Find the Mistakes

APA Format Task: In-text Citations

One concept that is fundamental to algebra understanding and that has received considerable research attention is that of equality and, in particular, understanding of the equal sign (Alibali 1999; Kieran 1981; Behr, Erlwanger, and Nichols 1980). According to Carpenter, Falkner & Levi (1999), lack of understanding the equal sign is one of the major stumbling blocks for students when they move from arithmetic to algebra (p. 234). They discussed how children need to understand equality as a relationship in order to think about relationships expressed by number sentences. Matthews et al. (2012) identified four levels of indicators of student understanding of equality. Children who interpret the equal sign as something to do will have to resort to memorizing the rules for solving the equations that could be resolved by manipulating numbers on both sides of the equation if the equal sign had signified a relationship between two expressions (Carpenter et al. 1999).

The notion of teaching early algebra then is both a paradigm shift and a novel way of teaching that requires extensive professional development. According to Carraher et al. (2008), early algebra builds on background contexts of rich problems where early algebra tightly interweaves existing topics of early mathematics and formal notation is introduced gradually and carefully. Furthermore, Carraher, Scheliman & Schwarts, 2008 stressed, “Early algebra is not the same as algebra early. To move algebra-as-most-of-us-were-taught it to elementary school is a recipe for disaster” p. 235.

Kaput, Carraher, & Blanton, 2008, explored teaching early algebra for the elementary grades and found that elementary students are capable of reasoning algebraically. As reported by Cai (2004),

“An integrative approach of algebraic reasoning and arithmetic connections is common in many international elementary and middle school mathematics curriculum, particularly in Southeast Asia (e.g., China, Singapore, and South Korea) and in Russia, where students begin the formal study of algebra much earlier.” (p. 543)

Integrative approaches, such as used in these countries, have helped students in building mathematical understanding with skill development, in embedding the arithmetic in interesting and challenging problem situations, and in enhancing their number sense through purposeful calculations (Kaput, 2008, Kieren, 2004, Carpenter and Levi, 2000; Bastable & Schifler, 2007).

Edens & Potter (2008) studied students’ use of graphic representations as an aid in problem solving. For one of the math challenge tasks, students were instructed to draw a picture to assist them with problem solution. They found that “girls were more likely than boys to use schematic representations at a statistically significant level and that students who used schematic visual representations were more successful problem solvers than those pictorially representing problem elements (p. 88).”
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