specifically asks how the webs-of-understandings related to key concepts like "bi/multi/plurilingualism" and "translanguageing" differ from social practices that comprise "normal languageing", and what concepts like "super/hyperdiversity" and "newly-arrived" offer in comparison to "normal diversity"? By privileging social practices, we, in other words, ask what is the nature of *normal languageing* and *normal diversity*?

Intercultural Digital Narratives

Presenting Author: Giuseppe Ritella, University of Helsinki, Finland; **Co-Author:** Alessio Surian, Università degli Studi di Padova, Italy

The paper presents Intercultural Digital Narratives (In.Di.es), a proposal for research and intervention for developing intercultural competences at school in the 21st century. In particular, our proposal aims at fostering an international community of teachers where participants jointly reflect on teaching practices to trigger educational innovation on the theme of cultural diversity. Research shows that the creation of a community of practice (Wenger, 1998) and specifically a community of teachers where participants jointly reflect on teaching practices and exchange ideas and good practices is an effective trigger of educational innovation. The theme of cultural diversity, in particular, is best addressed within an international community, where a wide range of identities, histories, practices can enrich the collective awareness and contribute to the building and scaffolding of intercultural sensibility. In.Di.es seek to address the issue of multiculturalism in schools at the international level, improving schools' capability to deal with cultural diversity and to develop cultural literacy in the young generation. In particular, we aim at building an international community of teachers at the European level, which will co-design and implement innovative intercultural teaching practices involving photovoice and digital storytelling.

Learning to be in the new environment - a pilot project for youngsters in Luxembourg 2017

Presenting Author:Gudrun Ziegler, multi-LEARN Institute, Luxembourg; **Co-Author:**Jin Choi, multi-LEARN Institute, Luxembourg; **Co-Author:**Phillipe Blanca, multi-LEARN Institute, Luxembourg

"Learning to be in the new environment" is a learning initiative launched with regard to the increased number of migrants and refugees coming to Luxembourg since end 2015. Given the cultural as well as the linguistic backgrounds of these newcomers, innovative measures were designed to help the migrants as well as the host society to deal with issues of mutual perception, cooperation, tolerance and self-control. Drawing from previous findings on migrants with other or poor literacy coming to the multilingual contexts of Luxembourg (Choi & Ziegler 2015) two key aspects govern the conception of six interconnected modules which cover a span of three months. Firstly, Luxembourg offers resources for newcomers, yet these resources are mainly written and require multilingual literacy with regard to the three administrative languages of the country. Secondly, migrants are often put in the position to "listen and learn", yet previous findings show that interactive measures are most efficient as they provide room to explore, enact and experience the "new environment". This study then provides insights on several levels, relying on a multi-method approach. On the conceptual level, we discuss the visual, interactive principles, which govern and interconnect the training modules. With regard to the participants, the study assesses the profiles of the newcomers with regard to their learning disposition, engagement and self-reported success within the program. Finally, the project reports the reactions towards the project and its participants with regard to acceptance and integration (<http://leilu.org>)

Session S 1

2 September 2017 14:45 - 16:15

Main Building D - D14

Single Paper

Higher Education

Researcher Education and Careers

Keywords: Communities of practice, Doctoral education, Higher education, Motivation, Qualitative methods, Researcher education

Interest group: SIG 24 - Researcher Education and Careers

Chairperson: Nadine Spörer, University of Potsdam, Germany

Rethinking researcher competitive identity at the crossroads of education, business and economy

Keywords: Communities of practice, Higher education, Qualitative methods, Researcher education

Presenting Author:Irina Lokhtina, University of Central Lancashire, Cyprus

This paper provides the findings of a narrative research study exploring the experiences of twenty Cypriot academics through the lens of Situated Learning Theory (Lave and Wenger 1991; Wenger 1998). The narratives which have been extracted from in-depth, semi-structured interviews illustrate the ambitious nature of research practice and how established performance indicators influence the development of researcher identity. Moreover, rich insights into the impact of *power inequalities* within academic communities upon shifting constructions of academic identity were gained. The findings revealed that academics expressed their doubts regarding the way universities operated, commenting negatively on managerialism as a mediating factor of power imbalances between academics and disruption of teaching-research balance at universities. Academics described their shifting identities due to limited academic autonomy mostly when researching and viewed their academic career as uncertain. They questioned the efficiency of the performance evaluation system and showed their willingness to accept a more transparent and less bureaucratic approach. However, there were academics who kept balance between desired and required research outputs in order to move on to more secure positions. It was concluded that even though academic freedom is considered as a basic condition of knowledge development and the purpose of being in academia, the existing performance management system gives institutions a legitimate basis for control over resources and research outcomes. That is why academics' mutual engagement in shared practices (Wenger 1998) and mentoring arrangements for academics who are disadvantaged regarding their research practices are significant for their competitive identity construction and career development.

Why are doctoral studies initiated? Comparison of Finnish, UK and Spanish PhD students' interests

Keywords: Doctoral education, Higher education, Motivation, Researcher education

Presenting Author:Jouni Peltonen, University of Oulu, Finland; **Co-Author:**Kirsi Pyhältö, University of Oulu / University of Helsinki, Finland; **Co-Author:**Lynn McAlpine, University of Oxford, United Kingdom; **Co-Author:**Montserrat Castelló, Ramon Llull University, Spain

Motivation plays a major role in the doctoral studies experience. Doctoral student interest is affected by the socio-cultural context of doctoral education and hence can vary across countries. This study focused on exploring cross-cultural variation in doctoral students' interests by comparing Finnish, UK and Spanish doctoral students' research interests. Also, association between reported interest in doctoral studies and research group status, dropout intentions, satisfaction with doctoral studies and experience of burnout were explored. Altogether, 2,426 doctoral students from social sciences and sciences responded to the *Doctoral Experience* survey. Although doctoral students in general showed high levels of research and development interest, also differences across the three socio-cultural contexts were detected. Spanish students displayed higher levels of *researcher interest* than UK students, and also higher levels of *instrumental interest* compared to both UK and Finnish students. Finnish students on the other hand showed the lowest levels of *instrumental interest*. Spanish students suffered least from cynicism, whereas Finnish students experienced the lowest levels of exhaustion. Those doctoral students who showed high levels of *research interest* experienced less cynicism and exhaustion than others.

Early researchers' identity positions based on significant events in research

Keywords: Doctoral education, Higher education, Qualitative methods, Researcher education

Presenting Author:Eva Liesa, Ramon Llull University, Spain; **Co-Author:**Antoni Badia, Universitat Oberta de Catalunya, Spain; **Co-Author:**Carles Monereo, UAB Universitat Autònoma de Barcelona, Spain

The aim of this research was to explore what were the positions that emerge during the construction of the early researchers' identity through the analysis of the significant experiences that appear in the doctoral journey. A phenomenographic research approach (Åkerlind, 2012) and a narrative methodology (McAlpine, Amundsen, & Turner, 2013) were used. An intentioned sample of five beginning social science researchers has participated. All participants were PhD students when the study started and doctors when the study finished. The instruments to collect data were three: the journey plot, elicitation cards and interviews during the process of writing the dissertation and after their presentation. The journey plot was used to get information about participants' positive and negative experiences over time (Shaw et al. 2008; Sala-Bubaré&Castelló, 2016; Turner, 2015) and Elicitation cards allowed us to know more about the importance of these experiences (McAlpine& Amundsen, 2011; McAlpine, Amundsen&Turner, 2012). Finally, participants were interviewed twice to obtain more information about the meaning of each significant event. These significant events allow us to establish seven different early researchers' positions during their trajectories (managerial, tutored student, subject content learner, academic writer, research designer, academic speaker and research community member). The more frequent positions are described.

Session S 2

2 September 2017 14:45 - 16:15

Virta - 120

Single Paper

Motivational, Social and Affective Processes

Motivation, Emotion and Affect

Keywords: Cognitive development, Cognitive skills, Collaborative Learning, Educational Psychology, Emotion and affect, Goal orientation, Motivation, Motivation and emotion, Self-regulation, Social aspects of learning and teaching, Social development

Interest group: SIG 08 - Motivation and Emotion

Chairperson: Engin Ader, Bogazici University, Turkey

The role of epistemic emotions during daily life problem solving

Keywords: Emotion and affect, Goal orientation, Motivation, Motivation and emotion

Presenting Author:Sandra Becker, Ludwig-Maximilians-Universität (LMU), Germany; **Co-Author:**Elisabeth Vogl, Ludwig-Maximilians-Universität (LMU), Germany; **Co-Author:**Julia Haager, University of Regensburg, Germany

Epistemic emotions such as surprise, curiosity, and confusion, have been linked to general knowledge generating processes. To explore in more detail which role these emotions play for knowledge-generating activities in daily life problem solving, we conducted a diary study over a period of 30 days. In a total of 1675 diary entries, 113 students reported about their emotions during daily life problem solving. In line with appraisal theories of emotions (e.g., Pekrun, 2006), correlation analyses revealed that control and value appraisals were associated with the experience of discrete epistemic emotions. In addition, epistemic emotions related to knowledge-generating activities used as cognitive problem-solving strategies. The findings highlight that not only positive epistemic emotions (e.g., curiosity) but also negative epistemic emotions (e.g., confusion, anxiety) can be connected to cognitive problem-solving behaviors that are generally

considered as being adaptive. Our results add to the understanding of the origins and effects of epistemic emotions, which may open up possibilities for fostering cognitive processes in various contexts in which problem-solving skills are crucial.

Functions of Emotions for Mathematical Thinking

Keywords: Cognitive skills, Emotion and affect, Motivation, Motivation and emotion

Presenting Author:Sandra Becker, Ludwig-Maximilians-Universität (LMU), Germany; **Co-Author:**Reinhard Pekrun, Ludwig-Maximilians-Universität (LMU), Germany; **Co-Author:**Stefan Ufer, Ludwig-Maximilians-Universität (LMU), Germany

We investigated the influence of emotions on mathematical thinking, specifically the functions of excitement and anxiety for the generation and evaluation of scientific conjectures. Excitement is hypothesized to support the cognitive processes aiding the generation of conjectures, because positive-activating emotions facilitate relational and flexible thinking. Anxiety, on the other hand, is hypothesized to support cognition in a way beneficial to the evaluation of mathematical conjectures, as negative-activating emotions have been found to support analytical-algorithmic thinking. This experimental study supports these hypotheses and demonstrates that a brief emotion induction, prior to a mathematical task, can enhance performance. The findings suggest that emotions and cognition can be synchronized in ways supporting mathematical thinking, illustrate how the subtle modulation of cognition, instigated by emotions, can support or hinder our thinking and therefore reveals fundamental principles on how emotions shape thinking.

Students' perceptions about emotion regulation and a group awareness tool in collaborative learning

Keywords: Collaborative Learning, Emotion and affect, Self-regulation, Social aspects of learning and teaching

Presenting Author:Arttu Mykkänen, University of Oulu, Finland; **Co-Author:**Hanna Jarvenoja, University of Oulu, Finland; **Co-Author:**Marika Koivuniemi, University of Oulu, Finland; **Co-Author:**Sanna Järvelä, University of Oulu, Finland

Students participating in collaborative learning activities might experience emotional challenges. These challenges need to be regulated as a group. However, group members' emotional states might not always be salient to other group members. Group awareness tools can be used to clarify these issues to other group members and prompt further discussion. This research investigated students' perceptions about the use of group awareness tool. Especially, the focus was on the perceptions that students had about the emotion regulation within the group and how the awareness tool supported the group in regulation activities. Participants of this study were second year teacher education students (N = 44). Data was collected during Math didactics course which lasted for two months. After the course the students were interviewed about the use of the awareness tool. Content analysis was implemented to summarize students' perceptions. Results showed that students' considered the tool to be beneficial to emotion regulation on one hand, but also laborious and disconnected from the actual learning task. Results suggest some ideas for further development of group awareness tools, such as how to better connect the use of tools to be a part of the actual learning task and not just an additional work.

Curiosity and Well Being in Emerging Adulthood

Keywords: Cognitive development, Educational Psychology, Motivation, Social development

Presenting Author:Thomas Reio, Florida International University, United States; **Co-Author:**Joanne Sanders-Reio, Florida International University, United States; **Co-Author:**Mia Heikkilä, Florida International University, United States

The purpose of this study was to explore the relationship between curiosity and psychological well-being in 18- to 30-year-old individuals considering Arnett's (2003) criteria for adulthood. In a group of 233 college students, a questionnaire battery was administered to measure cognitive and sensory curiosity, the Emerging Adulthood Criteria, and psychological well-being, as well as select theoretically relevant demographic variables (e.g., age, gender, and ethnicity). Hierarchical regression analysis revealed that among the emerging adulthood criteria, achieving role-transition was significantly and negatively related to psychological well-being, while experiencing high frequency of cognitive-curiosity and sensory-curiosity were positively, and significantly related to psychological well-being.

Session S 3

2 September 2017 14:45 - 16:15

Main Building E - E222

Single Paper

Cognitive Science, Educational Policy and Systems, Higher Education

Cognitive Skills and At-risk Learners

Keywords: Achievement, At-risk students, Cognitive skills, Educational attainment, Experimental studies, Higher education, Learning and developmental difficulties, Quantitative methods, Reading comprehension, School effectiveness, Secondary data analysis, Writing / Literacy

Interest group: SIG 04 - Higher Education, SIG 12 - Writing, SIG 18 - Educational Effectiveness

Chairperson: Riikka Hirvonen, University of Jyväskylä, Finland

Using secondary data to analyse school improvement

Keywords: Achievement, Quantitative methods, School effectiveness, Secondary data analysis

Presenting Author:Daniel Muijs, University of Southampton, United Kingdom

In England, while pupil attainment in large cities such as London has improved substantially over the past decade, other parts of the country are still experiencing high levels of school failure. Attention has, in particular, shifted to so-called 'coastal towns', in which pupil attainment remains particularly poor. Nevertheless, even in such challenging circumstances there are schools that show significant improvement. In this paper we outline both the method of identifying these schools, and how to identify factors that could contribute to improvement using secondary datasets. For this study we draw on a number of secondary data sources. The first is the National Pupil Database. This is a database that contains information on attainment of pupils in national assessment at the end of primary and secondary school and on student background characteristics such as gender, ethnicity and poverty. The second dataset used is the Ofsted inspection dataset. This dataset provides the full inspection reports on each school in England. The third dataset used is the Schools Workforce Census. This is a national database of teachers and school leaders through which we can track variables like the staff composition of schools and the appointment of new leaders. Finally, we also have a number of datasets detailing schools participation in a number of government-sponsored improvement projects. A three-stage research strategy is used: 1. identification of high performing schools, 2. matching to comparator schools, and 3. analysis of variables relating to improvement.

Stability of Reading Difficulties

Keywords: Cognitive skills, Learning and developmental difficulties, Quantitative methods, Reading comprehension

Presenting Author: Maria Psyridou, University of Jyväskylä, Finland; **Co-Author:** Minna Torppa, University of Jyväskylä, Finland; **Co-Author:** Asko Tolvanen, University of Jyväskylä, Finland; **Co-Author:** Anna-Maija Poikkeus, University of Jyväskylä, Finland; **Co-Author:** Marja-Kristiina Lerkkanen, University of Jyväskylä, Finland; **Co-Author:** Jari-Erik Nurmi, University of Jyväskylä, Finland

In the present study we examine the stability of the development of reading fluency (RF) and reading comprehension (RC) from grade 2 to grade 6 and whether kindergarten skills predict RF and RC development. The study is part of a Finnish longitudinal study in which approximately 2000 children participated. RF was assessed with three tasks and RC using a subtest of a nationally normed reading test battery. The assessed kindergarten factors were: initial phoneme identification, naming letters, Peabody picture vocabulary, rapid serial naming of objects, number sequences, and listening comprehension. First we estimated cross-lagged factor path models to examine the correlative associations between RF and RC across grades 2 to 6. Next, we focused on reading difficulties (lowest 10 % in RF and/or RC) and their stability across time. Using the cross-lagged factor models as a basis, we simulated 200.000 cases, which provided a way to omit measurement error from the stability analysis. Finally, we modeled the relative contributions of the kindergarten factors to RF and RC in grades 2 and 6 in SEM framework by using Cholesky decomposition. Our results indicated that RF is more stable than RC. In addition, our results suggest that reading difficulties (RD) are not stable across time since 6.9% of the children had late-emerging RD and 6.5% had resolving RD. RF better linked with letter naming and rapid naming while RC with letter naming, phoneme identification and vocabulary. Our results suggest that children's reading skills should be followed beyond the early grades.

The influence of first-year study yield on degree completion in Flemish higher education

Keywords: At-risk students, Educational attainment, Higher education, Quantitative methods

Presenting Author: Sebastiano Cincinato, Vrije Universiteit Brussel, Belgium; **Co-Author:** Els Consuegra, Vrije Universiteit Brussel (VUB), Belgium; **Co-Author:** Nadine Engels, Vrije Universiteit Brussel (VUB), Belgium

In Flanders (Belgium), study yield in the first year of higher education, defined as the number of obtained credits compared to the credits enrolled, is regarded as crucial for success in higher education. Although intuitively appealing, we lack the research to corroborate this assumption. Therefore, in this study we examine the relationship between first-year study yield and degree completion in higher education. Furthermore, we examine whether the group of low-yield students that obtain a degree is differently composed from those that do not. Our analyses are based on the Flemish Higher Education Database (DHO), an administrative database that keeps records of students higher education trajectory. The analysis carried out is Event History Analysis, a longitudinal technique for estimating the likelihood of events occurring. First, our findings corroborate the assumption that low study yield in the first year decreases the likelihood of degree completion. Second, our findings also indicate that among the students with low study yield, those that graduate are different from those that do not with respect to primarily secondary school characteristics (type and retention), but also background characteristics such as language spoken at home, educational attainment of the mother and sex. Future analysis will focus on factors that can effectively be influenced by higher education, since the present analysis only serves identification purposes – i.e., who are the students at risk. Of interest in this regard is how student reorientation might help students obtain a degree, especially among low-yield students.

Capacity limitations, orthographic coding, writing fluency and dyslexia

Keywords: Cognitive skills, Experimental studies, Learning and developmental difficulties, Writing / Literacy

Presenting Author: Lorna Bourke, Liverpool Hope University, United Kingdom; **Co-Author:** Simon Davies, Liverpool Hope University, United Kingdom

The main aim of the current study was to investigate differences between dyslexic and non-dyslexic students to determine the role both orthographic coding and visual working memory influences have in explaining differences between dyslexic and non-dyslexic groups of. Forty university students (20 dyslexic and 20 non-dyslexic) participated in study. Initial

analyses indicated that the non-dyslexic group performed significantly better on tasks measuring the speed, fluency and legibility of handwriting. A change detection task tested relative performance accuracy for two types of visually presented stimuli (orthographic and novel symbols) as working memory demands on capacity increased from 3 to 7 items in relation to the type of change (e.g. word, letter, letter cluster) that occurred between memory and test displays. Participants were more accurate with orthographic stimuli and when the change detection was words or strings of novel symbols. Not surprisingly there was a general linear decline in performance as the length of stimuli increased and capacity limitations were reached. Of particular interest, theoretically, was the interaction between all four factors. This will be discussed in further detail in relation to the more pronounced differences in changes in strategy between the two groups when they were retaining novel visual stimuli at word and letter level. The findings provide a clear distinction between the types of processing engaged by both groups and the constraints in accuracy with which dyslexic students can orthographically code and visually process information can consequently impact on coursework and exam grades throughout university.

Session S 4

2 September 2017 14:45 - 16:15

Main Building D - D13

Single Paper

Learning and Instructional Technology

Computer-assisted and Online Learning

Keywords: Computer-assisted learning, E-learning / Online learning, Educational Psychology, Educational Technology, Emotion and affect, Experimental studies, Instructional design, Learning analytics, Learning Technologies, Mathematics, Secondary education

Interest group: SIG 07 - Learning and Instruction with Computers

Chairperson: Charoula Angeli-Valanides, University of Cyprus, Cyprus

Learning the Concept of Function With Computer-Generated Dynamic Visualizations

Keywords: Computer-assisted learning, Experimental studies, Mathematics, Secondary education

Presenting Author: Tobias Rolfes, University of Koblenz-Landau, Germany; **Co-Author:** Jürgen Roth, University of Koblenz-Landau, Germany; **Co-Author:** Wolfgang Schnotz, University of Koblenz-Landau, Germany

In this paper we present a laboratory experiment with secondary school students who learned with dynamic visualizations. The control group worked solely with static representations. The learning setting domain was the concept of function. We used two different versions of dynamic visualizations in order to evaluate whether interactivity had an impact on the learning outcome. In the group learning with an animated representation, the students could only start a dynamic visualization and run it as a whole. In the group using an interactive representation, the students control the visualization by their mouse actions. The result of the experiment was that students learned significantly better with dynamic visualizations. However, there was no significant difference in the learning effect of animated or interactive representations.

The effect of the acceptance and actual use of a virtual learning environment on learning outcomes.

