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Examining the task and knowledge demands needed to teach with representations.

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Summary: Representations are often used in instruction to highlight key mathematical ideas and support student learning. Despite their centrality in scaffolding teaching and learning, most of our understanding about the tasks involved with using representations in instruction and the knowledge requirements imposed on teachers when using these aids is theoretical. In this study, we examine the task and knowledge demands for teaching integer operations with representations by analyzing teaching practice. Teaching integer operations is used as an intensity case, as integer operations are challenging for students, and teachers are often required to employ several representations to teach this topic. Following a practice-based approach while also taking prior literature into consideration, we first generate a list of tasks entailed in teaching with representations and then discuss the knowledge demands imposed on teachers to successfully undertake this work. We highlight these tasks and knowledge demands by analyzing and discussing an integer addition and an integer subtraction episode for each of two teachers, Bonita and Karen. Based on our analysis, we organize the generated knowledge components using the mathematical knowledge for teaching framework. We conclude by drawing implications for teacher educators and curriculum developers.

Classification: D30 D40 F40 D50

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