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An exploratory study of pre-service middle school teachers' knowledge of algebraic thinking.

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Summary: Using algebraic habits of mind as a framework, and focusing on thinking about functions and how they work, we examined the relationship between 18 pre-service middle school teachers' ability to use the features of the algebraic thinking (AT) habit of mind "building rules to represent functions" and their ability to recognize and interpret the features of the same AT habit of mind in middle school students. We assessed the pre-service teachers' own ability to use the AT habit of mind building rules to represent functions by examining their solutions to algebra-based tasks in a semester-long mathematics content course. We assessed the pre-service teachers' ability to recognize and interpret students' facility with the AT habit of mind building rules to represent functions by analyzing their interpretations of students' written solutions to algebra-based tasks and their ability to plan and analyze AT interviews of middle school students during a concurrent field-based education course. The data revealed that the pre-service teachers had a limited ability to recognize the full richness of algebra-based tasks' potential to elicit the features of building rules to represent functions in students. The pre-service teachers' own overall AT ability to build rules to represent functions was related to their ability to recognize the overall ability of students to build rules to represent functions, as exhibited during one-on-one interviews, but not to their ability to recognize the overall ability to build rules to represent functions exhibited exclusively in students' written work. Implications for mathematics teacher education are discussed.

Classification: H39 H29 F99 C39

Keywords: algebraic thinking; algebra instruction; teacher knowledge; teacher education

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