Keywords: Computer-assisted learning, E-learning / Online learning, Instructional design, Learning Technologies

Presenting Author: Charlotte Larmuseau, KU Leuven, Belgium; **Co-Author:** Marie Evens, KU Leuven (BE), Belgium; **Co-Author:** Fien Depaepe, KU Leuven, Belgium; **Co-Author:** Jan Elen, KU Leuven (BE), Belgium; **Co-Author:** Piet Desmet, KU Leuven KULAK, Belgium

Virtual learning environments (VLEs) are used more and more frequently in higher education. However, their effectiveness depends on their instructional design and how they are perceived and used by the students. The Technology Acceptance Model (TAM) is regularly used to investigate students' acceptance of the learning environment and the impact on their intention to use the learning environment. Past TAM studies barely investigated students' actual use of the learning environment, neither how this related to their learning outcomes. In this study, TAM is used to examine the effect of the students' acceptance on their actual use of a VLE and their learning outcomes in the context of foreign language teacher education. We analyzed the log data to detect students' actual use of the VLE and measured their learning gain through a pre- and posttest. The design of the VLE is based on the theoretically and empirically validated four component instructional design (4C/ID) model. We measured the students' acceptance of the VLE by using the constructs perceived usefulness (PU) and perceived ease of use (PEOU) of TAM. Data were collected from 117 students of two teacher education institutes. A path analysis including (in)direct effects reveals that students' performance on the pretest has a significant effect on PEOU. PEOU has an indirect effect on the relationship between the pretest and PU. PU has a significant effect on the actual use of the VLE. Furthermore, controlled for the pretest, results show that actual use has a significant influence on students' posttest performance.

Dispositional Learning Analytics: a linking pin between LA and educational theory

Keywords: Computer-assisted learning, Educational Technology, Learning analytics, Learning Technologies

Presenting Author: Dirk Tempelaar, Maastricht University, Netherlands; **Co-Author:** Quan Nguyen, Open University, United Kingdom; **Co-Author:** Bart Rienties, Open University, United Kingdom

This empirical study aims to demonstrate how Dispositional Learning Analytics (DLA) can provide the missing link between

Learning Analytics (LA) and pedagogy. Where LA based models typically do well in predicting course performance or student drop-out, they lack actionable data to easily connect model predictions with educational interventions. Using a showcase based on the learning processes of 1069 students in a blended introductory quantitative course, combining demographic and trace data from learning-management systems with self-reports of several contemporary social-cognitive theories, we analyse the use of worked-out examples by students. Students differ not only in the intensity of using worked-out examples but also how they position that use in the learning cycle. These differences can be described both in terms of differences measured by LA trace variables, as well as by differences in students' learning dispositions. We conjecture that the second description has major advantages for designing educational interventions. Rather than focusing interventions on e.g. low learning activity, only a symptom of suboptimal learning, pedagogy-based interventions focus on potential causes of suboptimal learning, such as applying ineffective learning strategies.

Using interaction patterns in a visual problem-solving task to detect learners' confusion

Keywords: E-learning / Online learning, Educational Psychology, Emotion and affect, Learning analytics

Presenting Author:Amael Arguel, Macquarie University, Australia; **Co-Author:**Kevin Chai, Curtin University, Australia; **Co-Author:**Mariya Pachman, Macquarie University, Australia; **Co-Author:**Lori Lockyer, University of Technology Sydney, Australia

Confusion is an emotion that learners can experience when they are learning complex content or trying to solve difficult problems. Confusion can sometimes be harmful when it leads to frustration; confusion can also be beneficial when it promotes engagement. This study aims to provide insights on the dynamics of emotions that are experienced during a problem-solving activity with a puzzle game, with a focus on the role of confusion in engaging learners in the activity. Understanding how confusion can be beneficial may provide significant clues on how to improve learning outcomes in digital interactive environments. However, because confusion is an emotional state, it can be challenging to detect within digital environments. This study also evaluates a methodology based on the recording of the interactions of learners with the puzzle in order to identify specific solving strategies that are indicators of the level of confusion. For example, in the absence of predefined solving strategy, participants search widely for solutions and adopt an observable *foraging strategy* behaviour, which is linked to a high level of confusion. Applied to real-world digital learning environments, an extension of this methodology has the potential to provide real-time indicators of confusion, which could be employed to the management of learners' confusion.

Session S 5

2 September 2017 14:45 - 16:15

Main Building A - A2B

Single Paper

Learning and Social Interaction, Teaching and Teacher Education

Learning and Development in Early Childhood - B

Keywords: Cognitive development, Cognitive skills, Early childhood education, Educational Psychology, Inquiry learning, Reading comprehension, Reasoning, Science education, Social aspects of learning and teaching, Social interaction, Teacher Effectiveness, Teaching approaches

Interest group: SIG 05 - Learning and Development in Early Childhood

Chairperson: Liisa Ilomäki, University of Helsinki, Finland

Keeping the spirit up: The impact of parent and teacher emotional support on working memory

Keywords: Cognitive skills, Educational Psychology, Social aspects of learning and teaching, Social interaction

Presenting Author:Dieter Baeyens, KU Leuven, Belgium; **Co-Author:**Loren Vandenbroucke, KU Leuven, Belgium; **Co-Author:**Jantine Spilt, KU Leuven, Belgium; **Co-Author:**Karine Verschueren, KU Leuven, Belgium

Working memory, used to temporarily store and mentally manipulate information, is important for children's development and learning. It is therefore valuable to understand the development of working memory and which factors influence this development. The current study investigated whether parent and teacher emotional support promote working memory performance by buffering the negative effect of stress. An experimental design was used to examine this research question, in first and second grade children ($n=170$, $M_{age}=7$ years 6 months, $SD_{age}=7$ months). Mild stress was induced in the children, followed by an audio message to manipulate parent and teacher support. Working memory performance was measured with a Corsi task before and after the stress and support manipulation. Questionnaires were used to assess children's perceptions of the teacher-student and parent-child relationship. Repeated measures ANOVA show that the effects of emotional support on working memory depend on the quality of the relationship with the parent and teacher. When children have a negative relationship with their parent (e.g., high conflict), a supportive message of that parent decreases working memory performance, while a supportive message from the teacher increases performance. In sum, the current study suggests that, for some children, parents and teachers can promote working memory performance by being supportive for the child. Improving the parent-child and teacher-child relationship might be helpful for children with working memory difficulties.

"Sometimes the Internet doesn't know everything": Children's Epistemic Reasoning in Science Inquiry

Keywords: Early childhood education, Inquiry learning, Reasoning, Social aspects of learning and teaching

Presenting Author:X. Christine Wang, State University of New York at Buffalo, United States

This project investigates young children's (ages 5-6) epistemic reasoning during science inquiry: What practical epistemologies (PEs) do young children demonstrate while engaging in their own science inquiry? What are the roles of individual, peer and teacher actions on children's demonstrated PEs? It was conducted in a kindergarten class where the teacher implemented a 12-week long science inquiry project. Data sources included videos of these group sessions, artifacts, and student interviews. Qualitatively we identified salient epistemic events during the inquiry sessions, and coded the interview along 6 categories: (1) general understanding of inquiry; (2) science content; (3) source of knowledge; (4) justification of knowledge; (5) certainty of knowledge; and (6) simplicity of knowledge. Quantitatively, we use statistical discourse analysis (SDA, Chiu & Khoo, 2005) to analyze connections between actions of his/her peers and teachers during science inquiry and children's PEs. Our preliminary results show that kindergarteners' emerging understanding of knowledge and knowing are uneven across different dimensions of PEs in the context of science inquiry. The teacher's explicit guiding on PEs related reflection was positively related to PEs outcomes. Peer's actions such as questioning and disagreement, and subsequent discussion of solving the disagreement were also affecting factors. This study illuminates the early development of PEs in the context of science inquiry. It addresses theoretical and methodological difficulties in studying young children's epistemic reasoning. Practically, understanding the connection between PEs and science inquiry can inform possible early interventions, which can facilitate development of scientific reasoning and improve motivation for science inquiry.

Balancing blocks: Young children's understanding of statics

Keywords: Cognitive development, Early childhood education, Educational Psychology, Science education

Presenting Author:Anke Maria Weber, University of Koblenz-Landau, Germany; **Co-Author:**Miriam Leuchter, University of Koblenz - Landau, Germany; **Co-Author:**Ina Plöger, WWU Münster, Germany

Balancing blocks: Young children's understanding of statics

Young children have an intuitive understanding of basic physical concepts such as balance. With increasing experience, they start to form theories of how and why objects can be balanced. This process starts in preschool for most children and continues into primary school and even beyond. Interventions such as scaffolding and teaching children how to balance symmetrical as well as asymmetrical objects could speed up said process. Seventy-five children between ages five to eight took part in the study. The sample was divided into two experimental and one control group. Both experimental groups received structured materials and the second group additionally received scaffolding in the form of verbal explanations about why different objects can be balanced. Physical knowledge concerning balance increased for both experimental groups after the intervention, whereas the control group showed no improvement. Furthermore, results showed an influence of prior knowledge on achievement at subsequent times of measurement. Thus, scaffolding as well as structured materials can enhance children's physical understanding in the balance domain.

The Role of Teaching Practices in Reading Skills Development from Grade 1 to 3

Keywords: Early childhood education, Reading comprehension, Teacher Effectiveness, Teaching approaches

Presenting Author:Xin Tang, University of Jyväskylä, Finland

The present study aimed to examine the longitudinal effects of teaching practices on children's reading performance. Thirty-two teachers were observed at grade 1 and the reading skills (reading fluency and comprehension) of 359 children were assessed yearly from grade 1 to grade 3. By using a person-oriented approach, teachers' dominant teaching practices (i.e., teaching styles) were identified. The results showed, firstly, that Finnish teachers deployed three different teaching styles: child-centred style, teacher-directed style, and a mixture of child-centred and teacher-directed style. Further analyses showed that children whose teacher deployed a *mixture of child-centred and teacher-directed style* showed more rapid development of their reading skills than children whose teacher deployed *teacher-directed style*. Implications for pre- and in-service teacher training will be discussed.

Session S 6

2 September 2017 14:45 - 16:15

Main Building C - C8

Single Paper

Learning and Social Interaction, Teaching and Teacher Education

Teaching and Teacher Education - F

Keywords: Achievement, Attitudes and beliefs, Collaborative Learning, Competencies, Mathematics, Mixed-method research, Motivation, Pre-service teacher education, Secondary education, Self-regulation, Teacher Professional Development, Teaching / instruction

Interest group: SIG 11 - Teaching and Teacher Education

Chairperson: Olia Tsvitanidou, University of Cyprus, Cyprus

Motivational orientations in teacher education

Keywords: Competencies, Motivation, Pre-service teacher education, Self-regulation

Presenting Author:Daniela Martinek, University of Salzburg, Austria; **Co-Author:**Julia Maria Keller, University of Salzburg, Austria; **Co-Author:**Ulrike Kipman, Pädagogische Hochschule Salzburg, Austria; **Co-Author:**Matteo Carmignola, University of Salzburg, Austria

Currently education in Austria is characterized by a range of reform programs. The main aim of this study (MOCASE – motives, causality orientations and self-regulation) focusing on student teachers' motivational orientations and their self-regulation competences was to get empirical evidence how to adjust teacher education in a way that contributes to a supportive personal development throughout initial training and to better prepare student teachers for future challenges. Building on the Self-determination theory by Deci & Ryan and on Kuhl's Personality-Systems-Interaction Theory 600 students participated in a questionnaire-based survey assessing general motivational motivation (GCOS), implicit (OMT) and explicit (MUT) motives and self-regulation competences (SSI: self-management; SRQ-L: learning regulation). Concerning motivational orientations we found a group of clearly autonomous oriented students and three profiles with specific constellations regarding autonomous, controlling and impersonal orientation. Motivational dispositions are used to characterize the profiles based on their general causality orientation. As we expected based on past studies, all groups show a high implicit power motive, however explicitly they report of a high affiliation motive. In respect to self-management autonomy oriented students display better self-regulation competencies and autonomous learning-regulation ($p < .02$). Detailed analyses of the dispositions and competences of students without a clear autonomy orientation are used to draw conclusions for training and structure of educational programs with the main aim to establish an adaptive learning culture guiding students' trainable dispositions toward self-determination and self-regulation.

Teaching quality: An online intervention

Keywords: Achievement, Mathematics, Motivation, Teaching / instruction

Presenting Author:Jaime Leon, University of Las Palmas de Gran Canaria, Spain; **Co-Author:**Elena Medina-Garrido, University of Las Palmas de Gran Canaria, Spain; **Co-Author:**Juan L. Núñez, UNIVERSITY OF LAS PALMAS DE GRAN CANARIA - FACULTAD DE CIENCIAS DE LA EDUCACIÓN, Spain; **Co-Author:**Zuleica Ruiz Alfonso, University of Las Palmas de Gran Canaria, Spain; **Co-Author:**Miriam Ortega-Viera, University of Las Palmas de Gran Canaria, Spain

Several interventions have been designed and tested to modify the teaching quality; however, more research is needed to design scalable and replicable interventions. Therefore, in this research we have designed and tested the efficacy of an internet-based intervention to modify the teaching quality and students' motivation to learn and achievement. 667 middle school students and 26 math teachers took part in the study. Variables were assessed three times. Via a multilevel model we observed a significant Time X Group X Classroom interaction in teaching quality indicators, motivation to learn and grades. This research provides preliminary evidence of an online intervention to modify teaching quality, students' motivation to learn and grades.

Teacher or team? The role of individual and team resources in collaborative professional development

Keywords: Attitudes and beliefs, Collaborative Learning, Secondary education, Teacher Professional Development

Presenting Author:Katrien Vangrieken, KU Leuven, Belgium; **Co-Author:**Filip Dochy, KU Leuven, Belgium; **Co-Author:**Eva Kyndt, KU Leuven, Belgium

The importance of teacher teamwork is becoming more widely acknowledged and schools are pushed towards a team-based organisation to cope with current challenges and demands. In line with the rise of teamwork, professional learning and development in these collaborative contexts also becomes more important. However, teacher collaboration often seems difficult to achieve because of its complex relationship with individual autonomous work. This tension is central to this study, integrating an individual and team perspective on collaborative professional development (CPD) by investigating how individual resources (autonomy, collaborative attitude, teacher efficacy) and team resources (team entitativity, psychological safety) foster CPD (i.e., exchange activities, professional collaboration, and constructive conflict). This was investigated in an empirical study including two waves of data collection. In total, 731 teachers completed both questionnaires. Data were analysed using multilevel regression analyses. Results show that, when controlling for CPD in the first wave, two resources (measured in the first wave) significantly predicted all three CPD activities in the second wave: collaborative attitude and outcome interdependence (i.e., one of the features of team entitativity). Hence, in the context of teachers, openness towards collaboration and feeling that the outcomes of the team matter as they influence individual benefits foster CPD. No significant effects were found of autonomy, teacher efficacy, shared goals and cohesion and task interdependence (i.e., the remaining features of team entitativity), and psychological safety.

If a student thinks "I'm not a math person", do teachers notice?

Keywords: Attitudes and beliefs, Mathematics, Mixed-method research, Pre-service teacher education

Presenting Author:Helene Rieche, University of Freiburg, Germany; **Co-Author:**Timo Leuders, University of Education Freiburg, Germany; **Co-Author:**Georg Brunner, University of Education Freiburg, Germany; **Co-Author:**Alexander Renkl, University of Freiburg, Germany

Students' beliefs about whether mathematical abilities are fixed or malleable have a strong impact on motivation, learning, and achievement. Thus, teachers should have conceptual knowledge about students' mathematical beliefs, and skills for intervening sensibly in cases of dysfunctional beliefs. We explored teachers' noticing of such beliefs as a prerequisite for teacher acting. In our study, we used vignettes to determine whether pre-service teachers noticed belief-related problems, and whether they developed useful strategies for dealing with such problems. We analyzed to what extent they referred to

theoretical concepts of teaching and learning. Additionally, we assessed their intuitive theories about mathematical ability. Our findings demonstrate that pre-service teachers' noticing of students' mathematical beliefs is insufficient. The majority of our participants did not notice problematic beliefs, nor did they develop useful strategies for dealing with them. Of those who did, few referred to theoretical concepts of teaching and learning. We further revealed that pre-service teachers' noticing of students' beliefs was positively related to the belief that mathematical abilities are malleable. Our research suggests that teacher education should foster teachers' noticing, explaining and acting when encountering dysfunctional beliefs.

Session S 7

2 September 2017 14:45 - 16:15

Virta - 109

Single Paper

Higher Education, Learning and Instructional Technology

Higher Education - I

Keywords: Assessment methods and tools, Communities of practice, Competencies, E-learning / Online learning, Educational Technology, Goal orientation, Higher education, Learning Technologies, Self-efficacy, Social interaction, Social sciences, Special education, Teacher Professional Development

Interest group: SIG 04 - Higher Education

Chairperson: Eleni Kyza, Cyprus University of Technology, Cyprus

Understanding functionality in Higher Education. Metaresearch across disciplines in the 21st century

Keywords: E-learning / Online learning, Educational Technology, Learning Technologies, Special education

Presenting Author:Giulia Messina Dahlberg, University of Skövde, Sweden; **Co-Author:**Sangeeta Bagga-Gupta, Jönköping University, Sweden

Since the advent of the internet and the connectivity that it entails, digital technologies like personal computers, smartphones, tablets have enabled greater accessibility to educational content through e.g. open educational resources, massive online open courses, or institutionally framed online instructional activities. An emerging interest, in the last two decades, addresses a trend that frames education as potentially open-for-all, including the differently-abled, 'anywhere at anytime'. The study presented in this paper is part of the Swedish Research Council project PAL (www.ju.se/ccd/pal). It explores trends in research illuminating the range and functions of different (digital) technologies deployed in the learning spaces of higher education (HE). Putting the spotlight on research published in journals (2005-2015), this meta-study focuses the ways in which support services, for differently-abled students are studied and accounted for within HE. This meta-study identifies important dimensions in terms of the kinds and nature of support that exist and are wanting in courses where students in need of such support are members. The recent literature frames technology in terms of facilitating access to content, rather than facilitating communication and dialogue in HE learning and instructional contexts. We argue for the need to merge a positivistic approach in the study of technology that primarily focuses on the design, implementation and outcomes of digital technology in educational settings that are understood as being open-for-all, with a humanist perspective. The latter accounts for philosophical, sociocultural and historical positions within which technological representations are strictly bound.

Career Competences at the End of Higher Education: The Role of Structural and Personal Factors

Keywords: Competencies, Goal orientation, Higher education, Self-efficacy

Presenting Author:Ilke Grosemans, KU Leuven, Belgium; **Co-Author:**Liesje Coertjens, Université catholique de Louvain (UCL), Belgium; **Co-Author:**Eva Kyndt, KU Leuven, Belgium

The changing labour market forces students to take their career in their own hands, preferably before leaving higher education. The current study examines the relationship between factors in education and career competences, starting from the Job Demands Control model. In line with the model, it is hypothesised that structural factors in education (autonomy and workload) have a positive effect on career competences. Furthermore, personal factors (self-efficacy and motivation) are included in the model as a mediator between structural factors and career competences. This longitudinal three-wave study included data from 4178 students in their last year of higher education. Results indicate that the five investigated career competences (reflection on qualities, networking, self-profiling, work exploration, and career control) are mainly predicted by personal factors. Self-efficacy relates positively to all career competences. The structural factors do not have a direct effect on the career competences. Lastly, it can be stated that workload influences students' personal factors, leading to small indirect effects on career competences.

Taking a digital leap? University students' experiences of electronic examinations

Keywords: Assessment methods and tools, Educational Technology, Higher education, Social sciences

Presenting Author:Liisa Myyry, University of Helsinki, Finland; **Co-Author:**Anni Rytönen, University of Helsinki, Finland

Assessment in higher education is a multifaceted matter, although conventional assessment method is a written test. Electronic examinations is increasing in popularity in Finnish higher education, and the University of Helsinki is planning on taking a digital leap in its teaching during the coming strategy period. Our study examines social science and law students' experiences of taking closed-book, monitored electronic examinations in an exam room when time to take the exam is

flexible for the students but the place is fixed. In this study we ask: 1) have the examination practices changed while moving from written paper exams to written electronic exams? 2) what advantages and disadvantages the closed book electronic exams in a computer lab have from students' perspective? The results indicate that the monitored but invigilated examination in an exam room do not differ much as an exam experience in terms of preparing, responding and learning from a traditional paper and pen examination in a lecture hall. The biggest differences seem to be in flexibility of taking an exam at a time that suits best for the students, and on the other hand in inconvenience due to the strict rules of exam rooms. The advantages and disadvantages concentrated on the context and practical issues, not learning process of the students. Thus, it seems that flexible but closed-book method do not influence learning as much as open-book examinations. This may be a challenge to development of electronic assessment and in evaluating benefits of the digital leap.

