Teaching Practices that Develop Children's Algebraic Thinking Skills

Algebraic Thinking is a "habit of mind that students acquire through instruction that builds regular, sustained opportunities to think about, describe, and justify general relationships in arithmetic, geometry, and so on." (Blanton, 2008)

Teachers should have four important instructional goals when helping children to think algebraically:

- **Represent:** Provide multiple ways for children to systematically represent algebraic situations.
- **Question**: Ask questions that encourage children to think algebraically.
- **Listen**: Listen to and build on children's thinking.
- **Generalize**: Help children develop and justify their own generalizations.

LISTEN

Listening is just as important as questioning. In fact, it has been said that teaching is about those who know being silent so that those who don't know can speak. It is instinctive for teachers to help, to tell, to explain; however, listening is critical because it helps you understand children's thinking, and you can use this knowledge to guide your instruction. Also, if you are listening, then children are talking and—more likely—actively engaged in their learning. Whether students are solving an elaborate task or simply reviewing solutions to homework problems, listen to their ideas, strategies, and reasoning and think about how you can extend their algebraic thinking.

GENERALIZE

The central goal of algebraic thinking is to get children to think about, describe, and justify what is going on with regard to some mathematical situation. That is, we want children to develop a generalization, a statement that describes a general mathematical truth about some set of data. The three instructional goals described so far—represent, question, and listen—are all critical components in helping children build their own generalizations.

The ability to generalize builds over time, based on the age and experience of your students. As children learn to use tools such as function tables to interpret correspondence relationships in data, begin to understand quantities that vary, and develop the mathematical language to symbolize functional relationships, the ability to generalize will increase. Don't be discouraged if you find that one algebraic thinking task can consume an entire lesson (or more). Remember that you are asking your students to think at a much deeper level than is required to learn arithmetic skills and procedures. As you observe children begin to develop, explain, and justify complex mathematical ideas, you will find that the payoffs are tremendous.

Components of Building a Generalization

We can characterize the process of building a generalization in the following way:

1. Children are given a mathematical situation to explore.
2. They develop a conjecture, or mathematical statement that is either true or false
3. They test their conjecture to see if it is true or false.
4. If the conjecture is not true, they can revise it and test the new conjecture.
5. If the conjecture is confirmed to be true after sufficient evidence is gathered, it becomes a generalization.

(Blanton, 2008)