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Mathematical content knowledge for teaching elementary mathematics: a focus on algebra.

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Summary: As part of a recent effort to summarize research-based knowledge of prospective elementary school teachers' (PTs) mathematical content knowledge, this paper summarizes research literature on PTs' knowledge of algebra, focusing on the range of years from 1998 through 2012. The 21 papers included in this summary focus on a broad range of topics within algebra, such as (a) producing, representing, and justifying generalizations; (b) interpreting and using algebraic symbols; (c) solving algebraic word problems; and (d) understanding functions. Looking across this body of research, three themes are identified: (1) PTs generally have strong procedural skills and can make mathematically sound generalizations of many different types of patterns; (2) however, PTs tend to struggle to (a) interpret and effectively use algebraic symbols, even those that they have produced themselves; (b) interpret graphical representations; and (c) make connections between representations; and (3) PTs have limited algebraic problem-solving strategies, often relying, inflexibly, on inefficient and/or incorrect computational methods. Suggestions for future research directions are discussed.

Classification: H29 I29 B50

Keywords: subject content knowledge; preservice teacher education; primary education; research; state of the art; bibliographies; elementary algebra; functions; generalization; notation; word problems; graphical representations; modes of representation; problem solving; teacher characteristics

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