

## AN INSTRUCTIONAL MODEL FOR LEARNING THE CONCEPT OF FRACTIONS WITH VIRTUAL MANIPULATIVES

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Recent research on virtual manipulatives has shown the utility of these new technological tools to construct mathematical knowledge (Moyer, 2005; Moyer & Boyard, 2002; Moyer, Bolyard, & Spikell, 2002; Moyer, Niezgodá & Stanley, 2005; Reimer & Moyer, 2005; Suh, Moyer & Heo, 2005). But, as Baroody (1989) stated, “simply using manipulatives does not guarantee meaningful learning” (p. 4). In addition, multimedia instructional messages, presented in virtual manipulatives, have also been a source of recent research from the educational psychology field (Mayer, 2001, 2005). Using these two concepts based on generative learning theory (Wittrock, 1974a, 1974b), we suggest that the SOI (Selecting, Organizing, Integrating) instructional model (Mayer, 1989, 1999) would help students to use virtual manipulatives to learn the fraction concept. These activities are motivated by the curriculum, teaching, learning, and technology principles stated by the National Council of Teachers of Mathematics (NTCM, 2000).

Based on different constructs (Kieren, 1976; Behr, Lesh, Post & Silver, 1983), “personalities” (Behr, Harel, Post & Lesh, 1992), or practicing representations (Greeno & Hall, 1997) of fraction concept, this study is focused on part-whole representation. As stated by Behr and Post (1988), “the part-whole notion of rational numbers is fundamental to the other interpretations” (p.192). For the current poster presentation, we use virtual manipulatives from the National Library of Virtual Manipulatives (<http://nlvm.usu.edu/en/nav/index.html>) to show three developed activities based on each step of the SOI model and the cognitive theory of multimedia learning. These activities are: generate notes to select the main information, generate summaries to organize the selected information, and generate examples to integrate the organized information with students’ previous knowledge.

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