Investigating Networks within the field of Higher Education Institutions

Keywords: Communities of practice, Higher education, Social interaction, Teacher Professional Development

Presenting Author:Tobias Jenert, University of St.Gallen, Switzerland; **Co-Author:**Chloé Meredith, KU LEUVEN, Belgium;

Co-Author:Luci Gommers, University of St.Gallen, Switzerland

Within higher education institutions (HEIs), professional interactions are extremely important for the development and innovation of teaching practices. Roxa and Martensson (2011; 2015) have shown that higher education faculty forms local networks in which they share and develop teaching-related experiences, but that these networks are influenced by, for instance, disciplinary affiliation. However, effective educational practices such as problem-based curricula or cross-disciplinary co-teaching require interactions that reach beyond disciplinary and hierarchical boundaries. The aim of this study is to investigate whether a "managed" network can overcome the network boundaries arising from organizational structures (e.g., discipline and function) and natural social processes that occur in HEIs. Both descriptive and inferential analyses were performed to get an overview of the network and to descriptively analyze possible boundary effects of the different attributes (e.g., type of HEI, function, status, and discipline). Our results illustrate that the investigated managed network succeeded in overcoming some boundaries typical to HEI-contexts such as discipline. However, other social selection processes based on formal features such as the type of HEI and the function one has arose. This study helps us to understand social relations and social selection processes in a managed network with different innovators from the HEI context. By better understanding this kind of networks, we can contribute to optimizing processes like the exchange of knowledge and experience in the field of teaching and learning research and practice.

Session S 8

2 September 2017 14:45 - 16:15

Linna - K103

Single Paper

Developmental Aspects of Instruction

Comprehension of Text and Graphics - F

Keywords: Attitudes and beliefs, Cognitive skills, Comprehension of text and graphics, E-learning / Online learning, Educational Psychology, Experimental studies, Instructional design, Mathematics, Metacognition, Parental involvement in learning, Primary education, Quantitative methods, Reading comprehension, Science education

Interest group: SIG 02 - Comprehension of Text and Graphics

Chairperson: Julia Mendzheritskaya, Goethe-Universität Frankfurt, Germany

Verbal Instruction Effectively Reduces the Consistency Effect in Mathematical Word Problem Solving

Keywords: Comprehension of text and graphics, Educational Psychology, Instructional design, Mathematics

Presenting Author:Björn de Koning, Erasmus University Rotterdam, Netherlands; **Co-Author:**Anton Boonen, Vrije Universiteit Amsterdam & Kenniscentrum Windesheim Zwolle, Netherlands; **Co-Author:**Menno van der Schoot, Vrije Universiteit Amsterdam, Netherlands

In contemporary mathematics education, increasing emphasis is placed on mathematical word problem solving. Mathematical word problems are mathematical exercises that present the problem information as text rather than in the form of mathematical notation. From both educational practice and research, a relatively well-established finding, referred to as the consistency effect, is that more errors are made on word problems in which the relational keyword (e.g., more than, lower than) is *inconsistent* instead of *consistent* with the required arithmetic operation (e.g., addition, subtraction). This study provides the first attempt to reduce this consistency effect using a targeted verbal instruction. Using a pretest-posttest control group design, children solved a set of compare word problems before and after receiving the verbal instruction focusing on the consistency effect. A control group received a control verbal instruction in-between the pre- and posttest. Additionally, we explored potential transfer of the verbal instruction to word problems containing other relational keywords (e.g., larger/smaller than) than those in the verbal instruction (i.e., more/less than). Results showed a significant pretest-to posttest reduction of the consistency effect after the experimental verbal instruction but not after the control verbal instruction. No significant effects were found regarding transfer. Together, this study demonstrates the usefulness of a targeted verbal instruction to reduce the consistency effect, offering a relatively easy way to improve mathematical word problem solving.

Chunking in Chess: Expertise Differences in Eye Movements and Recall Performance

Keywords: Cognitive skills, Comprehension of text and graphics, Experimental studies, Quantitative methods

Presenting Author:Markus Nivala, University of Gothenburg, Sweden; **Co-Author:**Helen Jossberger, University of Regensburg, Germany; **Co-Author:**Dagmar Festner, University of Paderborn, Germany; **Co-Author:**Hans Gruber, University of Regensburg, Germany; **Co-Author:**Christian Harteis, University of Paderborn, Germany

For decades, chess players have been used to examine cognitive processes of pattern recognition and recall of chess patterns. Experts are superior in recalling chess patterns as long as they are confronted with real game positions. This is due to their experience that enables them to build larger chunks. However, most of the chess expertise studies have not investigated the process of acquiring the chess position information. The current study aims at examining whether expertise and chunking process are identifiable via eye-tracking. The participants ($N = 40$) represented four levels of chess skills, laypersons, novice players, intermediate and expert players. The experiment consisted of eight trials. Four of the trials were real middle game positions, four were random positions. The stimuli were shown for 5 seconds each. The participants then completed the recall task using a chess software without time limit. Eye-movements and recall performance were recorded. The recall performance is analysed in terms of accuracy, speed, order of pieces, and latency between the pieces. The eye movement analysis focuses on number and duration of fixations and the correspondence between the recall order and eye movements. The preliminary results confirm some of the findings of past research in terms of recall performance. However, the eye tracking data enables us to examine also the differences in the process of acquiring this information, particularly to identify the application of chunks in memorizing chess patterns. The study contributes to the theoretical discussion of expertise and their superior performance.

Learners' Epistemic Understandings of the Nature of Visual Representations

Keywords: Comprehension of text and graphics, E-learning / Online learning, Metacognition, Science education

Presenting Author:Sarit Barzilai, University of Haifa, Israel; **Co-Author:**Billie Eilam, University of Haifa, Israel

Learners frequently encounter visual information sources that depict phenomena in diverse or even conflicting ways. The aims of this study were to systematically examine how learners explain the reasons for differences between contrasting visual representations (VRs) in order to shed light on learners' understandings of the nature of such representations. Middle-school students ($N = 203$) viewed four pairs of contrasting scientific VRs that depicted the same phenomena in different ways and were asked to explain the reasons for differences between the VRs. Participants provided rich and diverse explanations that were classified in five themes which represent different lenses for viewing the nature of VRs: realist, visual design, informational, pre-constructivist, and constructivist lenses. Relatively few participants expressed realist views of VRs as mirrors of natural phenomena. However, no more than two-thirds of the participants expressed constructivist views that acknowledged the roles of creators' knowledge and perspectives in the production of VRs. Participants' explanations were sensitive to the design and content of the VRs and the differences between them. Particularly, constructivist explanations were more frequent when the VRs offered clearly discrepant information, in contrast to similar or complementary information. Hence, introducing salient discrepancies between VRs might offer a direction for promoting learners' meta-level epistemic understanding of how creators' knowledge and perspectives underlie the design of VRs. The findings of the study expand the understanding of the epistemic dimensions of learners' meta-representational competence and point to challenges on the course to achieving a constructivist epistemic understanding of representation.

Second graders' literacy attitudes: are they related to reading performance or parental involvement?

Keywords: Attitudes and beliefs, Parental involvement in learning, Primary education, Reading comprehension

Presenting Author:Ruth Villalon, University of Cantabria, Spain; **Co-Author:**Ma. Angeles Melero Zabal, Universidad de Cantabria, Spain; **Co-Author:**Belen Izquierdo-Magaldi, University of Cantabria, Spain

Reading comprehension it is not only influenced by individual's cognitive variables. There are also motivational aspects that are important as well as external factors. This research studies the attitudes towards literacy and the feeling of competence as a reader/writer and his relationship with reading achievement and parental involvement of 348 primary education pupils at second grade. Their teachers were informants of family involvement and the degree of students' reading achievement, who also was assessed by a standardized test of reading comprehension. Attitudes and feeling of competence were measured through a questionnaire used in previous literature, which was translated and adapted. The results reveal that pupils obtain very high scores in both attitudes and feelings of competence. In addition, there are gender differences regarding gender attitudes in favor of girls, but do not exist for feeling of competence. Moreover, correlation analysis showed no association between attitudes and reading performance, but we did find a positive correlation between reader feeling of competence and performance when it is estimated by teachers, and also between parental involvement and reading performance. Some educational implications can be drawn from this results.

Session S 9

2 September 2017 14:45 - 16:15

Linna - K110

Single Paper

Instructional Design, Motivational, Social and Affective Processes

Science Education

Keywords: Argumentation, Attitudes and beliefs, Cognitive development, Communities of learners, Conceptual change, Developmental processes, Inquiry learning, Metacognition, Model-based reasoning, Reasoning, Science education, Teaching / instruction

Interest group: SIG 03 - Conceptual Change, SIG 16 - Metacognition

Chairperson: Antonia Scholkmann, University of Hamburg, Germany

Revealing Learners' Paths During Progression: A Conceptual Change Assessments Method

Keywords: Communities of learners, Conceptual change, Inquiry learning, Science education

Presenting Author: François Lombard, University of Geneva, Switzerland; **Co-Author:** Marie Merminod, Université de Genève, Switzerland; **Co-Author:** Vincent Widmer, FPSE, Université de Genève, Switzerland; **Co-Author:** Daniel K. Schneider, University of Geneva, Switzerland

Empirical data on learners' conceptual progression is required in order to identify difficulties in learning, design curricula and learning environments or guide students. In this contribution we present an assessment method for revealing students' conceptual progressions in the context of an inquiry-based teaching design in high school biology classes. This instrument identifies concepts and links expressed in students' successive versions of their productions, and charts them onto a concept map visualizing the learning goal defined by the teacher. Time sequences in which concepts and links appear were measured with a prevalence index counting occurrences of each item across all versions for one topic. Our results offer systematic data to discuss the learners' diverse and often surprising paths towards the learning goal, and challenge the view of learning as a linear, predictable process. However, prevalence indexes, consolidated over 8 cohorts, reveal trends within this variability: some items consistently appear later than others. We briefly suggest possible causes for late-appearing items (cognitive construals, threshold concepts, design weaknesses...) and implications for curricula. We argue for important teaching implications, such as iterative engagement of learners, discussing incomplete understanding, and guidance in recognizing gaps and refining models. We finally discuss limits and perspectives.

Evidence-based model evaluation: Students' interpretation of multiple pieces of evidence

Keywords: Argumentation, Inquiry learning, Science education, Model-based reasoning

Presenting Author: Hebbah El-Moslimany, Rutgers University, Graduate School of Education, United States; **Co-Author:** Na'ama Av-Shalom, Rutgers University Graduate School of Education, United States; **Co-Author:** Clark Chinn, Rutgers University, United States; **Co-Author:** Ravit Duncan, Rutgers University, United States

Model evaluation is a core scientific practice, which is supported by the comprehension and interpretation of evidence. The ability to recognize and use evidence that supports a specific model is actually critical to making good theory choices, yet little is known about whether students use such information and whether instruction improves its use. For this reason, we examined students' use of evidence through a discussion of the results of a written assessment task that occurred before and after the implementation of a life science model based inquiry curriculum with 7th grade students. The curriculum spanned the course of several months and included creating, evaluating, and revising models using a wide variety of evidence in form and quality. The assessment task asked students to choose between two comparable, competing models and write an argument in support of their chosen model. Five pieces of evidence were provided for this task and varied in whether they support both models (nondiscriminatory) or support one and not the other (discriminatory). We examined students' use of evidence in relation to three key aspects of evidence-based model evaluation: (a) comprehending evidence correctly, (b) interpreting evidence in respect to both models, and (c) how students deal with discriminatory evidence. Our findings suggest that students improved in attending to and understanding key points of the evidence, relating evidence to models, but still have trouble understanding the significance of discriminatory evidence.

The development of scientific thinking from kindergarten to elementary school

Keywords: Cognitive development, Metacognition, Reasoning, Science education

Presenting Author: Susanne Koerber, University of Education Freiburg, Germany; **Co-Author:** Christopher Osterhaus, University of Munich, Germany

How predictive are kindergarteners' competencies in scientific thinking for elementary school? And how important is children's epistemological understanding for the emergence of experimentation skills? We investigated these two questions in a longitudinal study involving 64 kindergartners (6-year-olds) who were tested at two times of measurement (kindergarten, T1, and at the end of grade 1, T2) for their understanding of the nature of science (epistemological understanding), their experimentation skills, and their abilities in data interpretation using a 30-item instrument that was administered verbally. In addition, children's language abilities were assessed as a control variable. The results revealed substantial competencies in kindergarten in all three components of scientific thinking. Significant intraindividual development from kindergarten to grade 1 was observed for NOS (from 43 to 57%) and for experimentation skills (from 51 to 59%), not however for data interpretation. Significant correlations between nature of science understanding and experimentation skills, and between experimentation and data interpretation emerged at both times of measurement, suggesting a close relation between children's epistemological understanding and their mastery of inquiry strategies. NOS and language abilities at T1 significantly predicted experimentation at T2; there was however no significant influence of experimentation at T1 on experimentation and T2. This result clearly supports the hypothesis that children's

epistemological understanding plays an important role in the emergence of broad scientific thinking skills, and it suggests that children's epistemological understanding and their NOS may be primary abilities to target when trying to foster scientific-thinking skills in young children.

Students' epistemic beliefs in Sweden and Germany: Correlations with classroom characteristics

Keywords: Attitudes and beliefs, Developmental processes, Science education, Teaching / instruction

Presenting Author:Andrea Bernholt, Leibniz Institute for Science and Mathematics Education (IPN), Germany; **Co-Author:**Mikael Winberg, Umeå University, Sweden; **Co-Author:**Maria Lindfors, Umeå University, Sweden

The study aims at describing students' epistemic beliefs over school years 5-11, investigating differences between Sweden and Germany regarding the 'trajectories' of epistemic beliefs over the grades, and if classroom factors can explain these differences. A cross-sectional survey, covering grades 5-11, was distributed to 1501 students in Sweden and 2839 in Germany to assess their epistemic beliefs and perceived classroom environment in chemistry. Factor analysis revealed four valid constructs for students' epistemic beliefs and perceived classroom environment, respectively. A common trend for both countries was an increasing sophistication over grades as to the Certainty of knowledge and an emphasis in all grades on the need for evidence from several sources to make claims of knowing (Justification). Trust in authorities decreased over the grades in Germany, while Swedish students showed similar levels in all grades. Beliefs in dynamic and changing knowledge was strong in both countries, with an increasing trend in Germany while stable in Sweden. Significant correlations between epistemic beliefs and perceived classroom environment were found in both countries, but stronger in Sweden than Germany.

Session S 10

2 September 2017 14:45 - 16:15

Pinni B - B3116

Single Paper

Instructional Design, Learning and Instructional Technology

Instructional Design - E

Keywords: Achievement, Educational Psychology, Educational Technology, Experimental studies, Higher education, Instructional design, Learning Technologies, Out-of-school learning, Problem solving, Student learning, Teaching / instruction

Interest group: SIG 06 - Instructional Design

Chairperson: Carmela Aprea, Friedrich Schiller University Jena, Germany

Providing Written or Oral Explanations? Modality Effects of Explaining on Students' Learning

Keywords: Educational Psychology, Experimental studies, Higher education, Instructional design

Presenting Author:Andreas Lachner, University of Tübingen, Germany; **Co-Author:**Matthias Nückles, University of Freiburg, Germany

Learning by explaining to (fictitious others) has shown to be an effective instructional method to support students' generative learning. In this study, we investigated differential effects of the modality of explaining (written versus oral) on students' quality of explanations and learning. Forty-eight students worked on a hyper-text about combustion engines. Afterwards, they were asked to explain the learning content, either orally or in written format. Findings indicated that providing written explanations was more beneficial for acquiring conceptual knowledge as compared to providing oral explanations, at least for low prior knowledge students, as writing triggered students to better organize the content of the explanations. In contrast, generating oral explanations triggered students' elaborative processes to a more pronounced extent than written explanations which was more beneficial to attaining transferable knowledge. Thus, we can conclude that the modality of explaining plays a critical role in learning-by-explaining-approaches to differentially support students' knowledge acquisition.

Learning by tracing: A cognitive load approach

Keywords: Achievement, Educational Psychology, Experimental studies, Instructional design

Presenting Author:Paul Ginns, University of Sydney, Australia; **Co-Author:**Amy Smith, The University of Sydney, Australia; **Co-Author:**Natasha Marsh, The University of Sydney, Australia

Gestures using the index finger to point and trace have been found across a variety of studies to benefit learning. Macken and Ginns (2014) found tracing enhanced performance on tests of terminology and comprehension following study of expository text and diagrams about the human heart, but process hypotheses concerning different sources of cognitive load were not supported. The two experiments presented here tested alternative methods for measuring cognitive load. In Study 1, 30 university students were instructed to gesture or not gesture while learning from materials about the structure and function of the human heart; single-item ratings of difficulty were used after each page of instruction to measure cognitive load. Participants in the gesture group performed significantly better than the non-gesture group on terminology and comprehension tests, but there was no significant difference in the average difficulty rating between the two groups. In Study 2 (n = 30), using the same materials, participants rated cognitive load both after each page, and following the instructional phase using a new multi-item instrument measuring both intrinsic and extraneous cognitive load. The

experimental conditions did not differ in average difficulty ratings or in test performance, but a reliable difference favouring the tracing condition was found on post-instruction ratings of extraneous cognitive load. Taken together, the results of the two experiments add to the evidence base on tracing to learn, while also demonstrating the strengths and limitations of alternative measures of cognitive load.

The Role of Gender and Spatial Ability in Enhancing Static Pictures with Embodied Cognition

Keywords: Educational Psychology, Educational Technology, Instructional design, Learning Technologies

Presenting Author:Paul Ayres, University of New South Wales, Australia; **Co-Author:**Nadine Marcus, The University of New South Wales, Australia; **Co-Author:**Francilia Gomes, The University of New South Wales, Australia

This study investigated whether instructional static pictures could be enhanced through the embodied cognition effects of gesturing and the observation of hands when learning to tie two knots. 32 male and 32 female university students were randomly assigned to one of four conditions (Gesturing with hands present in the pictures, Gesturing with no-hands present in the pictures, No-gesturing with hands present in the pictures, No-gesturing with no-hands present in the pictures). Participants watched a static presentation on a computer screen of the key frames for the first knot (Trucker's Hitch) twice and were then required to construct the knot with a length of string. This process was then repeated for the second knot (Bowline). The spatial ability of each participant was measured using the Mental Rotations Test (MRT). Results varied according to differences in MRT. For lower MRT scores, gesturing was an advantage, whereas depicting static hands was a disadvantage. A number of interactions suggested that gesturing was a more robust strategy overall for females than males. For males the impact of gesturing depended on whether hands were visible or not. It was concluded that for this domain static presentations can be enhanced by gesturing, but their effectiveness is moderated by gender, spatial ability, and the depiction of hands.

Investigating the Impact of Time of Instruction on Learning in an Out-of-School Lab

Keywords: Out-of-school learning, Problem solving, Student learning, Teaching / instruction

Presenting Author:Valentina Nachtigall, Ruhr University Bochum, Germany; **Co-Author:**Nikol Rummel, Ruhr University Bochum, Institute of Educational Research, Germany; **Co-Author:**Katja Serova, Ruhr University Bochum, Germany

The current study builds on a large body of research demonstrating the effectiveness of problem solving followed by instruction (PS-I) on learning *in school*. In contrast, so far little is known about effects of time of instruction in *out-of-school* learning. Out-of-school learning settings typically offer opportunities for inquiry-based learning that feature minimal or even no instruction. But research on out-of-school fieldtrips shows that including instruction in these out-of-school learning settings can increase their impact on learning. Also research on inquiry-based learning more generally illustrates that unguided or minimally guided problem solving often does not promote learning. The question arises where the instruction should best be placed: before or after students' independent problem-solving? To investigate impact of time of instruction in out-of-school learning, we conducted a quasi-experimental study with 212 10th graders in an out-of-school lab at a large German university. We compared two experimental conditions: problem solving prior to instruction (PS-I) and instruction prior to problem solving (I-PS). We hypothesized that the PS-I condition would outperform the I-PS condition on a posttest. However, against our hypothesis, our findings show that I-PS students outperformed PS-I students. The results are discussed in light of principles put forward by Loibl, Roll, and Rummel (2016) concerning when and how problem solving followed by instruction may support learning. In our discussion we consider the role that the prior knowledge as well as the intrinsic motivation of our participants may have played.

Session S 11

2 September 2017 14:45 - 16:15

Pinni B - B1097

Single Paper

Assessment and Evaluation, Higher Education, Teaching and Teacher Education

Assessment and Evaluation - C

Keywords: Assessment methods and tools, Competencies, Higher education, Metacognition, Peer interaction, Quantitative methods, Self-regulation, Social aspects of learning and teaching, Social interaction, Special education, Teaching / instruction, Vocational education

Interest group: SIG 01 - Assessment and Evaluation

Chairperson: Claude Mueller, Zurich University of Applied Sciences, Switzerland

Continuous and Multidimensional Representation of a Child's Social Status within Its Peer Group

Keywords: Assessment methods and tools, Quantitative methods, Social interaction, Special education

Presenting Author:Pawel R. Kulawiak, University of Potsdam, Germany; **Co-Author:**Juergen Wilbert, University of Potsdam, Germany

Sociometric methods are widely used in educational research to measure positive and negative links between peers within a group. Sociometric data reflect a child's amount of likeability/dislikeability within its peer group. Sociometric information should be considered when describing a child's *social status* within its peer group, like this is done with *social status classification methods*. With these procedures children are usually classified into five categorical groups *popular, rejected,*

neglected, controversial, average). The social status group affiliation constitutes an important predictor for children's behavioral outcomes. It is essential to overcome shortcomings which accompany group assignments in the current classification system. This can be achieved by replacing the arbitrary group assignment rules by a method generating more consistent social status information. To characterize a child's social status within its peer group more precisely, the social status information should be continuous rather than categorical. Instead of a distinct classification, the social status information should represent the multidimensional nature of a child's social status. To obtain a continuous (non-categorical) as well as a multidimensional representation of a child's social status within its peer group we will introduce a new approach for defining this kind of information. We will compare this new approach with a classical social status classification procedure and highlight advantages and disadvantages of both methods (also in terms of predictive ability in detecting externalizing child behavior).

