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The fractional knowledge and algebraic reasoning of students with the first multiplicative concept.

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Summary: To understand relationships between students' quantitative reasoning with fractions and their algebraic reasoning, a clinical interview study was conducted with 18 middle and high school students. Six students with each of three different multiplicative concepts participated. This paper reports on the fractional knowledge and algebraic reasoning of six students with the most basic multiplicative concept. The fractional knowledge of these students was found to be consistent with prior research, in that the students had constructed partitioning and iteration operations but not disembedding operations, and that the students conceived of fractions as parts within wholes. The students' iterating operations facilitated their work on algebra problems, but the lack of disembedding operations was a significant constraint in writing algebraic equations and expressions, as well as in generalizing relationships. Implications for teaching these students are discussed.

Classification: F43 F44 C33 C34

Keywords: fractional knowledge; algebraic reasoning; struggling students; first multiplicative concept; iterating operation; disembedding operation

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