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Loong, Esther Yook Kin

Fostering mathematical understanding through physical and virtual manipulatives.

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Summary: When solving mathematical problems, many students know the procedure to get to the answer but cannot explain why they are doing it in that way. According to Skemp these students have instrumental understanding but not relational understanding of the problem. They have accepted the rules to arriving at the answer without questioning or understanding the underlying reasons for why a certain procedure is carried out. To help students grasp abstract mathematical concepts and form relational understanding of these concepts, research has found that it is often necessary to make use of physical or virtual materials to help scaffold their understanding and/or simplify the abstract idea. This paper presents some ways in which fundamental concepts such as subtraction with regrouping, equivalent fractions, dividing and multiplying fractions, and measurement topics such as area and perimeter, can be explored and clarified. A range of physical and virtual manipulatives are suggested to help foster and consolidate the relational understanding needed to grasp these concepts. A number of examples are provided which are suitable for teachers from primary through to middle years. Even though some of these concepts seem basic and related to primary mathematics, they are addressed here because they underpin the efficient working out of the more abstract concepts associated with middle school mathematics. Having a strong relational understanding and subsequent mastery of these concepts help prevent misconceptions and errors, and position students better in their mathematics learning. Additionally, these activities and strategies have the potential to help struggling middle school students grasp these basic concepts. (ERIC)

Classification: U60 U70 D40

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