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On recognizing proportionality: does the ability to solve missing value proportional problems presuppose the conception of proportional reasoning?

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Summary: This paper investigates the relationship between the ability of middle school students to solve missing value proportional problems and their facility in differentiating proportional relationships from non-proportional relationships. Students in low- and high-proficiency groups in mathematics took a ratio-and-proportion test involving two typical missing value proportional (MVP) and two recognizing proportionality (RP) problems. The findings revealed that while the students generally performed better on MVP problems than on RP problems, the two groups differed in their performance on MVP problems, but not on RP problems. Moreover, of those students from both the groups who successfully solved the two MVP problems, a significantly greater proportion of students in the high-proficiency group were unsuccessful in solving either of the two RP problems than those in the low-proficiency group. An analysis of performance differences between items within the same student group showed that the effect of differences in the structural components of RP problems to some extent contradicted the previous findings on the effect of differences in the structural components of MVP problems. It is hoped that these findings can shed light on what might be missing in the teaching and learning of proportional reasoning.

Classification: F83 H33

Keywords: missing value proportional problems; ratios; proportions; proportional reasoning

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