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Overcoming a 4th grader's challenges with working-memory via constructivist-based pedagogy and strategic scaffolds: tia's solutions to challenging multiplicative tasks.

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Summary: This case study addressed a twofold problem: (a) how a particular, complex scheme that coordinates multiplicative and additive operations may evolve for a student (Tia, grade-4) who was identified as having a learning disability and working memory deficits and (b) how may a constructivist-based approach, Student-Adaptive Teaching (and special considerations of a student's tendency to struggle with working memory) foster the student's construction of such a scheme. The present study consists of qualitative analysis of teaching considerations for and interactions with Tia during episodes in which she was engaged in solving multiplicative reasoning tasks. We discuss three contributions of Tia's case study: (a) the non-trivial mathematics students like her can undertake and enjoy learning, (b) the critical role that analysis of a child's current conceptions serves in adapting goals/activities for her learning of such mathematics, and (c) the potential benefits of utilizing student-adaptive teaching methods for students with learning disabilities.

Classification: D72 C42 F32

Keywords: constructivism; scheme; multiplicative reasoning; working memory; learning disabilities; visual representations

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