The Problem with Word Problems

Solving word problems in math requires a complex web of skills. But there’s no reason why it can’t be fun.

Emily’s panic-stricken face looked up at me before she even finished reading the third-grade math word problem. “I can’t do this,” she announced in a bewildered tone. “I don’t get it.”

For many students, the major problem with word problems is the words! Solving word problems in math involves a complex web of skills that require learners to be good readers and to be proficient at thinking critically, computing, and using a process to solve problems. As instructional leaders, principals need to support teachers in their pursuit of instructional strategies that can help students become effective problem-solvers.

IN BRIEF
Children need to combine reading, thinking, and computational skills to solve math word problems. The author provides some strategies that principals can share with their teachers to help students become proficient and advanced problem-solvers. They include creating a conducive classroom environment, providing daily mental math activities, making problem-solving a fun activity, using a step-by-step approach, and implementing the Singapore model-drawing approach, described and illustrated in an accompanying sidebar.
Singapore Math: A Problem-Solving Approach

Singapore Math is exciting. The small Southeast Asian nation has set itself apart as the world’s leader in math achievement. But that wasn’t always the case. Not too long ago, Singapore ranked 20th in nations surveyed by the Third International Mathematics and Science Study (TIMSS). How did Singapore soar to the top?

The changes they made to their curriculum have been significant. Singaporean students now cover fewer topics in math each year, but study them in greater depth. Extraneous topics and duplication have been minimized or eliminated. Currently, Singapore Math combines a high level of mathematical content and a strong emphasis on building number sense and higher-level thinking skills. Textbooks present concepts using pictures, numbers, and words. The teaching sequence in Singapore begins with the concrete, moves to the pictorial, and finishes with the abstract.

Problem-solving is the key component in the Singapore Math program. Students learn to use the model-drawing strategy in the primary grades and continue using it throughout the program. With this ongoing practice, students become highly proficient at solving increasingly complex problems.

What is the model-drawing approach? Let’s use it to break down a sample problem into manageable chunks in order to find the correct answer.

The Problem: Mrs. Smith had 200 stamps in her collection. She gave three-fourths to her granddaughter and half of the remainder to her neighbor. How many stamps does Mrs. Smith have left in her collection?

Step 1. Break the problem down into small pieces using pictorial representation. Start with: “Mrs. Smith had 200 stamps in her collection.”

Step 2. Continue breaking down the problem. Label the bar with new information: “She gave three-fourths to her granddaughter…”

Step 3. Apply mental math strategies to determine the value for each segment. Half of 200 is 100 and half of 100 is 50. Therefore, each segment represents 50 stamps. She gave 150 to her granddaughter.

Step 4. Continue to break down the problem: “...and gave half of the remainder to her neighbor.” The remainder is 50. Half of 50 is 25.

Mrs. Smith gave 25 stamps to her neighbor.

Step 5. The solution: Mrs. Smith has 25 stamps left in her collection.

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How can you help? In 1992, I wrote a book, *Teaching Thinking and Problem Solving in Math*, in which I shared a number of ideas that helped me improve my students’ problem-solving skills. Since that time, I have discovered even more strategies to help students become proficient and advanced problem-solvers. Here are some of them you can share with your teachers.

**Create a classroom environment conducive to math and problem-solving.** “Math counts” is a message that every classroom needs to convey. Hands-on manipulatives and visual aids that stimulate thinking and connect student learning to their experiences in the real world can strengthen understanding of math concepts and skills. Collect and display photographs, postcards, and magazine illustrations that capture representations of the concept being studied. Math word walls are also very beneficial to students.

**Provide daily mental math activities.** Daily math warmups are a great way to help students build vocabulary, concepts, and skills. Large or small group activities, puzzles, games, and problems of the day or week are effective ways to begin math classes. In a popular warmup activity called “Renaming the Date,” students brainstorm and list as many different ways as possible to rename that day’s date. For example, on the 16th of the month, you might see answers like “15 + 1,” “½ of 32,” and “(6 + 12) – 2.”

**Make problem-solving fun.** Teachers need to motivate students to approach word problems with confidence and a positive attitude. They must find ways to hook students’ interest and commitment. I accomplished this through a fun activity we called “doctor rounds.” Student “interns,” trying to earn the degree, diagnose a word problem as a doctor would a patient. The mathematical vocabulary and essential numbers of the problem were “symptoms” that determined how they would “operate” to determine the correct answer. A “final checkout” then ensured that the “operation” was successful.

**Teach students how to read word problems.** Students need explicit instruction on how to read math word problems. The text structure, vocabulary, and purpose are unique and quite different from other types of reading. A good time to teach problem-solving skills would be during reading. The teacher could pose a problem or question before students read a particular passage. Students could then use graphic organizers to list their problem-solving steps, with highlighting tape or self-stick notes to identify key information.

**Use a step-by-step approach.** Word problems can appear overwhelming and difficult to many students. We can help them make problem-solving manageable by breaking it into a series of steps. While most textbooks include lists of steps students should follow when solving problems, it takes time to teach students to take these steps. Turning these lists into simple graphic organizers allows students to approach problems in a step-by-step fashion.

**Separate process from content.** Begin with easy word problems, making sure the readability and necessary computation levels are within each student’s comfort zone. As students become more comfortable with taking the time to follow a problem-solving sequence, the teacher can gradually increase the readability and mathematical complexity of the word problems.

**Teach specific strategies.** Once students are comfortable with solving straightforward arithmetic word problems, it’s time to teach specific strategies, including “guess and check,” “work backwards,” and “draw a picture.” Start with easy problems and gradually increase their complexity. Teaching strategies doesn’t work if they are used only now and then. Students must see the need for the strategies and have numerous opportunities to practice using them.

**Implement the Singapore approach** *(see sidebar).* Eighth-grade students from Singapore ranked highest in the world in math achievement, according to the 1999 TIMSS (Third International Mathematics and Science Study). When I visited classrooms there recently, I was impressed with the number sense internalized by even the youngest students. In first grade, they are already doing word problems in conjunction with their learning of addition and subtraction facts. For example, if they are learning addition facts that make a sum of 7, their textbook might present an illustration of seven birds, showing four sitting on tree branches and three on the ground, looking for worms. Students are told to make addition stories that go with the picture. This type of activity occurs regularly throughout the text and students learn to draw pictures or diagrams to help them solve increasingly complex problems.

Hopefully, these problem-solving ideas and strategies will enhance whatever program or text series you are currently using in your school. Perhaps one day, when you observe a math class of excited students working on solutions and ask how they’re doing, they just might reply, “No problem!”

**Reference**

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