What Does Research Tell Us about Fostering Algebraic Thinking in Arithmetic?

Research has begun to shape both our ways of conceptualizing algebraic thinking and the routes by which its growth might be encouraged. Three of its main themes are thinking relationally about equality, thinking rule-wise in pattern generalization, and thinking representationally about the relations in problem situations.

- Children who view the equal sign relationally do not need to compute the total of both sides of an equation such as $67 + 86 = 68 + 85$ in order to determine equality. Research has shown that viewing the equal sign relationally is indicative of algebraic thinking and moreover supports more advanced forms of algebraic activity.
- Recent research in patterning suggests that pattern generalization is algebraic when it involves generating rules to calculate with. Once children have determined the commonality of a pattern and have generalized it to other terms, an effective question to ask them is how to build a really "big" figure of the sequence, without specifying a particular figure number.
- Elementary school children use a variety of representations to signify the relations in the mathematical problems they are asked to solve—some of these representations providing a potential bridge between arithmetic and algebra. The so-called pictorial-equation method is one representation that has been found to be especially conducive to developing algebraic thinking.

Based on *What Does Research Tell Us about Fostering Algebraic Thinking in Arithmetic?*