The Assessment of Collaborative Problem Solving Skills – Associations With the Big Five

Keywords: Assessment methods and tools, Competencies, Higher education, Vocational education

Presenting Author: Maida Mustafic, University of Luxembourg, Luxembourg; **Co-Author:** Katharina Herborn, University of Luxembourg, Luxembourg; **Co-Author:** Nick Schweitzer, University of Luxembourg, Luxembourg; **Co-Author:** Samuel Greiff, University of Luxembourg, Luxembourg

The assessment of collaborative problem solving skills was incorporated in large-scale OECD PISA studies in which collaborative problem solving skills of thousands of students were assessed across over 50 countries. To validate the human-to-agent (H-A) PISA 2015 collaborative problem solving assessment approach, in the current study, we developed a computer-based human-to-human (H-H) collaborative problem solving assessment instrument that was similar to the H-A tasks used in PISA with the exception that one agent was replaced by a real student. In this presentation, we will introduce the two collaborative problem-solving instruments and their theoretical foundation. We will also present data on the external validity of the H-A instrument, i.e., the association of collaborative problem solving skills with the big five personality traits. Our concrete hypothesis was that students' collaborative problem solving skills would be more likely associated with openness to experience, agreeableness, and extraversion, and less likely with conscientiousness and neuroticism. 777 students from 36 classes from grade 9 and 10 in Germany and in Luxembourg from different grammar schools participated in the study. Structural equation models revealed that CPS was related to openness to experience and agreeableness and was not significantly related to the other personality traits.

With this study, we confirmed that external criteria such as personality are associated with the PISA 2015 assessed collaborative problem solving skills. We will discuss to which degree the H-A design resembled realistic human-to-human collaboration and outline the future challenges as well as potentials of computer-based collaborative problem skill assessments in educational settings.

Promoting Pedagogical Effectiveness Through Self-Assessment and Peer-Instruction: an Evaluation

Keywords: Metacognition, Peer interaction, Quantitative methods, Self-regulation

Presenting Author: Fabio Riccardo Arico, University of East Anglia, United Kingdom; **Co-Author:** Eva Susanne Fritzsche, Department of Teacher Education, Germany

This paper details the principles of an active learning teaching methodology aimed at fostering the formation of metacognitive skills along with learning. We combine Self-assessment and Peer-instruction with the aim to mutually re-enforce the positive effects generated by both pedagogies. Self-assessment and Peer-instruction are blended within a teaching algorithm that alternates a class discussion and collaborative learning component, with a reflection and self-regulation component. Our teaching approach makes intense use of Student Response Systems (SRS) to facilitate both components, and to support an easy implementation in large class environments. Does the combination of Self-Assessment and Peer-Instruction support student learning and students' meta-cognitive skills? We analyse data collected through SRS technology of $N=250$ students who participated in multiple active-learning sessions. Our preliminary results at class-level confirm the presence of a synergy between Self-assessment and Peer-instruction, as we demonstrate that: (i) students develop good self-assessment skills (positive association of attainment and performance, Fisher Exact tests, $p < 0.05$), and (ii) experience learning gains through Peer-instruction (regression analysis, $p\text{-value} < 0.05$). Our results will feed into an appraisal of pedagogical designs that can simultaneously address the formation of metacognitive skills along with learning.

Beyond means: Investigating classroom learning environments through consensus in student surveys

Keywords: Assessment methods and tools, Quantitative methods, Social aspects of learning and teaching, Teaching / instruction

Presenting Author: Jonathan Schweig, RAND Corporation, United States; **Co-Author:** Jose Felipe Martinez, University of California, Los Angeles, United States; **Co-Author:** Meredith Langi, University of California, Los Angeles, United States

Student ratings are a critical component in current policy efforts to assess and improve teaching. Typically, information is collected from student using questionnaires, and inferences about teachers or classrooms then based on aggregated student responses. Considerable attention has been paid to the reliability and validity of these aggregates as predictors of student achievement, or indicators of teacher performance or classroom practice. However, much less attention has been paid to what within-classroom consensus in student ratings may reveal about the classroom environment. This study uses data from hundreds of classrooms in the Measures of Effective Teaching Project (MET) to investigate how within-classroom

consensus in student survey reports can enhance our understanding of features of instructional practice, and of learning environments more generally. The results suggest that consensus is related to student achievement as well as other measures of teacher effectiveness, to questioning strategies used by teachers, and to the demographic heterogeneity of students. The possibility of instructional subclimates and the implications for the use of overall averages in teacher appraisal are discussed, and directions for future research are proposed.

Session S 12

2 September 2017 14:45 - 16:15

Main Building D - D11

Single Paper

Cognitive Science, Instructional Design, Learning and Instructional Technology

Comprehension of Text and Graphics - I

Keywords: Assessment methods and tools, Cognitive skills, Comprehension of text and graphics, Experimental studies, Instructional design, Mathematics, Multimedia learning, Primary education, Problem solving, Reading comprehension

Interest group: SIG 02 - Comprehension of Text and Graphics

Chairperson: Inga Glogger-Frey, University of Freiburg, Germany

Inside the clockwork – a closer look on students constitutional difficulties with word problems

Keywords: Comprehension of text and graphics, Mathematics, Primary education, Problem solving

Presenting Author: Verena Dresen, Institute of Psychology, UMIT, Health & Life Sciences University, Austria; **Co-**

Author: Silvia Pixner, Institute of Psychology, UMIT, Health & Life Sciences University, Austria; **Co-Author:** Erik Danay, Institute for Psychology, UMIT, Health & Life Sciences University, Austria

In primary education, mathematical word problems are one of the most typical type of puzzles in math class. It is sensible to assume that students take different approaches to solve such problems, which in turn could account for different errors. While prior studies investigated single aspects of mathematical word problems, this study sets out to take a closer look on the defining features of word problems. To this end we tested 240 children of the 2nd-4th class elementary with items varying regarding the mathematical level: 1. operation (addition and subtraction), 2. combination (all together vs. one has) and 3. sequence of information, as well as regarding the language level: wording congruent (more ~ plus, less ~ minus) or incongruent (more ~ minus, less ~ plus) with operation, depending on point of reference. Data analysis will be two-fold. First we will look at what parameters influence correct solving of a problem, regardless of possible errors, second we will look specifically at the errors made by classifying them categorically and then looking for possible relationships, first within the clockwork of word problems themselves and second in the children.

Four reading ability tests as predictors of multimedia document comprehension

Keywords: Comprehension of text and graphics, Experimental studies, Reading comprehension, Multimedia learning

Presenting Author: Juliette Désiron, University of Geneva, Switzerland; **Co-Author:** Mireille Betrancourt, University of Geneva, Switzerland; **Co-Author:** Erica de Vries, Université Grenoble Alpes, France

Although research on learning from multimedia documents acknowledges the importance of learners' text comprehension ability, there is scarce investigation on how students' reading abilities affect learning outcomes. In this study, pre-vocational students (N = 54) took four standard reading ability tests (vocabulary, fluency, inference and general literacy) and learned about the evolution of cocoa with a 6-page text-picture document in one of two versions (high vs. low cohesion level). Then they completed a post-test questionnaire for three levels of comprehension (text-based, local bridging inference, global bridging inference). Cohesion had no impact on any comprehension level and therefore the results for the two conditions were collapsed. Correlation analyses at the three outcomes levels showed significant correlations for all test scores except fluency which was removed from further analyses. A multiple multivariate regression analysis showed that the model with the three test scores significantly predicted comprehension performance but that only vocabulary scores significantly added to the model at the three levels of comprehension.

Young Students' Reading of Partly Contradictory Texts: A Think-Aloud Study

Keywords: Cognitive skills, Comprehension of text and graphics, Primary education, Reading comprehension

Presenting Author: Wenke Mork Rogne, Volda University College, Norway; **Co-Author:** Helge Strømsø, University of Oslo, Norway

Young Students' Reading of Partly Contradictory Texts: A Think-Aloud Study Abstract In the present think-aloud study we investigated how thirty 7th-grade students read a set of partly contradictory texts on the course of events associated with a bicycle accident. Students' text processing strategies were explored, and their relationship to students' understanding of the contradictions and memory for important information were analyzed. Results showed that the majority of episodes of text processing were elaboration strategies, whereas evaluations and paraphrases were the two other major categories of strategies. Both intertextual and intratextual elaboration and evaluation strategies occurred in the verbal protocols. Elaboration strategies turned out as a positive predictor of students' memory for important information, while paraphrasing predicted students' detection of contradictions negatively. The results indicate that strategic processing of multiple texts improves young students' memory for central text elements, and that more passive processing decreases attention to

contradictions. In order to understand the story presented in the set of texts, students need to note both important information and potential contradictions. This is also often the case when students are exposed to multiple texts in and outside school, and teachers need to attend to how students work with such textual resources.

Adjusting Task Difficulty to Control Learner's Intrinsic Cognitive Load

Keywords: Assessment methods and tools, Comprehension of text and graphics, Experimental studies, Instructional design

Presenting Author:Tina Seufert, University of Ulm, Germany; **Co-Author:**Melina Klepsch, Ulm University, Germany; **Co-Author:**Julia Westphal, University of Ulm, Germany

A lot of studies exists on varying extraneous cognitive load and thereby testing different multimedia design principles. Studies on germane and especially on intrinsic cognitive load variations, are less popular. Most intrinsic load studies use a categorization of learners into novices and experts to vary intrinsic load, very often in relation to interactions with different treatment effects. In all these cases intrinsic load has not been levelled to learners skills individually. This may be due to the problem of producing treatment material, that adapts to the learner's skills and prior knowledge. Therefore, in three experimental studies with learning and testing material originally coming from flow-research, we tested intrinsic load variations by adapting the demands of the task to the learner's skills and prior knowledge. In three studies different domains (mathematics, game-play, general knowledge) are addressed and the learning and testing material adjusts the level of difficulty to the participant's skill level. Hence, three experimental groups are generated: (1) boredom (skills exceeding demands), (2) fit (skills matching demands), and (3) overload (demands exceed skills). Preliminary results with n=58 students and the mathematical learning material show promising results that automatically adjusting the level of difficulty to the participant's skill level results in the expected level of intrinsic cognitive load, measured by a subjective differentiated questionnaire of cognitive load.

Session S 13

2 September 2017 14:45 - 16:15

Main Building A - A2A

Single Paper

Cognitive Science, Instructional Design, Teaching and Teacher Education

Writing, Literacy and Language - B

Keywords: Attitudes and beliefs, Computer-assisted learning, Educational Psychology, Language (L1/Standard Language), Metacognition, Peer interaction, Secondary education, Self-efficacy, Teaching / instruction, Video analysis, Writing / Literacy

Interest group: SIG 12 - Writing

Chairperson: Carla Van Boxtel, University of Amsterdam, Netherlands

Fostering Personal and Social Insights in the Literature Classroom: A Review of Intervention Studies

Keywords: Attitudes and beliefs, Language (L1/Standard Language), Secondary education, Teaching / instruction

Presenting Author:Marloes Schrijvers, University of Amsterdam, Netherlands; **Co-Author:**Tanja Janssen, Universiteit van Amsterdam, Netherlands; **Co-Author:**Olivia Fialho, Utrecht University, Netherlands; **Co-Author:**Gert Rijlaarsdam, University of Amsterdam, Netherlands

The purpose of this review was to identify a set of educational design principles that may inform the design of literature education fostering adolescent students' personal and social insights. Sixteen intervention studies met our inclusion criteria. Quality assessment of these studies was conducted using a framework of eight quality categories, e.g., descriptions of and rationales for experimental and control conditions, instructor effects, implementation fidelity and reliability of measures. From an analysis of the studies we deduced three general design principles. To foster personal and social insights, effective literature instruction should (1) promote dialogic learning in a safe classroom context, in which students feel free to explore and share their authentic, affective and possibly contradictory responses; (2) use fictional texts that stylistically and thematically stimulate personal and social insights, e.g., including deviations from conventional language use while addressing moral or social issues; and (3) instruct students to focus on personal experiences triggered by texts or learning activities, which will help them to connect their reading to self-aspects and to their own lives. We present a hypothetical model of how these design principles may ideally be implemented in the literature classroom.

Self-Efficacy for Metalinguistics and Its Relation to Writing Quality: Exploring the Translation Box

Keywords: Educational Psychology, Metacognition, Self-efficacy, Writing / Literacy

Presenting Author:Michael Dempsey, Boston University, United States

This study developed a metalinguistic self-efficacy scale designed to measure participants' confidence for engaging in metalinguistic tasks. More generally, this study was meant to better understand and describe the activity that occurs during the translation phase of the writing process. Participants were 115 undergraduate students. They completed the Metalinguistic Self-Efficacy Scale, read a news story, and wrote a professional letter in response to it. The self-efficacy scale represents the independent measure. There were two dependent measures, self-reported average grade on college papers, and a rating on the letter they wrote, specifically their demonstrated mastery of metalinguistic tasks. These three

measures formed the core of this correlational study. The means for all items on the self-efficacy scale tended to be high. Factor analysis yielded two factors, which were labeled Ideation and Conventions, though more were originally hypothesized based on metalinguistic theory (Gombert, 1992). The two factors were highly correlated, the dependent variables correlated as well. Ideation and Conventions correlated with the dependent variables as expected with one notable exception: Ideation did not correlate significantly with ratings. This study suggests that this population of writers can identify personal self-efficacy for metalinguistic task abilities generally. It also suggests that writers engage interactively with a range of metalinguistic dimensions as they write.

Learning to write: a recursive process

Keywords: Computer-assisted learning, Peer interaction, Secondary education, Writing / Literacy

Presenting Author: Klaske Elving, Utrecht University, Netherlands; **Co-Author:** Gert Rijlaarsdam, University of Amsterdam, Netherlands; **Co-Author:** Huub Van den Bergh, Universiteit Utrecht, Netherlands

ABSTRACT (173 words) *In this intervention study, we tested the effect of a newly developed interactive online writing course for Dutch students in the upper grades of secondary education. The course aimed to enhance students' overall writing performance by offering them a general, recursive writing strategy. The first assumption was that diminishing the cognitive overload that goes with writing would create 'space' for learning to write, and therefore would lead to higher text quality. The second assumption was that offering two evidence based pedagogies, observational learning and peer interaction, would increase students' awareness of their writing processes, and therefore would lead to higher text quality. The intervention was implemented by two teachers in three classrooms of students aged 15 to 18 (N=89), using a switching replication design with two groups and three measurement occasions. Results show that students' writing performance significantly improved in both groups due to the writing course. These results are so promising that a follow up study on a larger scale already has started.*

What opportunities do students have to engage in writing during their language arts lessons?

Keywords: Language (L1/Standard Language), Teaching / instruction, Video analysis, Writing / Literacy

Presenting Author: Marte Blikstad-Balas, University of Oslo, Norway; **Co-Author:** Kirsti Klette, University of Oslo, Norway; **Co-Author:** Astrid Roe, University of Oslo, Faculty of Education, Norway

In order for students to develop as writers, they must experience a supportive writing environment and be given time to engage in writing for a sustained period of time (eg. Graham, Harris & Chambers, 2016). However, we know little about what writing opportunities students actually have embedded in their lessons. The present study draws on 180 video-recorded language arts lessons across 46 secondary classrooms in Norway. By analyzing these recordings using a language arts specific manual The Protocol for Language Arts Teaching Observation (PLATO), our study assesses to what degree students are provided with opportunities to engage in writing, and what kind of writing this time is spent on. A key finding is that in 85% of the events in our material, there is no opportunity to write for more than a short period of time. In line with other research, we find that many of the writing assignments are short and fragmented – that is, they are not followed up or developed further. However, our material also provides detailed insight into how some teachers include writing opportunities that are embedded in a lesson, with attention to specific issues of writing craft. These events provide powerful examples of successful writing instruction.

Session S 14

2 September 2017 14:45 - 16:15

Main Building A - A05

Single Paper

Learning and Special Education, Teaching and Teacher Education

Special Educational Needs and Teacher Professional Development

Keywords: Learning and developmental difficulties, Primary education, Quantitative methods, Self-efficacy, Social aspects of learning and teaching, Special education, Teacher Effectiveness, Teacher Professional Development

Interest group: SIG 15 - Special Educational Needs

Chairperson: Katja Scharenberg, University of Education Freiburg, Germany

Student-specific teachers' self-efficacy related to students' special educational needs

Keywords: Primary education, Quantitative methods, Self-efficacy, Teacher Professional Development

Presenting Author: Susanne Schwab, University of Wuppertal, Germany

This study aims to show the importance for researchers to explicitly identify student-specific teacher self-efficacy to interpret teachers' self-efficacy regarding the implementation of inclusive education. Data from regular teachers and special needs teachers of about 500 fourth-grade students from 20-30 inclusive classes in Styria (Austria) will be analyzed. Teachers' sense of self-efficacy towards individual students was assessed with a German four-item short version of an adapted version of the Tschannen-Moran and Woolfolk Hoy's (2001) Teachers' Sense of Efficacy Scale (Zee, Koomen, Jellesmaa, Geerlings, & de Jong, 2016). Preliminary results illustrate that there is a relative high student-specific variance in teachers' student-specific teachers' self-efficacy. This underlines the importance of assessing student-specific teacher self-efficacy instead of general teacher self-efficacy. The preliminary data further show that self-efficacy towards students

with special educational needs (SEN) is lower than towards students without SEN. As not all data are available yet (data collection and entry will be finished by the end of this year) further results of multilevel-analysis will be presented and discussed at the conference.

Self-Efficacy beliefs as predictor to quit the teacher training?

Keywords: Primary education, Quantitative methods, Self-efficacy, Teacher Professional Development

Presenting Author: Petra Hecht, Pädagogische Hochschule Vorarlberg, Austria; **Co-Author:** Corinna Koschmieder, University of Graz, Austria; **Co-Author:** Georg Krammer, University of Teacher Education Styria, Austria

This presentation focuses on determinants causing the intention of teacher students to quit their teacher training. Studies addressing pre-service teachers' intention to quit at early stages of teacher training are still sparse. Furthermore, they do not address pre-experiences of teaching as influencing factor, although master experiences are conceptualized as a main source of self-efficacy beliefs in the social cognitive theory (Bandura, 1997). We therefore aim to evaluate the intention of teacher students to quit within a theoretical framework building on current influential models following expectancy-value theories according to the theory of planned behaviour (Ajzen, 1991) and self-efficacy theory (Bandura, 1997).

The data collection was embedded in a reorganization of teacher training education in Austria over five years - at least one year more than initially planned. This makes Austrian teacher training Universities and Colleges highly interested in acquiring the most adapted student to become teachers. We focus on data (N= 939) representing motivational and belief factors (Watt & Richardson, 2007), collected before entering the teacher training and half a year later.

Analyses show that teacher training self-efficacy beliefs (Schulte, K., 2008) contribute significantly in explaining variances of the intention to quit teacher training. However, there was no significant contribution from general teacher self-efficacy beliefs (Schwarzer & Schmitz, 1999). Further analysis – multi-group means and covariance structure analysis – were then carried out to compare students with pre-experiences in teaching to students without such pre-experiences. The differences found will be discussed in the proposed theoretical framework, and allow a better understanding of why students quit the teacher education training course.

The effect of class teachers' behavior management self-efficacy on classroom behavioral climate

Keywords: Quantitative methods, Self-efficacy, Teacher Effectiveness, Teacher Professional Development

Presenting Author: Olli-Pekka Malinen, Niilo Mäki Institute, Finland; **Co-Author:** Hannu Savolainen, University of Joensuu, Finland; **Co-Author:** Vesa Närhi, Niilo Mäki Institute, Finland

One of the most significant shortcomings in the existing teacher efficacy research has been the lack of studies investigating the connection between teacher efficacy and student outcomes. In addition, the few existing studies have significant weaknesses in their research design. The aim of this study is to fill this gap by studying the effect class teachers' behavior management self-efficacy on classroom behavioral climate with a longitudinal dataset the includes responses from 666 students in 46 Finnish primary school classes, and 46 class teachers of these same classes. The initial results of a two-level cross-lagged panel model point to the direction that class-teachers' behavior management self-efficacy may indeed predict student evaluation of classroom behavioral climate, but not vice versa. Nevertheless due to the small sample size in between-level, the standardized beta coefficient did not yet meet the criteria of statistical significance. Regardless of this limitation this study can be considered as an initial step to answer to the questions that to date has remained largely unanswered: Is higher teacher self-efficacy better also for the students?

