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A longitudinal examination of middle school students' understanding of the equal sign and equivalent equations.

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Summary: This longitudinal study investigated (a) middle school students' understanding of the equal sign, (b) students' performance solving equivalent equations problems, and (c) changes in students' understanding and performance over time. Written assessment data were collected from 81 students at four time points over a 3-year period. At the group level, understanding and performance improved over the middle school years. However, such improvements were gradual, with many students still showing weak understanding and poor performance at the end of grade 8. More sophisticated understanding of the equal sign was associated with better performance on equivalent equations problems. At the individual level, students displayed a variety of trajectories over the middle school years in their understanding of the equal sign and in their performance on equivalent equations problems. Further, students' performance on the equivalent equations problems varied as a function of when they acquired a sophisticated understanding of the equal sign. Those who acquired a relational understanding earlier were more successful at solving the equivalent equations problems at the end of grade 8.

Classification: H30 C30

Keywords: research; empirical investigations; lower secondary; educational diagnosis; learning; comprehension; elementary algebra

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