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Computational thinking and coding as tools of the mind

Abstract

In recent years, educational and developmental researchers have invested significant effort in developing and testing cognitive interventions aimed at stimulating the development of executive functions (EF) in children with special educational needs. However, limited attention has been given to the effectiveness of intervention programs that are naturally embedded in children's everyday school activities. In this talk, I will discuss the effectiveness of integrating new digital literacy elements, such as computational thinking and coding, into the elementary school curriculum to improve children's EFs in early elementary school. When children learn to think computationally or code in school, they not only develop digital skills but also learn to articulate and clarify their thoughts and plans, generate a clear sequence of commands (the code), and test their hypotheses—processes that can stimulate the development of EF skills. I will present the results of two cluster randomized trials (Studies 1 and 2) and a multiple-baseline single-case study (Study 3), discussing how learning coding and computational thinking could boost the development of EF skills in 5-6-year-old typically developing children (Study 1), children with low EF skills (Study 2), and children with sickle cell disease, a clinical condition characterized by frontal-lobe infarctions and significant executive dysfunctions (Study 3).