Analysing challenges to improve support for students on the autism spectrum in inclusive schools

Keywords: Learning and developmental difficulties, Social aspects of learning and teaching, Special education, Teacher Professional Development

Presenting Author: Andreas Eckert, University of Applied Sciences of Special Needs Education, Switzerland; **Co-Author:** Carla Canonica, Interkantonale Hochschule für Heilpädagogik Zürich, Switzerland; **Co-Author:** Karolin Gruber, Ludwig-Maximilians-Universität (LMU) München, Germany; **Co-Author:** Reinhard Markowetz, Ludwig-Maximilians-Universität (LMU) München, Germany

In inclusive school settings general and special education teachers and teaching assistants are often faced with major challenges when teaching students on the autism spectrum. Empirical research investigating the professional management of this type of challenging behaviour in the classroom is needed, as the majority of research in this area is based on single case studies (Machalicek et al. 2007, Parsons et al. 2011).

First, we present and discuss the findings of an online survey of general and special education teachers (N=213), which provides information regarding the challenging situations in teaching students on the autism spectrum arising in their educational practice. In a second step, we present a framework model that intends to classify challenges and to help identify possible areas of action.

Session S 15

2 September 2017 14:45 - 16:15

Main Building A - A08

Single Paper

Cognitive Science

Early Childhood Education and Achievement

Keywords: Achievement, Cognitive skills, Early childhood education, Psychometrics, Self-regulation

Interest group: SIG 05 - Learning and Development in Early Childhood

Chairperson: Daniela Raccanello, University of Verona, Italy

Behavioral Self-Regulation and Academic Achievement in Young Children in France

Keywords: Achievement, Early childhood education, Psychometrics, Self-regulation

Presenting Author: Blandine Hubert, University of Nantes, France; **Co-Author:** Megan McClelland, Oregon State University, United States

Several recent studies in the United States and abroad (i.e., Asia and Europe) have demonstrated that children's behavioral self-regulation, (which includes the cognitive processes of inhibitory control, working memory, attentional control) significantly predicts their academic achievement. The current study investigated the psychometric properties of a measure of behavioral self-regulation called the Head-Toes-Knees-Shoulders-Revised (HTKS-R) in France by assessing convergent validity, including relations to behavioral self-regulation assessed by parents, learning-related skills assessed by teachers and observational tasks, and predictive validity to academic achievement. 114 children from preschool and prekindergarten (Mage = 50.23 months, SD = 6.37 months) were followed from the fall to the spring of the school year in France. The results support the convergent validity of the HTKS-R task and indicate that HTKS-R scores significantly predicted literacy and numeracy achievement concurrently in the fall and spring of the school year. In addition, the HTKS-R was the only measure to significantly predict academic achievement after controlling for the other behavioral self-regulation measures. Results suggest that promoting strong behavioral self-regulation in young French children could be beneficial for their academic achievement.

The Influence of Executive Functioning on Academic Achievement among Elementary School Students

Keywords: Achievement, Cognitive skills, Early childhood education, Self-regulation

Presenting Author: Fitim Uka, University of Freiburg, Germany; **Co-Author:** Antje von Suchodoletz, New York University Abu Dhabi, United Arab Emirates

There is a strong body of research supporting the relationship between executive functions (EF) and academic achievement. However, most research focused on the early years and on adolescence while less is known about how EF components influence academic achievement throughout middle childhood. Addressing this gap in the literature, the study investigated associations between components of EF (e.g., attention shifting, inhibitory control, working memory) and Grade Point Average (GPA) among first, third and fifth graders. In total, 298 children (51.5% male) from elementary schools in Kosovo participated. Students completed a battery of EF tasks, including Dimensional Change Sorting Task (Zelazo et al., 2003), Go/No Go task (Garavan, Ross, & Stein, 2000) and Working Memory test (Petermann & Petermann, 2011). To assess children's intelligence, we used Culture Fair Test (CFT 20-R; Weiß, 2006). In addition, the GPA was calculated for each child at the end of the academic year. Regression analyses showed that each component of EF significantly predicted GPA after controlling for intelligence. Also, results showed that there are no significant differences across groups with regard to slopes and intercepts for working memory, attention shifting and inhibitory control on GPA. The results add to the literature on the importance of EF for academic achievement. Implications for the development of strategies to support EF among elementary school students will be discussed.

Developmental Pathways to Reading and Math: the Role of Attentional and Behavioral Control

Keywords: Achievement, Cognitive skills, Early childhood education, Self-regulation

Presenting Author: Dieuwert ten Braak, University of Stavanger, Norway; **Co-Author:** Tijds Kleemans, Radboud University Nijmegen, Netherlands; **Co-Author:** Ingunn Størksen, Stavanger University, Norway; **Co-Author:** Ludo Verhoeven, Radboud University Nijmegen, Netherlands; **Co-Author:** Eliane Segers, Radboud University Nijmegen / University of Twente, Netherlands

The present longitudinal study investigated the unique direct and indirect contributions of two aspects of self-regulation - attentional and behavioral control - to the developmental trajectories of early reading and math. Eighty Dutch children were assessed on phonological awareness, early numeracy, and multiple direct measures of self-regulation in kindergarten, and decoding and mathematics proficiency in first grade. Path analyses showed that attentional and behavioral control both uniquely predicted phonological awareness and early numeracy in kindergarten, but that effects became more specific in first grade: Decoding was best predicted by attentional control, while behavioral control accounted for the most variance in math. Moreover, path analysis showed that the pathway from attentional control to decoding was mediated by phonological awareness, while behavioral control remained to have a significant direct effect on math in first grade. These results suggest that while self-regulation has a gradual influence on reading development - via phonological awareness - it continues to contribute directly to the development of mathematics in first grade. In addition, attentional and behavioral control seem to play specific roles for each developing skill. Awareness of the differential importance of attentional and behavioral control for early reading and math skills may contribute to improved and more targeted educational practice for children struggling with the acquisition of early reading or mathematics.

Executive Functions and Self-Control Contribute to Mathematics Performance in Elementary Students

Keywords: Achievement, Cognitive skills, Early childhood education, Self-regulation

Presenting Author:Catherine Gunzenhauser, Leipzig University, Germany; **Co-Author:**Henrik Saalbach, University of Leipzig, Germany

Self-regulatory capacities are crucial for acquiring mathematical competencies in elementary school. However, different aspects of self-regulation (originating from different research traditions) have been investigated largely separately from one another. The present longitudinal study aimed at disentangling the relationship between executive functions (EF) and self-control capacity and at investigating their distinct and joint influences on mathematics achievement in third graders from Germany.

Participants were $N = 251$ third-graders ($M_{\text{Age}} = 8.60$ years, $SD = 0.57$; 50% girls) from East Germany as well as one parent per child. The project included two time points (6-month interval). At both time points, children's EF, self-control capacity, mathematics performance as well as several control variables (nonverbal intelligence, mathematics self-concept) were assessed. Cross-sectional analyses of Time 1 data revealed that children's EF positively predicted their self-control capacity, even after controlling for nonverbal intelligence and mathematics self-concept. Both EF and self-control capacity made unique contributions to children's mathematics achievement. Moreover, there was a significant indirect effect of EF on children's mathematics achievement through self-control capacity. Longitudinal analyses including data of Time 1 and 2 will be presented at the conference. Preliminary findings suggest that programs designed to support children's mathematics achievement might benefit from taking into account children's individual strengths and difficulties with regard to both EF and self-control capacity.

Session S 16

2 September 2017 14:45 - 16:15

Main Building E - E350

Single Paper

Educational Policy and Systems, Instructional Design

STEM and Educational Policy

Keywords: Design based research, Educational policy, Inquiry learning, Interdisciplinary, Mathematics, Quasi-experimental research, Science education, Teacher Professional Development

Interest group: SIG 20 - Inquiry Learning

Chairperson: Kristina Loderer, Ludwig-Maximilians-Universität (LMU), Germany

Disciplinary boundary crossing: Abolition, permeability and colonization in STEM education

Keywords: Educational policy, Interdisciplinary, Science education, Teacher Professional Development

Presenting Author:David Clarke, The University of Melbourne, Australia

The disciplines encompassed by STEM are currently distinguished by associated bodies of practice. Analogous distinctions apply in STEM education, extending to the signature pedagogies that characterize each discipline. Current curricular design reflects restrictive conceptions of field-specificity and the unique integrity of bodies of knowledge encrypted as school subjects. Attention must be paid to the affordances of affiliation and research undertaken to explore the legitimacy of the constituent STEM disciplines and STEM-related vocational communities functioning as communities of practice offering enhanced educational opportunities through their interconnection. This paper employs the idea of boundary crossing to explore different theoretical conceptions of interdisciplinarity by which STEM might catalyse a reconceptualization of the organizing principles of the curriculum. This presentation explores three forms of boundary crossing: the implications of vocational coherence as a boundary crossing device; the permeability of the boundaries that define and segregate the individual STEM disciplines and the educational significance of the constructs to which those boundaries are permeable; and, the dangers of colonization of the STEM domain by one or more of its constituent disciplinary members, sacrificing the affordances for innovation that interdisciplinarity might offer. Interdisciplinarity is not integration and the evidential bases and signature practices of the constituent STEM disciplines can be quite different, maintaining disciplinary integrity. Education for collaborative specialisation requires interconnection across disciplinary boundaries not their demolition. It is proposed that constructs such as Discourse, Artefacts, Reasoning, and Evidence can be used to (re-)design an interdisciplinary STEM curriculum that better addresses societal need.

Considering epistemological junctions when designing for interdisciplinary learning

Keywords: Educational policy, Interdisciplinary, Mathematics, Science education

Presenting Author:Richard Lehrer, Vanderbilt University, United States

Recent efforts in the U.S., reflected in the Next Generation Science Standards (2013) and the Common Core State Standards for Mathematics (2010) emphasize the importance of positioning students to participate in disciplined epistemic practices so that they develop some understanding of how practitioners of mathematics and science go about generating and revising knowledge. This presentation focuses on designing for interdisciplinary learning in light of the epistemic virtues of each discipline. The guiding assumption is to create opportunities for learners to participate in forms of activity where the "same" concept participates in related, albeit distinct disciplinary ways of knowing. The intention is to achieve a junction between epistemologies. Two cases will be discussed, both drawn from elementary classrooms. Both classrooms, Grade 3 and 6, respectively, were engaged in participatory design research involving a partnership among educational researchers,

teachers, and disciplinary experts in science and in mathematics. In both cases, interdisciplinary engagement created opportunities for students to extend the reach and grasp of conceptual systems. For the third grade students, the opportunities included an emerging appreciation of an important practice in science, modeling, and how this practice was distinct from similar looking practices in mathematics. The sixth grade students, studying variability, experienced an opportunity to understand how mathematical tools for understanding signal and noise could be extended to consider natural variation as well. In addition, since their investigations and findings attracted the attention of local government, variability became infused with civic responsibility.

Integrating research and design in interdisciplinary STEM education

Keywords: Educational policy, Interdisciplinary, Mathematics, Science education

Presenting Author:Jan van Driel, The University of Melbourne, Australia; **Co-Author:**Tessa Vossen, Leiden University, Netherlands; **Co-Author:**Ineke Henze-Rietveld, Delft University of Technology, Netherlands; **Co-Author:**Marc De Vries, Delft University of Technology, Netherlands

The need to acquire skills in research and design is a response to a demand for interdisciplinary STEM skills in the workplace. Also, research and design activities are expected to counter the decline of student interest in STEM. In authentic STEM practices, research projects often require design activities, and vice versa. Therefore, research and design should be taught integrated, rather than separated. Recent curriculum innovations in the Netherlands are aimed towards this goal. However, teachers often have limited knowledge and experience about research and design, and their relationships. A study was done on the views and attitudes of secondary teachers in this domain. It appeared that most teachers saw research and design as rather separate activities, focusing on experimenting and problem solving, and creating and testing, respectively. Implications for the design of curriculum materials and professional development will be discussed.

The effectiveness of multiple GILB-MIXP STEM learning environments on students' performance.

Keywords: Design based research, Inquiry learning, Quasi-experimental research, Science education

Presenting Author:Marion Crauwels, KU Leuven, Belgium; **Co-Author:**Arnt Van Soom, KU LEUVEN, Belgium; **Co-Author:**Carla Schramme, KU LEUVEN, Belgium; **Co-Author:**Daan Moechars, KU LEUVEN, Belgium

In line with educational reforms in science education, which demand for a more supporting pedagogy such as student-centred learning environments that authentically mirror scientific processes with the aim to enhance students' insights in and interest for STEM, we investigated the beneficial effects of a SRL-supported, guided-Inquiry lab-based hands-on method (GILB-MIXP) in an authentic classroom setting. While earlier research suggested that the implementation of this innovative didactics does improve students' achievement regarding the nature of science (NOS), domain-general skills (DGS), domain-specific knowledge (DSK), interest and self-efficacy (I&SE), we focussed on the added value of multiple GILB-MIXP interventions compared to a single one. We hypothesized that the students in the experimental condition with multiple GILB-MIXP interventions would outperform students of the control condition who participated in a single GILB-MIXP intervention. Participants were 12th-grade senior high school students with the subjects science and math as a major part of their curriculum. Intact classes were assigned to one of the two conditions. Our results show a significant improvement with regard to the domain-general skills and domain-specific knowledge in the multiple GILB-MIXP condition compared to the single GILB-MIXP condition. In addition, students' interest and self-efficacy also improved in the multiple GILB-MIXP condition. However, performance regarding some aspects of the nature of science did not further improve which requires further research. Our ultimate goal is to optimise the path for the implementation of this innovative didactics into the STEM curriculum.

Session S 17

2 September 2017 14:45 - 16:15

Pinni B - B3117

Single Paper

Cognitive Science, Developmental Aspects of Instruction

Cognitive Development and Skills

Keywords: Cognitive development, Cognitive skills, Culture, Learning disabilities, Mathematics, Numeracy, Quantitative methods

Interest group:

Chairperson: Lenka Schnaubert, University of Duisburg-Essen, Germany

Developmental changes in digit representations and their relation with arithmetic achievement

Keywords: Cognitive development, Cognitive skills, Mathematics, Numeracy

Presenting Author:Bert Reynvoet, KU Leuven, Belgium; **Co-Author:**Helene Vos, KU LEUVEN, Belgium; **Co-Author:**Delphine Sasanguie, KU Leuven, Belgium

Digit comparison performance has been shown to be a robust predictor of individual differences in more complex math processing in many different age groups. It is however unclear which underlying component of digit comparison is

responsible for this association (i.e., digit identification, digit to number-word matching, digit ordering or general comparison). In a previous study with adults, we showed that the relation between digit comparison and arithmetic was mediated by ordering ability, indicating that order relations between digits are responsible for the relation between digit comparison and arithmetic and not the magnitude of digits. In the current study, we addressed the same question in two samples of children (first and second graders). In the youngest children, who just started formal math education, we observed a different pattern than in adults: the relation between digit comparison and arithmetic was not mediated by order processing. In contrast, the relation between order processing and arithmetic was mediated by comparison. The pattern of the second graders was however identical to the one of adults. The difference between both samples reflects the early development of how digits are represented.

The role of ordering abilities in early mathematical development and developmental dyscalculia

Keywords: Cognitive development, Cognitive skills, Learning disabilities, Mathematics

Presenting Author:Kinga Morsanyi, Queen's University Belfast, United Kingdom; **Co-Author:**Patrick O'Connor, Queen's University, Belfast, United Kingdom; **Co-Author:**Bianca Van Bers, Queen's University, Belfast, United Kingdom; **Co-Author:**Teresa McCormack, Queen's University, Belfast, United Kingdom

Recent evidence (e.g., Lyons & Beilock, 2011; Lyons et al., 2014) has highlighted the important role that number ordering skills play in arithmetic abilities. It has also been shown that memory for both arbitrary (e.g., Attout et al., 2014) and familiar (Morsanyi et al., 2016) non-numerical sequences is linked to arithmetic skills. Nevertheless, most studies that investigated the relationship between ordering and arithmetic skills were conducted with adults, and, thus, little is known about the role of ordering abilities in early mathematical development. This talk presents new findings that demonstrate the important role that ordering abilities play in typical numeracy development at the start of formal education. Specifically, in a group of ninety children (43 females; mean age at first testing =4 years 11 months), ordering ability at the start of the first school year was the best predictor of formal maths abilities at the end of the second school year, when other relevant skills were also taken into account. In Study 2, sixteen children with developmental dyscalculia (DD), and twenty-one children without mathematical difficulties participated (mean age=9 years 6 months). The results showed that children with developmental dyscalculia have order processing deficits (among other difficulties). Taken together, the novelty of these findings is to highlight the important role that non-numerical ordering abilities play in early mathematics development in the case of both typically developing children and in children with DD.

SNARC and MARC effects - insight from a large-scale online study

Keywords: Cognitive skills, Mathematics, Numeracy, Quantitative methods

Presenting Author:Krzysztof Cipora, University of Tübingen, Germany; **Co-Author:**Mojtaba Soltanlou, University of Tuebingen, Germany; **Co-Author:**Ulf-Dietrich Reips, Universität Konstanz, Germany; **Co-Author:**Hans-Christoph Nuerk, University of Tuebingen, Germany

The SNARC (Spatial-Numerical Association of Response Codes) effect is a phenomenon that small magnitude numbers are responded faster on the left hand side, whereas large magnitude numbers are responded faster on the right hand side. In the presented study, we aimed at investigating the SNARC effect in a large-scale online setup as well as we tested for several domain-specific and domain-general factors which were hypothesized to influence SNARC. Additionally, we tested for another phenomenon – the MARC (Linguistic Markedness of Response Codes – i.e. left hand advantage when responding to odd numbers, and right hand advantage when responding to even numbers). In total 1056 participants were retained in the analysis. We observed strong and robust SNARC and MARC effects at the group level. The SNARC effect was modulated by whether participants started finger counting sequence from left or right hand (stronger in left starters) and by overall speed of reaction times (stronger in slower participants). Interestingly, there was no relationship between the SNARC and math grades. The MARC effect correlated with reaction times (stronger in slower participants), was smaller in individuals starting finger counting from the right hand. Additionally, it was reversed in left handers. Overall, these findings show that the SNARC and MARC effects are robust and can be investigated in online experiments. Furthermore, the results suggest that sources of individual variability in these phenomena need to be further investigated, and call for further replication efforts.

Numerical abilities of English and Chinese children

Keywords: Cognitive development, Cognitive skills, Culture, Mathematics

Presenting Author:Ann Dowker, University of Oxford, United Kingdom; **Co-Author:**Anthony Li, Oxford University, United Kingdom

Most international comparisons have shown that Chinese pupils perform significantly better than Western pupils in mathematical tests. Reasons may include cultural and educational factors, and also more specifically the greater transparency of the Chinese counting system. The present study involved seventy-five 6-to-8-year-old children: 40 Cantonese speaking children in Hong Kong and 35 English-speaking children in Oxford. They were given a standardized arithmetic test, and also tests of two-digit number comparison and number line estimation. There were no group differences in general arithmetic performance or number line estimation, but Chinese children were faster and more accurate at number comparison. This contradicts the hypothesis of better overall performance in mathematics by Chinese children, but supports earlier findings of specific effects of counting system transparency on multi-digit number comparison. Implications for theory and practice are discussed.

Session S 18

2 September 2017 14:45 - 16:15

Linna - K108

Single Paper

Developmental Aspects of Instruction

Achievement

Keywords: Achievement, Educational attainment, Educational policy, Educational Psychology, Goal orientation, Intelligence, Language (Foreign and second), Learning approaches, Secondary education, Self-regulation

Interest group:

Chairperson: Heidi Hyytinen, University of Helsinki, Finland

Educational tracking in early adolescence: To what extent does intelligence prevail?

Keywords: Achievement, Educational policy, Intelligence, Secondary education

Presenting Author: Elsbeth Stern, ETH Zurich, Switzerland; **Co-Author:** Sarah Isabelle Hofer, TU Munich School of Education, Germany; **Co-Author:** Esther Ziegler, ETH Zurich, Switzerland

In Switzerland, about 20% of the secondary school students attend the highest track of the educational system (Gymnasium), which is supposed to prepare for university education. Access to this track takes place between the ages of 12 and 14 and is based on achievement in core subjects at the end of elementary school or in early secondary school. The goal is to select the 20% most capable students for academic career tracks. However, measures of intelligence are not considered. In case of a very strong correlation between school achievement and intelligence, the vast majority of the Gymnasium students would be supposed to have an $IQ \geq 113$ corresponding to an IQ above the 80th percentile. We analyzed two data sets that included measures of intelligence to determine the percentage of students who fall into this range: In a sample of $N = 995$ Gymnasium students (mean age 15.6 years) this was the case for 54% of the students. A sample with $N = 935$ elementary school children was presented with an intelligence measure at age 12.5. Among those students with a percentile range > 80 only 49% were designated for the Gymnasium whereas 51% were not. The results indicate a considerable selection bias to the disadvantage of intelligence when decisions for university education are already made at early adolescence.

