Scaffolding in Simulations for Learning and Professional Development

E-CER founding date: 1st of January 2024

E-CER Scope:

Scaffolding is an important design feature of simulation-based learning. A scaffold consists of (a) a triggering condition that reflects the deviation between a learner's actual problem-solving and learning process from the desired behaviour and (b) the content that is provided by offering more or less specific feedback and advice. Scaffolds within simulation-based learning can be distinguished based on different characteristics. First, the decision on whether or when to trigger a scaffold can be computer-based or human-based. Second, the content of a scaffold can be prepared in advance or it can be developed ad-hoc (i.e., emerging during the simulation process). Third, the embeddedness of scaffolding refers to the source of a scaffold in the perception of the learner. Internal scaffolding is perceived as part of the scenario's 'storyline' while external scaffolding comes from outside of the scenario (i.e., from the teacher). Some types of scaffolds have been found to be more effective than others depending not only on the simulation environment but also on the individual characteristics of the learners (e.g., prior knowledge).

To enhance our insights about effective scaffolding, this E-CER includes a team with complementary expertise in theory-based design of simulations, data triangulation, and multimodal online measures. Altogether we pursue four aims:
(1) *Categorising design features of scaffolds in simulations*. The development of a comprehensive framework supports the design and implementation of scaffolds in educational simulations.
(2) *Identifying cognitive, metacognitive, and non-cognitive learning processes as triggers of and reactions to scaffolds*. Insights into how learners cognitively process and respond to different scaffolds are important to developing theory-based scaffolding strategies.
(3) *Evaluating multimodal (online) measures to investigate the above processes concerning scaffolding in simulations*. Employing multiple modes of data collection

allows researchers to gain a more holistic understanding of the multi-faced learning processes.
(4) *Developing guidelines to implement scaffolds in simulation design*. A theoretically driven and evidence-based composition of scaffolds contributes to enhanced learning outcomes and supports instructional practices.

E-CER Members:

1. DOROTHY DUCHATELET
   Dorothy Duchatelet, PhD, is Acting Director of the Teaching and Learning Center of the Open Universiteit, Netherlands. Her research focuses on expertise development among teachers and other professions. She is involved in projects focusing on the development of teachers' classroom management skills, and the development of expertise in programming and software testing. She has a specific interest in (online) learning environments that bring the professional context into higher education, and also studies the design and effects of simulation-based learning environments in higher education and training.

   

2. HELEN JOSSBERGER
   Helen Jossberger, PhD, is Assistant Professor at the Faculty of Human Sciences, Department Educational Science, at the University of Regensburg, Germany. She teaches courses on learning and professional development, expertise research, instructional design, evaluation, counselling development and socialisation, and methodology. Her research focuses on self-directed and self-regulated learning in vocational education, professional learning, (simulated) workplace learning and (visual) expertise development. Since 2014, she serves as Assistant Editor for Educational Research Review. In the past, she acted as SIG 14 JURE coordinator and was a member of the JURE 2010 scientific organising committee. She received her PhD at the Open Universiteit on self-regulated learning in vocational education. She obtained a Master's degree in Cognitive Psychology at Maastricht University.

3. ANDREAS RAUSCH

   Dr. Andreas Rausch is a full professor of Economics and Business Education – Workplace Learning at the Mannheim Business School (MBS) of the University of Mannheim, Germany. He received his PhD ("Dr. rer. pol.") in Business Education and also qualified as a professor at the University of Bamberg. His current research interests include learning at (simulated) workplaces, domain-specific problem solving, competence assessment, and vocational education and training (VET). Andreas is committed to empirical educational research with a focus on process analysis and non-cognitive facets. His research is published in international journals and he also serves as an associate editor for Vocations and Learning (Springer Nature) and as editorial board member and reviewer for several further journals in the field.

4. HALSZKA JARODZKA

   As a Full Professor of Educational Sciences at the Open Universiteit in the Netherlands, my expertise centers on integrating eye-tracking technology into educational research. I currently lead the department of "Online Learning and Instruction," where I guide a team of dedicated scholars and oversee the academic progress of both doctoral and master's students. My commitment to academic development extends beyond my department; I chair our university's delegation to the national 'Recognition & Rewards' committee, aimed at diversifying academic career paths. Additionally, I represent our university in the national initiative on AI in education and have previously led our university-wide ethics committee, ensuring the highest standards of research integrity and ethical practices.

