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Mathematical content knowledge for teaching elementary mathematics: a focus on whole-number concepts and operations.

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Summary: This report represents part of a recent effort to summarize the state of knowledge of prospective elementary teachers' (PTs') mathematics content knowledge and the development thereof. Extensive reviews of the research literature were conducted by a recent PME-NA working group across various content areas. This report focuses on whole number and operations. Research in this area is scarce. What we do know from the literature is that PTs' knowledge of whole number and operations is insufficient and in need of improvement. PTs reason about whole numbers and operations in ways that are tied to the standard algorithms. At the same time, they are hard-pressed to explain why these algorithms work. PTs tend to overgeneralize about operations and to overlook important distinctions. Some of the research reviewed helps us to understand the nuances of PTs' conceptions and can help to inform instruction. Further research is needed to (a) better understand PTs' conceptions when they enter our programs, and (b) better understand how PTs' conceptions develop.

Classification: F49 B50

Keywords: subject content knowledge; preservice teacher education; primary education; research; state of the art; bibliographies; integers; arithmetic operations; number sense; number concepts; arithmetic; algorithms; teacher characteristics

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