The sober reality of high school: somewhat engaged, ambivalent, and detached students

Keywords: Achievement, Learning approaches, Secondary education, Self-regulation

Presenting Author: Laura Helle, University of Turku, Finland; **Co-Author:** Eero Laakkonen, University of Turku, Department of Teacher Education, Finland; **Co-Author:** Tiina Tuijula, University of Turku, Department of Education, Finland; **Co-Author:** Jan Vermunt, University of Cambridge, United Kingdom

The first aim of the study was to test if Finnish high school seniors ($n=245$) fall into three groups based on their responses to the Inventory of Learning Styles: self-regulated learners, externally regulated learners, and undirected learners in line with the categorization of Vermunt (1996) using Latent Profile Analysis. Second, based on the profiling results, the aim was to explore the outcomes and predictors of latent class membership using continuous distal outcome variables added into the model with auxiliary BCH option in Mplus and multinomial regression. The profiling results suggested that students fell into three latent classes: Somewhat Engaged, Ambivalent, and Detached. The three classes differed in their final scholastic achievement. Latent class membership, in turn, was predicted by 9th grade GPA, maternal education, gender, and exhaustion reported in the fall of the junior year. To conclude, the most striking finding was that the classes did not differ in external regulation; neither could we find a class of highly self-regulated students. Our interpretation is that as the learning environment is heavily content and matriculation examination -driven, all latent profile groups resort equally to teacher regulation.

Personality and Domain-Specific Achievement at Upper Secondary School

Keywords: Achievement, Educational Psychology, Language (Foreign and second), Secondary education

Presenting Author: Jennifer Meyer, Leibniz Institute for Science and Mathematics Education (IPN), Germany; **Co-Author:** Johanna Fleckenstein, Leibniz Institute for Science and Mathematics Education / University of Kiel, Germany; **Co-Author:** Michael Leucht, Leibniz Institute for Science and Mathematics Education (IPN), Germany; **Co-Author:** Olaf Koeller, Leibniz Institute for Science and Mathematics Education, Germany

Individual differences are an important predictor of academic success over and above cognitive ability. This study examines the relationship of the Big Five personality traits with academic performance in upper secondary education in a sample of $N = 547$ students in Germany. Academic performance was assessed using standardized achievement tests measuring competencies in English as a foreign language (EFL) and mathematics as well as corresponding report card grades. Significant differential effects of the Big Five personality traits on domain-specific achievement are found even when controlling for general cognitive ability and gender. We conclude that personality is an important predictor of academic performance in secondary education beyond intelligence and with differential effects on specific domains. The findings are discussed considering implications of personality for domain-specific learning and achievement. Furthermore, our study shows differential effects of personality on report card grades and standardized test scores which should be

considered in further research.

Is to be Gritty to be Conscientious? Relations on a Facet Level

Keywords: Achievement, Educational attainment, Educational Psychology, Goal orientation

Presenting Author: Fabian T. C. Schmidt, Leibniz Institute for Science and Mathematics Education (IPN), Germany; **Co-Author:** Gabriel Nagy, IPN - Leibniz Institute for Science and Mathematics Education, Germany; **Co-Author:** Johanna Fleckenstein, Leibniz Institute for Science and Mathematics Education / University of Kiel, Germany; **Co-Author:** Jens Möller, University of Kiel, Germany; **Co-Author:** Jan Retelsdorf, University of Hamburg, Germany

Both grit and conscientiousness have been shown to predict success in a number of domains. There is strong empirical evidence for a close relation of the two constructs; however, the connection between them has rarely been investigated thoroughly on a theoretical basis. For this study we collected data from two samples ($N = 413$ secondary school students and $N = 530$ adults) to analyze the distinguishability of grit and conscientiousness on a facet level. Results show that the correlational patterns are heterogeneous on an aviated level. Only the sub-facets *achievement striving* and *self-discipline* are significant predictors of grit, but the superordinate factor conscientiousness explained a substantial amount of variance in grit. These results suggest a close relatedness between grit and conscientiousness. Findings are discussed with respect to their implications for educational research and policy.

Session S 19

2 September 2017 14:45 - 16:15

Pinni B - B1096

Single Paper

Assessment and Evaluation

Assessment, Methods and Tools - B

Keywords: Assessment methods and tools, Case studies, Content analysis, Higher education, In-service teacher education, Instructional design, Pre-service teacher education, Primary education, Quantitative methods, Teaching approaches

Interest group: SIG 01 - Assessment and Evaluation

Chairperson: Sharon Calor, University of Amsterdam, Netherlands

Assessment quality: an integrative literature review

Keywords: Assessment methods and tools, Content analysis, Higher education, Instructional design

Presenting Author: Desirée Joosten-ten Brinke, Open University of the Netherlands, Netherlands; **Co-Author:** Karin Gerritsen-van Leeuwenkamp, Open University of the Netherlands, Netherlands; **Co-Author:** Liesbeth Kester, Utrecht University, Netherlands

Especially in tertiary education, inferior assessment quality is a problem, since high-stake decisions are made with serious consequences for students, teachers, parents, governments, and society. Since a clear conceptualization of assessment quality is lacking, it is difficult to guarantee it in practice. Thus, the aim of this study is to review assessment research to conceptualize assessment quality in tertiary education. This study combined the text fragments of 78 peer-reviewed journal articles in a framework using Maxqda. Subsequently a text analysis with Leximancer was executed. This resulted in an overview of the assessment quality criteria, their influences, the evaluation of the assessment quality criteria, and the perspectives that should be taken into account in evaluating assessment quality. The results identified validity, transparency, and reliability as assessment quality criteria; standardization, stakeholders, clarity, and construct irrelevant variance as influences on the assessment quality criteria; validation and statistical data analyses to evaluate assessment quality; and students, staff, government, and experts as perspectives that should be taken into account when evaluating assessment quality.

Formative use of test results: A user's perspective

Keywords: Assessment methods and tools, Instructional design, Primary education, Teaching approaches

Presenting Author: Dorien Hopster-den Otter, University of Twente, Netherlands; **Co-Author:** Saskia Wools, Cito, Netherlands; **Co-Author:** Theo Eggen, Universiteit Twente, Netherlands; **Co-Author:** Bernard Veldkamp, University of Twente, Netherlands

Despite the potential of using test data to support student learning, several studies have concluded that the actual use of test data remains limited. One possible explanation is that assessment data are made available to users under the assumption that this data are useful in some way. Too little attention has been paid to the types of actions that intended audiences want to perform on the basis of test data. The current study addresses this problem in the context of Dutch primary education. It seeks to determine 1) the types of actions that teachers, internal coaches, principals and parents in primary education want to perform with the use of test results and 2) the information needed to enable these actions. By administering two questionnaires and conducting seven focus group meetings, both qualitative and quantitative data were gathered. In the analyses, distinctions were made among various users, including teachers, internal coaches, principals and parents. The results obtained from the questionnaires show that the various users want to use test results for actions that support learning, which amounts to a discrepancy relating to actual use. Furthermore, the various users perform

actions on different levels, thus indicating the need for tailored reports that fit the information needs of individual users. The results of the focus group method reveal the information needs of teachers, suggesting implications for the development of new score reports.

The effect of feedback on learning : a case study on the intended and the perceived curriculum

Keywords: Assessment methods and tools, Case studies, In-service teacher education, Pre-service teacher education

Presenting Author:Jorik G. Arts, Fontys University of Applied Sciences, Netherlands; **Co-Author:**Mieke Jaspers, Fontys University of applied sciences, Netherlands; **Co-Author:**Lianne Poel, Fontys University of Applied Sciences, Netherlands; **Co-Author:**Desirée Joosten-ten Brinke, Open University of the Netherlands, Netherlands

Assessment for learning (AfL) holds the promise of deeper and more meaningful learning. Although several definitions of AfL are being used in literature, feedback is found at the heart of most of them. Despite clear guidelines, implementation of effective feedback in education is complicated. In a study program for biology teachers in a teacher training institute, part of the curriculum addressing the development of research skills was redesigned to increase (i) awareness of teachers with respect to previous assignments, and (ii) urgency for students to transfer feedback from one course to another. The research question is "How do students evaluate their learning gains in a redesigned curriculum which emphasizes the use of (written) feedback?". To answer this research question, perceptions of students were studied by using a.o. the storyline methodology. The findings indicate that students did not seem to value feedback as an important aid in their development of skills. Although alternative explanations are plausible, it may reflect that the impact of feedback on learning is limited when considering complex tasks.

Assessing learning gains

Keywords: Assessment methods and tools, Higher education, Quantitative methods, Teaching approaches

Presenting Author:Jekaterina Rogaten, Open University, United Kingdom; **Co-Author:**Denise Whitelock, Open University, United Kingdom; **Co-Author:**Bart Rienties, Open University, United Kingdom

Learning gains, defined as the change in knowledge, skills, and abilities over time as a result of targeted learning process can be measured with different methods. An alternative to self-assessments or the use of pre-post tests for assessing students' gains in knowledge and understanding is to estimate students' learning gains from course assessments grades. This approach capitalises on the large quantity of student data routinely gathered by every university. In this study, this alternative method is evaluated with a three-level linear growth-curve model in two different disciplines. Results indicated the usefulness of this method and showed differences in learning gains between disciplines. The importance of the nature of the consistent, high quality assessments in predicting learning gains is discussed.

Session S 20

2 September 2017 14:45 - 16:15

Main Building A - A06

Single Paper

Cognitive Science, Instructional Design, Learning and Special Education

Cognitive Skills and Comprehension of Text and Graphics

Keywords: Case studies, Cognitive skills, Comprehension of text and graphics, Design based research, Developmental processes, Experimental studies, Language (L1/Standard Language), Learning approaches, Mathematics, Student learning

Interest group: SIG 02 - Comprehension of Text and Graphics

Chairperson: Stijn Van Laer, KU LEUVEN, Belgium

PISA-Reading: gender gap and early prediction in Finland

Keywords: Cognitive skills, Comprehension of text and graphics, Developmental processes, Student learning

Presenting Author:Minna Torppa, University of Jyväskylä, Finland; **Co-Author:**Kenneth Eklund, University of Jyväskylä, Finland; **Co-Author:**Sari Sulkunen, University of Jyväskylä, Finland; **Co-Author:**Pekka Niemi, University of Turku, Finland; **Co-Author:**Timo Ahonen, University of Jyväskylä, Finland

This paper examines gender gap and predictors of PISA-Reading in Finland. The data comes from Jyväskylä Longitudinal study of Dyslexia with PISA-Reading assessment in Grade 9 (age 15/16) for 1309 students. Of these students, 158 have been followed from birth onwards. We examined whether performance differences and gender gap in PISA-Reading performance can be understood via the effects of concurrent reading fluency, achievement behavior (mastery orientation and task-avoidant behavior), or the amount of time spent with leisure reading and homework. We also examined if early (age 2 onwards) language and pre-reading skills, or reading skills can predict adolescent PISA-Reading. Findings showed first that while girls outperformed boys in most measures the models explaining PISA-Reading were not different. The findings suggested that while mastery orientation, homework activity and leisure book reading are concurrent predictors of PISA-Reading over and above reading fluency for both girls and boys, they do not explain gender difference. Second, the analyses of early predictors revealed surprisingly strong effects for the early language and pre-reading skills, particularly among boys who had high risk for reading difficulties due to parental dyslexia. The findings underline the importance of oral language in reading comprehension. Overall these studies inform us on the reasons for performance differences in PISA-

Reading between individuals and genders including achievement behavior, reading habits, and cognitive factors.

Mathematical modelling of cognitive processes in graph interpretation from visual scan-paths

Keywords: Cognitive skills, Comprehension of text and graphics, Experimental studies, Mathematics

Presenting Author: Enrique Garcia Moreno-Esteve, University of Helsinki, Finland; **Co-Author:** Sonia White, Queensland University of Technology, Australia; **Co-Author:** Joanne Wood, Queensland University of Technology (QUT), Australia; **Co-Author:** Alexander Black, Queensland University of Technology (QUT), Australia

Children completed a graph task and visual scan-paths were analyzed to better understand the visual-cognitive processes involved in the task. Mathematical and computational analysis of the children's visual scan-paths provided high levels of accuracy in identifying which children completed the task successfully (accurately identifying three quarters of the children who answered the task correctly and two thirds of those who did not answer correctly). Our analysis involves weighing and accumulating number of fixations and durations in visual scan-paths to distinguish successful children from of unsuccessful children in a graph consisting of points resulting from the accumulated quantities. This method of analysis may potentially have wider applications for better understanding and predicting task performance.

Designing Critical New-Media Literacy Education

Keywords: Case studies, Comprehension of text and graphics, Design based research, Language (L1/Standard Language)

Presenting Author: Elaine Jee, Ministry of Education Singapore, Singapore

Traditionally, literacy is deemed to be the ability to read and write. However in today's age of media explosion, we consume most of our information from digital sources. The competencies to critically view new media forms have thus become essential skills in the 21st Century. With the growing threat of youths and adults falling victims to misleading content perpetuated online, many educators are looking towards new-media literacy education as an engaging approach to develop critical and inventive thinking skills in their students for comprehending a wide range of issues. By learning how to manage, create and share digital information thoughtfully, ethically and responsibly, new-media literates are better able to understand the complex messages we receive from Internet, newscasts, e-books, documentaries and social media etc. This paper shares how teachers of English Language in a Singapore school redesigned their formal curriculum to develop critical new-media literacy skills in their Primary Five students to curate, connect, collaborate, and create digital information for problem-solving a real-life issue through Newscasting.

Holists and serialists - differences in dealing with multiple representations

Keywords: Cognitive skills, Comprehension of text and graphics, Learning approaches, Student learning

Presenting Author: Julia Westphal, University of Ulm, Germany; **Co-Author:** Tina Seufert, University of Ulm, Germany

In a learning process, learners can operate differently with a learning material. Either one focuses on several aspects at the same time to get an overview early in the learning process and go into details later, or one focuses only on one aspect at the same time and associate the individual information step by step to get an overview very late in the process. The former are called holists and the latter one serialists. These approaches might be especially relevant when learners have to integrate multiple representations and to understand details as well as the global whole. Based on the different operation styles we assumed that there are differences in the learning time with longer times for serialists. We also assume a different impact of prior knowledge on performance, with especially strong relations for holists which have to rely more on their existing knowledge when building coherent overall structures. Results showed that serialists took more time for learning than holists. Furthermore, serialists showed better performance than holists when it comes to more locally focused posttest tasks. Moreover, correlations and multiple regressions revealed that there are different relations between time, prior knowledge and performances for holists and serialists. In particular, the prior knowledge mediated the relation between learning time and performances for holists, but not for serialists.

Session S 21

2 September 2017 14:45 - 16:15

Main Building A - A32

Single Paper

Assessment and Evaluation

Assessment Methods and Tools and Psychometrics

Keywords: Achievement, Assessment methods and tools, Attitudes and beliefs, Collaborative Learning, Educational Psychology, Knowledge creation, Pre-service teacher education, Psychometrics, Quantitative methods, Science education, Secondary education, Student learning

Interest group: SIG 01 - Assessment and Evaluation

Chairperson: Friederike Hendriks, University of Münster, Germany

Adaptation of the Collaborative Knowledge Practices Questionnaire to upper secondary education

Keywords: Assessment methods and tools, Collaborative Learning, Secondary education, Knowledge creation

Presenting Author: Hanni Muukkonen, University of Oulu, Finland; **Co-Author:** Liisa Ilomäki, University of Helsinki,

Finland; **Co-Author:**Minna Lakkala, University of Helsinki, Finland; **Co-Author:**Auli Toom, University of Helsinki, Finland

In the field of research on generic competences, there is a clear need for research instruments aiming to measure competence development embedded in the pedagogical practices of the course, instead of measuring them out of the context where they are used. This paper presents such instrument, the Collaborative Knowledge Practices Questionnaire, CKP, and especially the adaptation of the instrument for upper secondary education use. With a pilot study we examined the differences between contexts as the questionnaire was built and validated for higher education. CKP-School was adapted to accommodate school context, particularly because multiple disciplines are present at universities, while students take part in various subject studies or sometimes integrated courses at school. This paper a) reports the functioning of the scales and b) investigates students' perceptions of their learning of competences in three courses. The questionnaire measures course-related development of generic competences in collaboration, integration of efforts, giving and receiving feedback, persistent development, combining perspectives of different subjects, collaboration with experts outside of school, and exploiting technology. The data consisted of students ($N = 247$) participating in 15 secondary education courses, showing good scale reliabilities and differences between courses. The results indicate that there exist contextual differences in students' learning of generic competences depending on the course designs and practices. Development of generic competences could be facilitated even more extensively during upper secondary education to prepare students for further studies and working life.

Assessing teacher students' epistemological beliefs about texts in pedagogy with the StEB Inventory

Keywords: Attitudes and beliefs, Pre-service teacher education, Psychometrics, Quantitative methods

Presenting Author:Inka Haehnlein, University of Passau, Germany; **Co-Author:**Jutta Mägdefrau, University of Passau, Germany

Epistemological beliefs have direct and indirect effects on learning and teaching. Therefore, understanding teacher students' beliefs and linking epistemological beliefs to unique aspects of learning is essential. The central research objective of this study is the development of an instrument for the assessment of undergraduate teacher students' epistemological beliefs concerning their learning with professional texts in pedagogy (StEB). First, 5 scales with a pool of 126 items were created. A panel of 10 experts assessed the 126-item StEB inventory for content validity, which resulted in an optimized 98-item version. The theoretically assumed 5-factor as well as a statistically implicated 6-factor solution were subjected to exploratory factor analysis (EFA) in an undergraduate sample ($n = 217$). EFA results supported a multidimensional, 50-item, 5-factor solution. *Keywords: epistemological beliefs, teacher students, instrument development, exploratory factor analysis*

Evaluating the Instructional Sensitivity of Test Items in Consideration of Student Characteristics

Keywords: Assessment methods and tools, Educational Psychology, Psychometrics, Student learning

Presenting Author:Stephanie Musow, University of Teacher Education St.Gallen, Switzerland; **Co-Author:**Jan Hochweber, University of Teacher Education St. Gallen, Switzerland; **Co-Author:**Alexander Naumann, German Institute for International Educational Research (DIPF), Germany; **Co-Author:**Johannes Hartig, German Institute for International Educational Research (DIPF), Germany

Instructional sensitivity is the psychometric property of a test or an item to react sensitive to the content and quality of instruction (Polikoff, 2010). Previous research has conceived instructional sensitivity as a direct, invariable relationship between instructional variables and item difficulties or test scores (e.g., Polikoff & Porter, 2014). Referring to models which conceptualize student learning as the utilization of learning opportunities offered during instruction, we suggest that this common perspective on instructional sensitivity is oversimplifying. In this contribution, we address the questions a) how student characteristics determining the use of learning opportunities (e.g., prior knowledge) should be incorporated in statistical models to provide a more comprehensive evaluation of instructional sensitivity, and b) to which extent empirical relationships can be found between these student characteristics and indices/indicators of instructional sensitivity. Our sample consists of 951 students from 48 fifth-grade classrooms, participating in mathematic tests (arithmetic) and completing student questionnaires at four time points throughout the school year 2016/2017. All analyses will be carried out based on the longitudinal multilevel-DIF (LML-DIF) approach to operationalize instructional sensitivity proposed by Naumann, Hochweber, and Hartig (2014). Preliminary results based on already available data from the first time point (pre-test) indicate that a considerable percentage of variation in the item response variables is located at the classroom level (7% to 31.7%). Hence, as would be expected in evaluations of instructional sensitivity, instructional variables might explain a considerable amount of variation in student achievement.

Investigating the Impacts of Characteristics of Science Contextualized Items on Student Performance

Keywords: Achievement, Assessment methods and tools, Psychometrics, Science education

Presenting Author:Min Li, University of Washington, United States; **Co-Author:**Dongsheng Dong, University of Washington, United States; **Co-Author:**Maria Araceli Ruiz-Primo, Stanford University, United States; **Co-Author:**Jim Minstrell, Facet Innovations, United States

Despite the widespread use of contexts in science testing, their utility, practice, and underlying assumptions have been called into question. As contexts used may interfere with the target construct and lead to inaccurate inferences about student learning, it is important to carefully construct and evaluate the contextualized items to ensure the items provide

valid inference. In this paper, we propose a conceptual framework for evaluating the quality of contextualized items and provide empirical evidence by constructing three types of items: (1) contextualized items without an illustration, (2) contextualized items with an illustration, and (3) abstract items. We administered 40 physics items of 394 students at grades 7-8. By applying the cognitive diagnostic modeling procedure with student responses on the three versions of items, our preliminary analysis found that abstract items were more difficult than context-based items whereas students' performance did not differ between the two versions of with versus without an illustration. Findings of additional analysis will be reported and implications for item construction and validation will be included.

