Australian Junior Secondary Students' Approaches to Solving Ratio Problems Prior to Formal Instruction and Their Misconceptions

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Progressing from additive to multiplicative thinking is a key outcome of high school mathematics, making ratios an essential topic of study in junior secondary. Despite being a "big idea" in mathematics (Siemon et al., 2012), ratios are challenging to learn and teach (Lamon, 2007).

This study aimed to investigate Australian students' approaches to solving ratio problems prior to formal instruction and their misconceptions. 15 Year 8 students were given an 8-itemed ratio test and semi-structured interviews to explore their ratio conceptions. These quantitative and qualitative findings were then triangulated to synthesise common themes and trends.

Students' responses to the question "Can 10 people be divided into two groups with a ratio of 1:2?" were analysed. A 26.7% success rate was reported. Analysis of incorrect responses was conducted using a modified error analysis framework (Radatz, 1979). Main errors included incorrect associations with fractions and application of irrelevant procedures. Analysis of correct responses revealed varying levels of developing proficiency with ratios, with some students drawing on prerequisite knowledge including division and equal groups.

The findings of this study indicate how teachers should support students in developing proficiency in multiplicative thinking and prerequisite knowledge through diagnostic assessment and revision opportunities to set them up for success. Secondly, rather than viewing the topic of ratios as distinctly new, the similarities and differences between fractions and ratios should be made explicit so students can make mathematical connections.

References

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