

ZMATH 2010a.00338

Kim, Kyungmi; Whang, Woo Hyung

The impact of children's understanding of fractions on problem solving.

J. Korea Soc. Math. Educ. Ser. A, Math. Educ. 48, No. 3, 235-263 (2009).

Summary: The purpose of the study was to investigate the influence of children's understanding of fractions in mathematics problem solving. Kieren has claimed that the concept of fractions is not a single construct, but consists of several interrelated subconstructs (i.e., part-whole, ratio, operator, quotient and measure). Later on, in the early 1980s, Behr et al. built on Kieren's conceptualization and suggested a theoretical model linking the five subconstructs of fractions to the operations of fractions, fraction equivalence and problem solving. In the present study we utilized this theoretical model as a reference to investigate children's understanding of fractions. The case study has been conducted with 6 children consisting of 4th to 5th graders to detect how they understand fractions, and how their understanding influences problem solving of subconstructs, operations of fractions and equivalence. Children's understanding of fractions was categorized into "part-whole", "ratio", "operator", "quotient", "measure" and "result of operations". Most children solved the problems based on their conceptual structure of fractions. However, we could not find the particular relationships between children's understanding of fractions and fraction operations or fraction equivalence, while children's understanding of fractions significantly influences their solutions to the problems of five subconstructs of fractions. We suggested that the focus of teaching should be on the concept of fractions and the meaning of each operations of fractions rather than on computational algorithms of fractions.

Classification: F42 C32

Keywords: arithmetic of fractions; fractional numbers; learning; concept formation; rational number concepts; proportion; cognitive psychology; educational diagnosis; student errors; knowledge level; analysis of learning outcomes; research