Session S 22

2 September 2017 14:45 - 16:15

Pinni B - B4113

Single Paper

Assessment and Evaluation, Higher Education, Teaching and Teacher Education

Assessment and Higher Education

Keywords: Assessment methods and tools, Case studies, Competencies, E-learning / Online learning, Educational Psychology, Higher education, Mixed-method research, Secondary data analysis, Teacher Effectiveness, Teaching / instruction, Teaching approaches, Vocational education

Interest group: SIG 01 - Assessment and Evaluation

Chairperson: Minna Puustinen, INS HEA, France

Type and timing of feedback in an online environment: relation and implications for learning

Keywords: E-learning / Online learning, Educational Psychology, Higher education, Teaching / instruction

Presenting Author: Teresa Guasch, Open University of Catalonia (UOC), Spain; **Co-Author:** Anna Espasa, Universitat Oberta de Catalunya, Spain; **Co-Author:** Rosa M Mayordomo, Open University of Catalonia (UOC), Spain; **Co-Author:** Montserrat Martinez Melo, Open University of Catalonia, Spain

In online learning environments, monitoring students' progress closely and providing them with continuous support is of paramount importance. In relation to this, it is vital to understand how feedback timing and feedback type are related to learning. This is precisely the aim of this study, which on the one hand seeks to establish what correlation exists between feedback timing and feedback type and on the other hand, attempts to analyse their impact on learning. A survey was conducted among a sample of teaching staff involved in various undergraduate and postgraduate courses across all fields of knowledge in an online university whose pedagogical model is based on asynchronous and written communication. Results showed that 35% of respondents offer feedback at three different moments (before submission of an assignment, on submission, after marking). When feedback is given before submission, there is a significantly higher incidence of comments. A correlation was also found between feedback timing and academic attainment rate on the courses: providing feedback before submission of an assignment resulted in a greater attainment rate (95.2% on average) and consequently, providing feedback in the three moments or before submission and after marking also led to higher attainment rates (95.5% and 95.3% respectively). These results allow for a better understanding of feedback practices and thus inform teachers in designing more effective and tailored feedback in online learning environments.

Simulated Conversations for Assessing Professional Conversation Competence

Keywords: Assessment methods and tools, Competencies, Higher education, Vocational education

Presenting Author: Johannes Bauer, University of Erfurt, Germany; **Co-Author:** Anne Wiesbeck, TUM School of Education, Germany; **Co-Author:** Martin Gartmeier, Technical University of Munich (TUM), Germany; **Co-Author:** Manfred Prenzel, Technical University of Munich (TUM), Germany

Simulated conversations (SC) with trained actors are a performance-oriented method for assessing communicative competences in authentic task situations. This study evaluated the psychometric properties of parallel designed SC in a cross-professional setting: in teacher-parent and physician-patient conversations. Specifically, we addressed three research questions regarding the reliability and construct validity of the SC: (1) whether trained observers reach a satisfactory interrater reliability in rating examinees' performance; (2) whether correlations among three types of ratings (external observers', SC partners', and students' self-ratings) correspond to expectations; (3) whether hypothesized correlations with external criteria (prior communication training, semester, abitur grade) could be found. To answer these questions, $n = 72$ undergraduate medical students and $n = 96$ pre-service teachers conducted simulated conversations. Results showed sufficient interrater reliability ($ICC = 0.71$). Moreover, the pattern of correlations among the observer ratings, the other two types of ratings, and external criteria was as expected. These results provide initial evidence for the reliability and the validity of the developed SC assessment.

Pros and cons of student evaluation of academic teaching: a synthesis of strengths and challenges

Keywords: Higher education, Mixed-method research, Secondary data analysis, Teacher Effectiveness

Presenting Author: Liliana Silva, University of Bologna, Italy; **Co-Author:** Maria Lucia Giovannini, Alma Mater Studiorum Università di Bologna, Italy

The main instrument adopted to engage into the assessment process of academic teaching is the questionnaire proposed

to students to collect their opinions. Aims include identify problem areas that can be identified in research on the use of student recipients questionnaire as part of the evaluation of university education, with particular reference to the perceptions of students and university teachers. The objective of the research is to analyze and synthesize the findings by a protocol systematized by authors. Main results are: a) the answers often forced by de-individuation mechanisms lead to neglect the potential of the instrument; b) a lack of space dedicated to the evaluation of individual courses; c) the impact of factors related to students, courses and teachers on detecting students' opinions; d) a reference to the diversity of contexts; e) the return of results is often not timely, and therefore of little use for the improved outlook. Analysis of contributions on these questions, aimed at detecting evidence in support and against the possibility of improving teaching evaluation by the students shifts opinions in favor of the latter, but only when accompanied by the use of other assessment tools and especially when it involves students and teachers, who should receive adequate training to a more informed assessment.

Sharing Learning Goals with Students: Capturing What Teacher Do Everyday

Keywords: Case studies, Mixed-method research, Teaching / instruction, Teaching approaches

Presenting Author: Maria Araceli Ruiz-Primo, Stanford University, United States; **Co-Author:** Heidi Kroog, Smarter Balanced, United States

The paper reports a study focusing on a critical activity in formative assessment, clarifying learning goals. It was guided by the questions: What are the strategies teachers use to share the learning goals with their students on the everyday basis? and How do these strategies vary from day to day? We collected information with 10 mathematics and 10 science teachers during the implementation of 24 entire units. An important finding is that in 69% of the 420 days coded across the 24 units, teachers did not mention any learning goal. Furthermore, teachers did not mention the purpose of what students were doing in 64.8% of the instructional tasks in mathematics classes and in 56.9% of the tasks in science.

Session S 23

2 September 2017 14:45 - 16:15

Pinni B - B3109

Single Paper

Motivational, Social and Affective Processes

Attitudes, Beliefs and Self-Efficacy

Keywords: Attitudes and beliefs, Goal orientation, Learning disabilities, Motivation, Motivation and emotion, Primary education, Self-efficacy, Self-regulation, Student learning

Interest group: SIG 08 - Motivation and Emotion

Chairperson: Stephan Schwan, Leibniz-Institut für Wissensmedien, Germany

Implicit Theory and Classroom Goal Structure in the Cognitive Appraisal of Self-efficacy Information

Keywords: Attitudes and beliefs, Goal orientation, Motivation, Self-efficacy

Presenting Author: Mimi Bong, Korea University, Korea, Republic of; **Co-Author:** Hyun Seon Ahn, Brain and Motivation Research Institute (bMRI), Korea University, Korea, Republic of

The main purpose of this investigation was to examine how students' implicit theory of ability and perceived classroom goal structure alter the relationship between sources of self-efficacy information and academic self-efficacy. Hierarchical multiple regression analyses were performed on the responses of Korean high school students across two studies ($Ns = 395$ in Study 1 and 259 in Study 2). Sources of efficacy information interacted significantly with implicit theory and perceived classroom goal structure in predicting student self-efficacy. The relationship between mastery experience and self-efficacy was stronger for incremental theorists and students who perceived a strong mastery goal structure, compared to entity theorists and students who perceived a weak mastery goal structure in the classroom, respectively (Study 1). Interaction effects were created by a different moderator, depending on the achievement levels of students (Study 2). For high achievers, it was the implicit theory that interacted with efficacy sources: the relationship between mastery experience and self-efficacy and that between vicarious experience and self-efficacy were stronger for incremental than entity theorists. For low achievers, it was the perceived classroom goal structure that interacted with efficacy sources: the relationship between mastery experience and self-efficacy was stronger for those who perceived a strong, compared to a weak, mastery goal structure in the classroom (Study 2).

Sources of Mathematics and Science Self-Efficacy Among Adolescents in Rural Appalachia

Keywords: Attitudes and beliefs, Self-efficacy, Student learning, Motivation and emotion

Presenting Author: Ellen Usher, University of Kentucky, United States; **Co-Author:** Caihong Li, University of Kentucky, United States; **Co-Author:** Calah Ford, University of Kentucky, United States; **Co-Author:** Brianna Weidner, University of Kentucky, United States

According to social cognitive theory, the context in which people live can influence how they feel about their abilities (Bandura, 1997). Living in a rural location may reduce students' academic opportunities and resources and thereby lead them to develop less optimistic academic self-beliefs. The purpose of this study was to examine the sources of primary and secondary learners' ($N = 600$) mathematics and science self-efficacy in a rural, high-poverty area in the Appalachian region of the U.S. Participants from Grades 4-12 in one school district completed survey items in their mathematics and science

classes at two time points. Items assessed the sources of students' self-efficacy in each subject (Spring, Year 1) and their subject-specific self-efficacy and self-efficacy for self-regulated learning (Fall, Year 2). Confirmatory factor analysis revealed that a four-factor structure represented the sources of self-efficacy data. All variables were significantly correlated with one another. Regression analyses revealed that mastery experience, social persuasion, and physiological states predicted self-efficacy in mathematics and science. All four sources predicted students' self-regulatory self-efficacy in both subjects. Mastery experience and adverse physiological states were the most powerful predictors of students' academic self-efficacy. This research extends findings related to the sources of self-efficacy to the understudied population of rural learners and to the less-studied context of science.

Comorbidity of academic difficulties and sources of self-efficacy among primary school age children

Keywords: Attitudes and beliefs, Learning disabilities, Primary education, Self-efficacy

Presenting Author:Helena Viholainen, University of Jyväskylä, Finland; **Co-Author:**Tuija Aro, University of Jyväskylä, Finland; **Co-Author:**Tuire Koponen, University of Jyväskylä, Finland; **Co-Author:**Pilvi Peura, University of Jyväskylä, Finland; **Co-Author:**Riikka Sorvo, University of Jyväskylä, Finland; **Co-Author:**Eija Räikkönen, University of Jyväskylä, Faculty of Education, Finland; **Co-Author:**Mikko Aro, University of Jyväskylä, Finland

It has been suggested that learning disabilities (LD) may restrict access to sources of academic self-efficacy, and therefore, be risk for development of negative self-efficacy (SE), and further, to academic performance. Therefore, previous limited knowledge about connections between sources of SE and LD focused our interest to compare whether children with LD (in reading, RD; in math, MD; or combined, RMD) report mastery (ME) and vicarious experiences (VE), verbal persuasion (VP), and affective and physiological states (PS) differently than children without LD (NLD). Furthermore, effect of comorbid learning difficulties on sources of academic SE were studied. First, the participant's (N=867: girls=420, boys=447), enrolled from 2.–5. grades, reading (sentence reading, word chain) and math (addition, subtraction, arithmetic) skills were assessed in order to group the children into four groups: TD (standardized reading and math composite scores ≥ -0.5), RD (standardized reading composite score ≤ -1), MD (standardized math composite score ≤ -1), RMD (RD & MD). Sources of reading and math SE were assessed with a questionnaire. The repeated measures variance analyses were used to test the group differences. Our results showed that children with LD experiences lesser amount of MEs, VPs, and more anxiety and stress than children without LD. Thus, LDs restrict the access to sources of self-efficacy, and therefore, might be risk for negative development of academic SE, and thereby, for academic learning, especially in the academic skill difficult for them. Furthermore, children with comorbid difficulties might be in greater risk for developing negative academic SE.

Self-regulatory efficacy beliefs and their sources of children with attention deficits

Keywords: Attitudes and beliefs, Primary education, Self-efficacy, Self-regulation

Presenting Author:Mika Paananen, University of Jyväskylä, Finland; **Co-Author:**Tuija Aro, University of Jyväskylä, Finland; **Co-Author:**Helena Viholainen, University of Jyväskylä, Finland; **Co-Author:**Tuire Koponen, University of Jyväskylä, Finland; **Co-Author:**Jari Westerholm, Niilo Mäki Institute, Finland; **Co-Author:**Mikko Aro, University of Jyväskylä, Finland

The purpose of this study was to examine self-efficacy for self-regulated learning (self-regulatory self-efficacy) and its sources, and assess associations between these among elementary school children with attention deficit symptoms ($n = 66$) and their peers (population sample; $n = 1245$). We were especially interested in whether attention deficits affect relations between self-efficacy and its sources. ANCOVA revealed that control group children gave more positive estimation of their efficacy beliefs, mastery experiences and physiological/emotional states after controlling for gender and academic skills. Regression analyses showed that contribution of the sources of self-efficacy on self-regulatory efficacy varied as a function of attention deficit: the group with attention deficits indicated reduced connections between the sources and efficacy beliefs compared to the control group.

Session S 24

2 September 2017 14:45 - 16:15

Main Building E - E221

Single Paper

Cognitive Science, Motivational, Social and Affective Processes

Neuroscience and Cognitive Development

Keywords: At-risk students, Cognitive development, Cognitive skills, Experimental studies, Learning and developmental difficulties, Learning disabilities, Mathematics, Motivation and emotion, Neuroscience, Numeracy

Interest group: SIG 22 - Neuroscience and Education

Chairperson: Regina Mulder, University of Regensburg, Germany

Developmental trajectories of children's symbolic skills and associated cognitive competencies

Keywords: Cognitive development, Learning and developmental difficulties, Mathematics, Numeracy

Presenting Author:Kiran Vanbinst, KU Leuven, Belgium; **Co-Author:**Eva Ceulemans, KU Leuven - University of Leuven, Belgium; **Co-Author:**Lien Peters, KU Leuven - University of Leuven, Belgium; **Co-Author:**Pol Ghesquière, KU Leuven - University of Leuven, Belgium; **Co-Author:**Bert De Smedt, KU Leuven - University of Leuven, Belgium

While symbolic numerical magnitude processing skills are key for learning arithmetic, its developmental trajectories remain unknown. We therefore delineated in the first three years of primary education (ages 5-8 years) groups with distinguishable developmental trajectories of symbolic numerical magnitude processing skills, using a model-based clustering approach. Three clusters were identified and labeled as: *inaccurate*, *accurate but slow* and *accurate and fast*. The clusters did not differ in age, sex, socioeconomic status and IQ. We tested whether these clusters differed in domain-specific and domain-general cognitive competencies that might contribute to children's ability to (efficiently) process the numerical meaning of Arabic numerical symbols. The clusters differed in non-symbolic numerical magnitude processing, digit identification, visuospatial short-term memory and processing speed, but they did not differ in verbal working memory. Follow-up analyses of covariance further revealed that the cluster differences in children's symbolic development remained when the abovementioned cognitive competencies were controlled for, which suggests that other factors additionally account for these individual differences in children's development of symbolic skills. On the other hand, the three trajectories of symbolic numerical magnitude processing showed remarkable and stable differences in arithmetic fact retrieval, which stresses the importance of symbolic numerical magnitude processing skills for learning arithmetic.

Adjusting Skill Learning Protocols to Aid Learning in Developmental Disorders.

Keywords: At-risk students, Learning and developmental difficulties, Learning disabilities, Neuroscience

Presenting Author: Esther Adi-Japha, Bar-Ilan University, Israel

Procedural memory is integral to the learning of cognitive, perceptual, motor, and linguistic skills that contribute to school achievements. Procedural learning is a basic mechanism enabling newly acquired skills to improve gradually across multiple learning experiences. Motor skill learning tasks have been consistently used as a model for procedural learning. Atypical learning and consolidation of motor skills was reported in several developmental disorders, including attention deficit hyperactivity disorder (ADHD), specific language impairment (SLI), and developmental coordination disorder (DCD). In this presentation, I will show evidence suggesting that individuals with ADHD tend to perform inaccurately, and their inaccuracy is even enhanced 24-h post-training. Individuals with SLI display an initial learning rate that is slower than that displayed by their peers without the impairment. Furthermore, they do not retain their learning well between sessions. Finally, individuals with DCD display a typical learning curve, however overall their performance is slower than that of their peers. It has been suggested that adjustments in the learning protocols can improve learning. I will claim that the type of adjustments is different for different developmental disorders. Implications for the learning environment will be discussed.

Do rewards enhance learning? The effect of a reward prospect on information processing: An EEG study

Keywords: Cognitive skills, Experimental studies, Neuroscience, Motivation and emotion

Presenting Author: Sanne van der Ven, Utrecht University, Netherlands; **Co-Author:** Sven van Touw, Utrecht University, Netherlands; **Co-Author:** Anne van Hoogmoed, University of Groningen, Netherlands; **Co-Author:** Eva Janssen, Utrecht University, Netherlands; **Co-Author:** Paul Leseman, Utrecht University, Netherlands

Introduction. Promised rewards and punishments are often used to stimulate learning behaviour. This prospect may change the emotional state and thus processing of learning materials. It was tested whether a monetary reward or punishment affected information processing and recall of learned materials. Method. Two EEG studies were performed, with the N400 paradigm: sentences with a logical or illogical final word (e.g., the tree is full of apples/coffee). The difference in brain activity between these conditions was determined. *Study 1*: 39 female participants completed the N400 task, then a recall test of the sentence-final words. Participants were told that financial compensation increased with each correct answer (reward condition, $n=19$), or that compensation was fixed (control condition, $n=20$). *Study 2*: 56 female participants completed the N400 task, then a recall test of whether the sentences were logical. Participants were told that financial compensation increased with each correct answer (reward condition; $n=19$), decreased with each incorrect answer (punishment condition; $n=19$); or that compensation was fixed (control condition; $n=18$). Results. *Study 1*. In the reward condition the N400 effect was more spread over (left) frontal areas; recall was better than in the control condition. *Study 2*. No difference in brain activity was found between control and reward condition; in the punishment condition the N400 effect was more spread over (left) parietal and central areas. Recall performance was best in the control condition. Discussion. Results of the two studies seem contradictory: a reward prospect alters semantic processing, but its effects on learning are less clear.

Beyond Arabic digits: Symbolic number processing with alphabetic characters

Keywords: Cognitive development, Cognitive skills, Mathematics, Numeracy

Presenting Author: Courtney Pollack, Vanderbilt University, United States

The ability to understand numerical symbols is important for success in mathematics. In particular, literal symbols (e.g., x) in higher-level mathematics such as algebra are often used to represent numerical magnitude. However, compared to Arabic numerals, literal symbols may require more complex mental representations because these symbols have strong pre-existing associations in literacy that may interfere with numerical referents. The present study tested this notion using the same-different distance paradigm that typically produces longer response times and higher error rates for different magnitudes that are closer together compared to farther apart (i.e., a same-different distance effect). Twenty-four high school-aged adolescents completed three same-different tasks using numbers-only, literal symbols, and artificial symbols. All three symbolic formats produced a same-difference distance effect, suggesting that both literal and artificial symbols can access mental representations of magnitude. However, there was longer response time to process literal symbols

compared to artificial symbols, which suggests a cognitive processing cost associated with literal symbols that may reflect interference with extant mental representations related to literacy. Further, while there was a moderate positive correlation for reaction time between numbers-only and artificial symbol distance effects, reaction times in the literal symbols distance effect did not correlate with reaction times in the other conditions. Taken together, the results of the present study suggest that different cognitive mechanisms may support literal symbol processing in a mathematics context.

Session S 25

2 September 2017 14:45 - 16:15

Main Building A - A07

Single Paper

Learning and Special Education, Motivational, Social and Affective Processes

Special Education

Keywords: Assessment methods and tools, At-risk students, Attitudes and beliefs, Economics of education, Emotion and affect, Learning and developmental difficulties, Learning disabilities, Mathematics, Psychometrics, Quantitative methods, School effectiveness, Special education

Interest group: SIG 15 - Special Educational Needs

Chairperson: Maren Luebcke, Zurich University of Applied Sciences, Switzerland

Unemployment among individuals with learning disabilities: childhood predictors and adult outcomes

Keywords: At-risk students, Economics of education, Learning disabilities, Special education

Presenting Author: Anna-Kaija Eloranta, Niilo Mäki Institute, Finland; **Co-Author:** Vesa Närhi, University of Jyväskylä, Finland; **Co-Author:** Timo Ahonen, University of Jyväskylä, Finland; **Co-Author:** Elisa Korhonen, Niilo Mäki Institute, Finland; **Co-Author:** Tuija Aro, University of Jyväskylä, Finland

Learning disabilities (LDs) are known to be related with low education (e.g., Hakkarainen et al., 2016), and are hence a risk for unemployment and social marginalization (e.g., Myrskylä, 2012). However, research on long-term outcomes of LDs beyond early adulthood is scarce. In the present follow-up study we aimed to better understand the implications of LDs on individual wellbeing and society by examining unemployment of adults with childhood LDs. Four subgroups (reading disability (RD), mathematical disability (MD), reading and mathematical disability (RD + MD), and mild LDs) were studied. We analyzed 1) differences in unemployment among 509 individuals with different LDs and their 2530 controls, and 2) childhood predictors of long unemployment among individuals with LDs. Individuals with LDs had been unemployed significantly longer ($M = 358$ basic unemployment allowance (UA) days) than their controls ($M = 279$ days). The RD + MD and the MD group had received more UA than other groups ($M = 397$ days and 381 days, respectively). Moreover, the proportion of individuals having received UA for more than one year (258 days) was significantly higher among the LD group (28 %) than among controls (18 %), especially among the RD + MD (33 %) and the MD groups (31 %). Mathematical disability and mother's educational level were the only significant childhood predictors of receiving UA for more than a year. Results suggest that LDs have individual and societal implications on adulthood. Individuals with LDs need more efficient, long-term educational support, especially those with mathematical difficulties.