   My foray into eye-tracking research commenced at the KMRC-Leibnitz Institute in Tübingen, Germany, followed later on by a visiting scholarship position at the Eye-tracking laboratory in Lund, Sweden. My work spans the application of eye-tracking in various educational settings, studying expertise development, innovating Eye-Movement-Modeling-Examples (EMME) for educational videos, and exploring

computer-based learning and assessment. This multifaceted research has thrived through international collaborations and significant grant support.
A cornerstone of my career is my active involvement with the EARLI (European Association for Research on Learning and Instruction). Alongside Prof. Gruber and Prof. Kirschner, I was instrumental in establishing, and later chairing, the EARLI Special Interest Group 27 on online learning processes. I have also co-chaired the EARLI Special Interest Group 6 on Instructional Design. My contributions to educational science were acknowledged when I was invited as a keynote speaker at the EARLI conference in 2021, an honor that allowed me to disseminate my insights and research findings to an international audience.

5. VIOLA DEUTSCHER

Viola Deutscher serves as a professor of 'Vocational Education and Digital Learning' at the University of Göttingen and is currently the Chair for the Special Interest Group 'Workplace Learning' for the American Educational Research Association. She earned her bachelor's degree in economics from Goethe-University in Frankfurt and pursued her master's in business education at the University of Paderborn, where she received her doctorate in 2015 after a research stay at the Learning Sciences Research Institute in Chicago. From 2016 to 2023, she held the position of Professor for Business Education and Training Quality at the University of Mannheim. Her research primarily focuses on competence diagnostics, the quality of workplace learning environments, and digital learning, with a specific emphasis on personalized learning and XR learning in professional and higher education.

6. CHARLOTT SELLBERG

Charlott Sellberg is Associate Professor at Department of Education, University of Oslo, Norway and at Department of Applied Information Technology, University of Gothenburg, Sweden. She has a multidisciplinary background in Cognitive Science, Human-Computer Interaction and Education. Her research focuses on the use of simulations and simulators for professional learning, often with attention to instructional work in such technology-intense settings. She is a member of the advisory board for Centre of Excellence in Maritime Simulator

Training and Assessment (COAST) and a member of the editorial board for WMU Journal of Maritime Affairs (JoMA).

7. DAVID GIJBELS

David Gijbels is professor of learning and instruction and vice-dean in the Faculty of Social Sciences of the University of Antwerp.
His research is situated within the researchgroup EDUBRON and he teaches different courses in the master 'education and training sciences' (OOW). He is co-founder of the Antwerp Social Lab.

8. PIET VAN DEN BOSSCHE

Piet Van den Bossche is Professor 'Learning in Organisations' at the University of Antwerp (Faculty of Social Sciences) and Professor 'Team Learning' at Maastricht University (School of Business & Economics). He is co-director of the core facility 'the Antwerp Social Lab' on psychophysiological and behavioral methods that capture human interactions in interpersonal and mediated contexts. His research activities focus on how learning and performance is established through social interactions. From this perspective he studies team learning and professional development.

9. MARCELLA HOOGEBOOM

Dr. Marcella Hoogeboom is Assistant Professor at the department of Learning, Data Analytics and Technology at the University of Twente, where she earned a PhD (cum laude) on adaptive behavioral dynamics. She is specialized in how learning in teams and organizations unfolds over time, leadership, team routines, and complex adaptive systems. She supervises multiple PhDs around these topics. She is involved in several major research projects on learning in the workplace and effective collaboration in teams (e.g., NWA Skills@Scale, NWO Learning and Innovation Ahead of the Threat). In her work she uses, combines, and implements innovative tools and techniques for examining temporal processes of learning and effective interactions, also in the context of simulation settings.

10. BAS KOLLOFEL

Bas Kollöffel is Assistant Professor of Professional Learning with Technology. He received a PhD in Instructional Technology from the University of Twente. The focus of his research is on the use of technology-based, immersive training environments for professional and vocational training and education. Examples of such technologies are Virtual Reality (VR), Augmented Reality (AR), GoPro action cameras, simulators, games and online learning environments (including MOOC's and SPOC's). His research projects focus on both the instructional design and the effectiveness of such environments, by assessing the training and learning effects, and studying and finding new ways to support learners, to optimize their learning processes, and to foster transfer of training, in order to facilitate the use of newly acquired knowledge, skills, and attitudes at the workplace.