Helping Students Struggling with Math

Elizabeth G. Shellard

Teachers need to employ a wide variety of strategies to develop understanding of math concepts and encourage positive attitudes.



heir math homework includes errors or is only partially done—if at all. They perform poorly on standardized tests as well as classroom math tests. Students who struggle with mathematics may do so because they are unable to "see" the larger picture, make associations, or remember basic facts. They need not only high-quality

IN BRIEF

This report focuses on strategies teachers can use to help students struggling with math. A critical instructional component is to make sure they understand a skill or concept before being asked to practice it. Adapting instruction to a variety of learning styles can be useful, as is encouraging students to "think aloud" about how they approach math problems. Several strategies are suggested for students who have difficulty with basic math operations and word problems.

teaching, but well-planned instruction explicitly structured to develop a specific sequence of skills. In addition, providing a mix of direct instruction of new skills and concepts, guided practice, opportunities for complex thinking and problemsolving, and time for discussion is even more important for the struggling student than for students in general.

A critical component of math instruction—particularly crucial for struggling students—is ensuring that students understand a skill or concept before being asked to practice it. A short in-class assignment can help teachers check for this understanding. But assigning multiple problems to students who have only a tenuous understanding—or worse, a misunderstanding —of the skill can lead to confusion and frustration. Teachers should take special care in assigning homework to these students.

Teachers can address some of the problems presented by struggling learners, as well as normal differences in skill levels and developmental levels, through the use of adaptations or accommodations (Ebeling *et al.* 1994), many of which can be incorporated into regular classroom instruction. Activities that provide opportunities for students to use a variety of learning styles increase the likelihood that more students will understand the new concept or skill being presented. Here are some approaches that complement different strengths: Spatial: Using visual clues; Linguistic: Reading word problems; Logical-mathematical: Creating and solving equations; Kinesthetic: Exploring tactile models; Musical: Creating auditory patterns; Interpersonal: Sharing strategies; and Intrapersonal: Journal writing (King and Parker 2001).

Developing Understanding

Teachers working with young children know the importance of instruction directed toward students' developmental level. This concept remains important to math instruction through all grade levels. It may require moving from the concrete to the pictorial to the abstract, with opportunities provided for students to actively manipulate objects or draw graph-like "pictures." However, "Students do not discover or understand mathematical concepts simply by manipulating concrete materials [teachers] must help students focus on underlying mathematical ideas ... " (Sutton and Krueger 2002)

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Discussing math problems and solutions as a class helps students develop mathematics skills and understanding (Grouws 2004). For students struggling with math, such discussions can help by providing a window into alternative solution methods or having problems and solutions expressed in student-level language.

Encouraging students to "think aloud" and share the way they approach problems may be especially important. Teachers can encourage such discussion by:

Asking students to conjecture about "What might happen if ...?" situations. Return to those conjectures after the students have resolved the problem to discuss which of their ideas still hold true.

Asking students to share their solutions with the class, as well as the strategies they used (Kline 2000), and allowing other students to ask questions.

Asking a student to rephrase or repeat another student's explanation (Kline 2000).

Areas of Special Difficulty

While there are many math areas in which students have difficulty, two of the most common are basic operations and word problems. There are several strategies for addressing these areas.

Basic operations. When teaching basic operations, such as addition, subtraction, multiplication, or division, begin by helping students develop an understanding of the meaning of the operation before describing and modeling the procedure. Then provide plenty of opportunity to engage in both guided and independent practice. Students who need more support should stay in the guided instruction phase until they can work independently (Mercer and Miller n.d.).

Allsopp and Kyger (1999) offer the following tips:

(Jood Deeds Deserve Rewards!

Recognize your students with NAESP's latest student incentives, "Caught You Being Good!" buttons, certificates, and coupons. Use these colorful and attractive pieces for school assemblies, character education programs, or behavior management. "Caught You Being Good!" bring smiles to your student's faces, while reinforcing positive behavior at your school.

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Starter Kit includes:



Provide an example of a correctlysolved problem at the beginning of every lesson;

 Have students verbally or visually explain how to solve a problem;

■ Introduce only one concept at a time and teach it to mastery;

• Teach in small chunks so that students get lots of practice, one step at a time;

Provide learning aids, such as calculators, to help students focus on conceptual understanding;

• Routinely model the use of estimation and have students estimate a reasonable solution before starting any computation;

Teach families of facts; and

Demonstrate all concepts with manipulatives.

Word Problems. Many students experience difficulty with word problems (Jarrett 1999). For some, the problem lies with an inability to read and comprehend the problem (Bley and Thornton 1995). Others have trouble distinguishing relevant from nonrelevant information, whereas some cannot translate the words into mathematical operations they understand.

The following strategies may provide students with different ways to "see" word problems and better grasp the concepts of what is being asked and how to work toward a solution:

Work backward. Give students both the problem and the answer, then help them to develop connections between the words in the problem and their numeric representations.

Draw and model. Draw a picture or manipulate objects to form a model to help students visualize a situation, verbalize abstract ideas, and explain relationships.

Make a table or a graph. Tables and graphs provide visual means for students to organize and summarize numerical and verbal data.

Act it out. Some students learn best when they act out a problem kinesthetically (Krulik and Rudnik 1996; Sorenson *et al.* 1996).

Promoting a Positive Attitude

Finally, because many students who experience difficulty in math develop negative attitudes toward the subject, teachers must use good teaching practices to encourage positive attitudes. Mercer and Miller (n.d.) suggest the following:

■ Involve students in setting challenging but attainable instructional goals;

• Ensure that instruction builds on previously learned skills;

Use progress charts to provide students with feedback on how well they are doing;

Discuss the relevance of a math skill to real-life problems;

Communicate positive expectations for student learning;

• Help students understand how their own effort affects achievement outcomes; and

■ Model an enthusiastic and positive attitude toward math.

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WEB RESOURCES

Math Playground is an Internet site that contains math games, logic puzzles, and word problems designed to offer K–6 students entertaining ways to practice math skills. www.mathplayground.com/ index.html

Helping Your Child Learn Math, developed by the U.S. Department of Education, is a guide for parents that discusses what it means to be a problem solver, to communicate mathematically, and to demonstrate reasoning ability. www.ed.gov/pubs/parents/Math/ index.html

The executive summary of *Principles and Standards for School Mathematics*, a document from the National Council of Teachers of Mathematics that outlines the essential qualities of an effective mathematics program, is available online. www.ntcm.org/standards/overview. htm