Attitudes of students with learning disabilities to teacher assistance in learning and task solving

Keywords: Attitudes and beliefs, Learning disabilities, Quantitative methods, Special education

Presenting Author: Tibor Vidákovich, University of Szeged, Hungary; **Co-Author:** Erika Köböl, University of Szeged, Hungary

This research investigated the attitudes of students with cognitive disabilities to three types of assistance in learning and task solving, and the correlations between their attitudes and their results on a reading comprehension test. We hypothesized that the achievements of students can be influenced by the appropriate form of teacher assistance. For the assessment of the attitudes, a questionnaire was developed that contained statements representing three situations and three assistance conditions: (1) no assistance, (2) verbal instruction, and (3) verbal instruction with an illustrative example. Students' attitudes to school learning and to social situations related to learning were also assessed. For the assessment of reading comprehension, three equivalent tests were developed. These tests were administered with the three different conditions of teacher assistance. Data were collected in special schools, and the sample comprised altogether 208 students (3rd to 8th graders). Analyses of correlations showed that the attitudes to the assistance conditions correlate with the attitudes to school learning and to social situations. The attitudes to the first condition of assistance do not depend on age. The second and third conditions of assistance were less popular among the 7–8th graders than among the other students. Similarly, attitudes to school learning and to social situations were also weaker in the sub-sample of 7–8th graders. Students performed better under both conditions of active teacher assistance than without assistance. However, significant negative correlations were found between attitudes and reading comprehension achievements. Positive attitudes seem to show that students really need teacher assistance.

Validating a math anxiety scale for adolescent students: A confirmatory factor analysis approach

Keywords: Assessment methods and tools, Emotion and affect, Mathematics, Psychometrics

Presenting Author:Johan Korhonen, Åbo Akademi University, Finland; **Co-Author:**Pekka Räsänen, Niilo Mäki Institute, Finland; **Co-Author:**Karin Linnanmäki, Åbo Akademi University, Finland

This paper reports a cross-sectional two cohort study on math anxiety in adolescent students. The aim of the study was to validate the math anxiety scale for adolescents (MASA) with a sample of grade seven and grade nine students. Construct validity was assessed with confirmatory factor analysis and item properties were examined with Rasch modelling. Furthermore, convergent and discriminant validity of the measure was investigated. The literature supports a multidimensional conceptualization of math anxiety but the operationalization of these dimensions vary across studies. Overall in anxiety research, two prominent dimensions are often used to conceptualize anxiety; state (emotion) and trait (worry) anxiety. Accordingly, this conceptualization was used as a starting point when developing the current scale. The preliminary confirmatory factor analyses supported the a priori two-factor structure of the MASA and correlational analyses supported the convergent and divergent validity of the measure.

Practice and effects of inclusive education – Results from a Swiss national empirical study.

Keywords: Learning and developmental difficulties, Learning disabilities, School effectiveness, Special education

Presenting Author:Reto Luder, Zurich University of Teacher Education, Switzerland; **Co-Author:**Andre Kunz, Zurich University of Teacher Education, Switzerland

During the last years, the school systems in Switzerland are developing from strongly separated models of special needs education (special schools and special classes) into inclusive education (inclusive support for pupils with special educational needs in mainstream schools). In this situation, a lack of knowledge is stated about the ways and methods of inclusive support in practice and their effects. The study presented in this paper session is founded by the Swiss National Science Foundation and analyzed the realization of inclusive education in Switzerland on a national sample of Teachers and Professionals for special needs education (N=3669) in 208 schools. The study conducted a multi-method, longitudinal design (from 2014 to 2016) with a combination of quantitative and qualitative research methods, ranging from standardized school performance tests (languages and mathematics) to questionnaires, interviews and content based document analysis. The findings of the study are indicating important factors for effective realization of inclusive support and show ways for further development of practice for individual educational planning and support for children with special educational needs in inclusive schools.

Session S 26

2 September 2017 14:45 - 16:15

Pinni B - B1100

Single Paper

Motivational, Social and Affective Processes

Motivation and Achievement - B

Keywords: Achievement, Educational Psychology, Experimental studies, Motivation, Self-efficacy, Self-regulation, Social aspects of learning and teaching, Student learning

Interest group: SIG 08 - Motivation and Emotion

Chairperson: Ulrich Ludewig, University of Tübingen, Germany

Longitudinal relations between school-related basic need support and academic self-efficacy

Keywords: Achievement, Educational Psychology, Motivation, Social aspects of learning and teaching

Presenting Author:Åge Diseth, University of Bergen, Norway

Need support, as described within self-determination theory (SDT), and self-efficacy focus on the role of personal autonomy and control in motivation. This study investigated the longitudinal relations between self-efficacy for academic achievement and school related basic support from parents and teachers measured at three time points at an interval of two years (T1 at 6th grade, T2 at 8th grade, and T3 at 10th grade respectively). A main purpose was to investigate temporal causal relations between these variables, thus providing support for causality that has not been sustained in previous cross sectional research on these variables. A longitudinal path analysis (cross lagged design) showed that teacher support at T1 (6th grade) predicted self-efficacy at T2 (8th grade), and teacher support T2 (10th grade) predicted self-efficacy at T3 (10th grade). Hence, the results indicated that teacher support of basic needs is an independent source of subsequent self-efficacy, also when controlling for the effects of parent support and prior levels of self-efficacy. The relatively long time interval of two years provided a particularly strong test of these longitudinal relations, and support for the theoretical assumption that basic need support is an important source of motivation among students.

Individual and compositional effects of achievement goals, self-regulation and student achievement

Keywords: Achievement, Motivation, Self-regulation, Student learning

Presenting Author:Melvin Chan, National Institute of Education, Singapore

This study examines individual and class relations of academic achievement and learning-related outcomes. The primary research questions are: i) What impact do different aspects of motivational goal orientations have on students' self-regulatory dispositions and academic performance, taking into account the social and academic background of students? ii)

To what extent do individual and compositional effects of social and academic background influence student motivation, self-regulatory dispositions and academic performance? Based on a large-scale study of grade 10 students in Singapore, findings reveal that substantial compositional effects on both performance goals and academic achievement. Approach goals (mastery and performance) produced positive effects on self-regulation and achievement, while performance avoidant goals negatively predicted achievement. Implications of findings will be discussed, particularly, the importance of mastery learning.

Promoting Long-term Interest with a Utility-Value Intervention

Keywords: Achievement, Educational Psychology, Experimental studies, Motivation

Presenting Author:Judith Harackiewicz, University of Wisconsin-Madison, United States; **Co-Author:**cameron hecht, University of Wisconsin-Madison, United States; **Co-Author:**stacy priniski, University of Wisconsin-Madison, United States

We tested the long-term effects of a utility-value intervention that had proven effective in promoting academic performance for underrepresented students in a college biology course (Harackiewicz et al., 2016). We followed 1040 biology students over a three-year period and found that baseline interest, course grades, and perceived values were all important predictors of whether students continued into the second course of the Biology sequence, and whether they majored in STEM disciplines three years later, offering strong support for the multiplicative effects of expectancies and values in predicting academic choices. Interventions that promote perceived values and course performance in the short term can have long-term effects on important academic outcomes.

Correlates of students' self-evaluation bias of competence according to their level of achievement

Keywords: Achievement, Educational Psychology, Motivation, Self-efficacy

Presenting Author:Ludivine Jamain, Université Grenoble Alpes, France; **Co-Author:**Therese Bouffard, Université du Québec à Montréal, Canada; **Co-Author:**Pascal Pansu, Université Grenoble Alpes, France

Whatever their competence, students may erroneously estimate it and present either a positive or a negative bias of self-evaluation. The aim of this study was to examine if students' self-evaluation bias correlates differently to their motivation and their perception of parental feedback toward their school achievement. Participants were fourth graders and were examined with regard to two school subjects: Language arts (n=165) and Mathematics (n=168). Results showed that whatever their high or low level of achievement, students with a positive bias were generally at advantage over those with a negative bias which regard to their learning motivation in both Language arts and Mathematics and their perception of parental feedback. Cognitive advantage of students with higher competence seems to be annihilated when they underestimate their competence. Conversely, an overestimation of competence seems to protect students with a low level of achievement. Findings of this study thus confirmed the conclusions of previous research regarding to the deleterious correlates of the underestimation of competence and adaptive correlates of overestimation of competence.

Session S 27

2 September 2017 14:45 - 16:15

Virta - 113

Single Paper

Lifelong Learning

Lifelong Learning

Keywords: Citizenship education, Informal learning, Lifelong learning, Motivation, Professions and applied sciences, Qualitative methods, Science education, Vocational education, Workplace learning

Interest group: SIG 14 - Learning and Professional Development

Chairperson: Beatriz Vargas Dorneles, Brazil

Seeing the invisible: editing wikipedia for the public good

Keywords: Citizenship education, Informal learning, Professions and applied sciences, Lifelong learning

Presenting Author:Allison Littlejohn, Open University, United Kingdom; **Co-Author:**Nina Hood, University of Auckland, Faculty of Education, New Zealand; **Co-Author:**Martin Rehm, University of Duisburg-Essen, Germany; **Co-Author:**Bart Rienties, Open University, United Kingdom

This presentation illustrates the unseen work of online editors as they develop strategies to create and share knowledge in Wikipedia. Online tools open opportunities for social engagement with the ways knowledge is developed and circulated. New forms of knowledge production and distribution enable people to take on new responsibilities for knowledge, raising questions about knowledge strategies, the ways knowledge is generated and who contributes. Trace data from Wikipedia was analysed through Social Network Analysis and qualitative, interview data was investigated through thematic analysis. The findings indicate that work and learning is not only shaped by technical and content knowledge, but is influenced by the emerging roles and responsibilities associated with knowledge creation. These finding have important implications for the way society views the impact of learning activities in digital settings on the public good.

Entrepreneurial Competencies of Established Women Entrepreneurs in Germany and Ireland

Keywords: Professions and applied sciences, Vocational education, Workplace learning, Lifelong learning

Presenting Author:Kaethe Schneider, Friedrich Schiller University Jena, Germany

While there is a growing body of literature in the field of entrepreneurial competencies of male entrepreneurs, it seems that there is still considerable uncertainty concerning competencies as underlying set of characteristics of female entrepreneurs that result in effective performance. The current study extends previous research to examine the entrepreneurial competencies of established women entrepreneurs. The results reveal that the entrepreneurial competency predicted by a set of managerial skills, entrepreneurial orientations, entrepreneurial self-efficacy and the founder and innovator identity has strong impact on entrepreneurial success. Besides of business-related factors and financial performance the individual fulfillment and the social contribution predict the entrepreneurial success.

Determinants of a corporate culture for lifelong competence development

Keywords: Informal learning, Qualitative methods, Workplace learning, Lifelong learning

Presenting Author:Bernd Gössling, University of Osnabrück, Germany

Even though it is generally accepted that learning and development is necessary during the whole course of (working)life, human resource development and corporate training efforts are usually still targeted at younger employees. This neglects the added value of a workforce with a broad demographic structure and the learning potential of experienced and aging employees. In our study this is seen as a call for a more individualized approach to lifelong competence development. By interviewing 28 older employees, 3 HR representatives and 8 managers, we explored (a) which personal and corporate factors influence learning participation and readiness to run through a competence assessment process from the three perspectives, (b) which strategic and cultural changes are necessary and (c) to which degree are the internal stakeholders willing to change corporate culture and strategies. The results indicate that corporate views and stereotypes of aging employees are at least partially internalized even if employees themselves recognize a misfit between the stereotype and their own experience. Readiness to actively participate in learning activities also depends on professional identification and job satisfaction, which in turn depends on personal (e.g. family situation) and corporate factors (e.g. shown appreciation). When competence development is managed, learning opportunities are promoted and competence assessment is accompanied by guidance, readiness of older employees to partake is higher. The willingness of internal stakeholders for change also depends on the wider institutional background (e.g. legal conditions of acquiring qualifications) and financial flexibility (e.g. for personal guidance).

Workplace learning motivation: pointing out the conceptual and measurement issues

Keywords: Motivation, Science education, Workplace learning, Lifelong learning

Presenting Author:Nané Kochoian, Université catholique de Louvain (UCL), Belgium; **Co-Author:**Isabel Raemdonck, Université Catholique de Louvain, Belgium; **Co-Author:**Mariane Frenay, Université catholique de Louvain (UCL), Belgium

Workplace learning motivation becomes an increasingly important topic given the necessity for workers to involve in continuous learning. The present literature review focuses on the way workplace learning motivation is conceptualized and measured. Inclusion criteria captured empirical studies on training and learning motivation in the context of work. A total of 34 articles were included and examined through different aspects. First, the conceptualization of workplace learning motivation was analyzed. We also focused on the operationalization of the concept and its differentiation from other related terms. Results revealed that concepts of motivation and workplace learning were poorly developed in the conceptualization and operationalization of training and learning motivation. Moreover, there was no evidence for a clear distinction between pre-training, training and learning motivation. The article discusses results and brings suggestions that might reduce the revealed issues.

Session S 28

2 September 2017 14:45 - 16:15

Virta - 112

Symposium

Motivational, Social and Affective Processes

Facets of heterogeneity and their impact on emotions in the classroom

Keywords: Achievement, Developmental processes, Educational Psychology, Emotion and affect, Motivation and emotion, Quantitative methods

Interest group: SIG 08 - Motivation and Emotion

Chairperson: Katarzyna Gogol, University of Konstanz, Germany

Discussant: Tim Mainhard, Utrecht University, Netherlands

In spite of the emotional nature of classrooms and the impact of emotions on critical outcomes like learning, achievement, career decisions, and well-being, research on emotions in the school context is still relatively scarce. This symposium brings together several perspectives to address the impact of different facets of heterogeneity on learning-related emotions. The diverse research approaches applied in the studies cover a wide range of emotions and school-subjects, using both trait and state assessments as well as cross-sectional and longitudinal data sets from four countries. The first paper investigates relations of heterogeneity in students' perceived competence and situational interest in a lesson with various students' and teachers' emotions (i.e., enjoyment, anger, anxiety, and boredom). The second paper focuses on the effects

of subject-specific trait boredom due to being over- or unchallenged (i.e., in mathematics, German, and French classes) on students' career aspirations. The third paper examines how different task difficulties affect the relation between state math anxiety and math performance. The fourth paper addresses the heterogeneity of school subjects with regard to the students' experience of anxiety as well as developmental dynamics of anxiety across different school subjects (i.e., mathematics, German, French) and levels of generality. As such, the presented studies tackle important questions to better understand the complexities of students' and teachers' emotional experiences and their interrelations with heterogeneity aspects of classroom situations. Taken together, the symposium increases the empirical evidences for the importance of emotions at school and stimulate practical implications for school learning environments.

Heterogeneity in Competence and Situational Interest of Students relates to Classroom Emotions

Presenting Author:Eva Becker, University of Zurich, Switzerland; **Co-Author:**Melanie Keller, Leibniz Institute for Science and Mathematics Education at Kiel University, Germany; **Co-Author:**Madeleine Bieg, University of Konstanz, Germany; **Co-Author:**Fritz C. Staub, University of Zurich, Switzerland

Dealing with heterogeneity in the classroom and fostering student's individual needs, is a crucial demand that has been placed on teachers to optimize students' learning conditions. Besides stable interindividual differences between students (e.g., socio-economic background, special needs) there are also differences that arise at a situational level: For instance, lessons in which some students don't feel challenged while others find the tasks too difficult and some students are interested in the topic while others are not. The aim of the study is to examine antecedents (teaching quality) and effects (emotions) of lesson-specific heterogeneity in students' competence and situational interest. The study was conducted with samples from Germany (43 classes, 358 mathematic lessons, experienced teachers) and Switzerland (29 classes, 87 German lessons, pre-service teachers). Teachers and students filled out short questionnaires in the last five minutes of a minimum of three lessons. Results from hierarchical regression analyses showed that lessons with larger heterogeneity in students' perceived competence and situational interest were associated with lower teaching quality (cognitive activation, lesson structure, social support) and a negative emotional climate (students: more anger and boredom; teachers: more anger and anxiety). Consequently, both teachers' and students' emotions can be considered as central factors in heterogeneous classrooms: On the teachers' side, negative teaching emotions are stress-eliciting and detrimental for instructional behavior and on the students' side, negative emotions impede their learning. Besides instructional techniques to deal with heterogeneity (e.g., adaptive instructions), emotional competences to deal with these classroom situations could be a focus in teacher trainings.

Being over- or underchallenged: Effects on students' career aspirations via self-concept and boredom

Presenting Author:Maike Krannich, University of Konstanz, Germany; **Co-Author:**Thomas Goetz, Department of Empirical Educational Research, Germany; **Co-Author:**Anna-Lena Roos, University of Konstanz, Germany

In a school context, heterogeneous classes regarding cognitive capabilities and previous knowledge are one challenge teachers are confronted with. Consequently, the same instructional setting could result in students being overchallenged due to task demands above their abilities and students being underchallenged due to task demands below their abilities. Being over- or underchallenged 1st) plays a crucial role for the students' expectancy of success which in turn influences their career aspirations and 2nd) is important for the level of boredom which the students experience. Furthermore, high levels of boredom could also decrease career aspirations. The present study investigates the influence of students' being over- or underchallenged on their career aspirations mediated by academic self-concept and academic boredom. We tested these mediation hypotheses with a sample of $N = 662$ Swiss high-school students ($M_{age} = 17.69$) from 35 classes by using a questionnaire-based trait assessment of subject specific (i.e., German, French, mathematics) perceived challenge, self-concept, boredom and career aspirations. Results showed that being overchallenged reduces students' career aspirations while taking self-concept into account, whereas being underchallenged enhances these aspirations via self-concept. Furthermore, we could also show a negative effect of both, being over- and underchallenged, on students' career aspirations mediated by boredom. As such, the results of our study indicate effects of heterogeneity (being over- or underchallenged) on students' career aspirations and suggest that boredom – as the most frequently experienced emotion at school – shouldn't be neglected when looking at future career choice.

The relationship between state math anxiety and math performance among sixth graders

Presenting Author:Riikka Sorvo, University of Jyväskylä, Finland; **Co-Author:**Noona Kiuru, University of Jyväskylä, Finland; **Co-Author:**Tuire Koponen, University of Jyväskylä, Finland; **Co-Author:**Timo Ahonen, University of Jyväskylä, Finland; **Co-Author:**Helena Viholainen, University of Jyväskylä, Finland; **Co-Author:**Tuija Aro, University of Jyväskylä, Finland; **Co-Author:**Mikko Aro, University of Jyväskylä, Finland

Most of the math anxiety studies among children have focused on trait anxiety and left state anxiety unexplored. The previous studies have also overlooked the effect of the degree of difficulty of the performance measures on the relationship between math anxiety and performance. The aim of this study was to examine the relationship between trait and state math anxiety among sixth graders ($N = 128$) and the interplay between state math anxiety and math achievement, depending on task difficulty. The students were divided into three ability groups based on their arithmetic skills. They completed easy and difficult math task, adapted to their ability group and their performance was standardized based on the group. The trait math anxiety was assessed with six items and the state math anxiety with four items per task (easy/difficult). Trait anxiety in autumn was related to state anxiety in both easy and difficult task in the spring. Moreover, participants who were only

anxious about the difficult task, performed worse in the difficult task in relation to their skill level than they did in the easy task, whereas participants who were not anxious or were anxious about both tasks, performed similarly in the tasks relatively the average in their ability group. These results emphasize the importance measuring also state math anxiety in addition to trait anxiety. The results also give us information about the immediate effect of state math anxiety on math performance.

Structural model and developmental dynamics of general and subject-specific academic anxieties

Presenting Author:Katarzyna Gogol, University of Konstanz, Germany; **Co-Author:**Martin Brunner, University of Luxembourg, Germany; **Co-Author:**Franzis Preckel, University of Trier, Germany; **Co-Author:**Romain Martin, University of Luxembourg, Luxembourg

General and subject-specific conceptualizations of academic anxiety appear to coexist in the literature and have not been related to each other previously. Moreover, the potential hierarchical nature of academic anxiety has not been debated. However, referring only to one perspective and neglecting the other necessarily draws an incomplete picture of this important emotion in educational research. Thus, in the present study, we introduce a new structural model of academic anxiety that investigated and supported a subject-specific and hierarchical organization of academic anxiety with general component at the apex of the hierarchy. Further, we applied the new model to examine developmental dynamics of general and subject-specific (i.e., German, French, and mathematics) components of students' academic anxiety. Specifically, we analyzed how the general anxiety affect change in the different subject-specific anxieties (top-down processes) and on the other hand, how subject-specific anxieties influence change in the general level of academic anxiety (bottom-down processes). Moreover, we studied how subject-specific anxieties affect change in anxiety in other subjects (across-subject processes). We did not find any support for substantial top-down nor bottom-up developmental processes. However, our results indicate substantial negative developmental effects across anxiety in different school subjects. Taken together, the present study makes a substantial contribution to a fuller and more nuanced understanding of the structure and development of academic anxiety.