FAST DRAW: IMPROVING MATH WORD PROBLEM SOLVING
WITH STRATEGY INSTRUCTION

To solve word problems successfully, students must not only be able to perform the necessary computations, but must also understand the questions that are being asked, identify the relevant information within the problem, and determine the specific operations needed to solve the problem. In this intervention, students learn an 8-step strategy for solving math word problems, along with self-regulation procedures to assist them in completing the strategy successfully.

Materials

1. Math folders containing sheets of paper, one folder per student
2. Math manipulatives
3. Prompt cards, consisting of 3”x 5” index cards listing the strategy steps and FAST DRAW mnemonic, one per student
4. Self-monitoring strategy check-off sheet, one per student
5. Math word problem worksheets, one per student
6. Colored marking pens and highlighters, one each per student
7. Overhead projector and transparencies of math word problems and the strategy steps and mnemonic (optional)

Intervention Steps

Stage 1: Introduction and Initial Group Conferencing
1. Explain to the students that they will be learning a strategy called “FAST DRAW” that will help them be more successful in solving math word problems. Tell them that they will have an opportunity to work in pairs while they are learning the strategy
2. Lead a discussion of the reasons why it is important to know how to solve math word problems in terms of being a future consumer, worker, and citizen, and list the reasons on the chalkboard
3. Distribute to students their individual results on the 20-item math test administered during the observation period or a list of their grades on math quizzes and tests for the past several weeks. Using the chalkboard or an overhead projector, demonstrate how to construct a bar graph of percent-correct scores. Then help students construct bar graphs in their math folders, using their performance on the pretest or on previous math assessments as initial data. Explain that they can use the bar graphs to monitor their own progress in solving word problems

Stage 2: Preskill Development
1. Use manipulatives and simple computation problems to demonstrate the following relationships found in addition and subtraction problems:
   a. The relationship of addition and subtraction to the action implied in a word problem (i.e., for addition, objects are put together; for subtraction, they are separated or removed)
   b. The relationship of addition and subtraction to the size of an answer (i.e., for addition, the largest number in the problem will get larger; for subtraction, it will get smaller)
2. Conduct a classwide practice with each concept that will be taught until the students reach an 80% mastery criterion
**FAST DRAW: IMPROVING MATH WORD PROBLEM SOLVING**
**WITH STRATEGY INSTRUCTION (continued)**

**Stage 3: Discussion of the FAST DRAW Strategy and Self-Regulation Procedures**

1. Give each student a prompt card listing the eight strategy steps and the FAST DRAW mnemonic for remembering the steps, as follows:
   - **F:** Find and highlight the question, and then write the label (e.g., addition-change)
   - **A:** Ask what the parts of the problem are and then circle the numbers needed to solve it
   - **S:** Set up the problem by writing and labeling the numbers
   - **T:** Tie down the sign by rereading the problem (i.e., decide whether addition or subtraction should be used)
   - **D:** Discover the sign by rechecking the problem
   - **R:** Read the number problem
   - **W:** Write the answer and check to see if it makes sense

2. Discuss how and why each step is used in solving word problems, using examples displayed on the chalkboard or overhead projector

3. Discuss the importance of using self-statements while applying each step, such as:
   a. **(A)** “To find the question, look for the sentence ending with a question mark”
   b. **(S)** “When setting up the problem, remember to write the larger number on top”
   c. **(T)** “To tie down the sign, ask if I am putting together so the answer will be larger than the other numbers (if yes, use addition), or if I am taking apart so the answer will be smaller than the largest number (if yes, use subtraction)

4. Show students how these self-statements can be used to create a self-monitoring check-off sheet for use during word problem solving. Guide students in generating their own self-statements for using the strategy and have them record them on the check-off sheets in their math folders

**Stage 4: Modeling**

1. Model the use of the strategy using the following six self-instructions:
   a. **Problem definition:** “What is it I have to do?”
   b. **Planning:** “How can I solve the problem?”
   c. **Strategy use:** “FAST DRAW will help me remember all the things I need to do to solve a word problem successfully”
   d. **Self-monitoring:** “I can check off the steps of the strategy as I complete them so I can remember what I’ve done”
   e. **Self-evaluation:** “How am I doing? Does what I’m doing make sense? Did I complete all the steps?”
   f. **Self-reinforcement:** “Great, I’m half-way through the strategy!” or “Oops, I made a mistake, but that’s OK because I can fix it. Yay, I did it!”
   g. Have students record examples of statements for each of the six categories on their self-monitoring strategy check-off sheets. Stress that self-instructional statements do not have to be verbalized aloud; once they are learned, they can be whispered or said to oneself
Stage 5: Mastery of the Strategy Steps
1. Divide the class into pairs and have students work together to rehearse the strategy until they have memorized all 8 steps, including the FAST DRAW mnemonic, and several positive self-statements about solving math word problems

Stage 6: Collaborative Practice with Self-Instructions
1. Distribute a worksheet with a set of 7 to 10 problems of the first problem type to be taught (i.e., addition-change problems)
2. As students work in pairs, move around the room and provide assistance in the correct use of the strategy steps and self-instructions by asking questions and referring to the prompt cards and check-off sheets. Encourage students to verbalize their self-statements softly to each other and then silently to themselves
3. After all of the pairs have completed the worksheet, have the students exchange papers and go over the answers as a class. Have students graph the number of items they answered correctly on the bar graphs in their math folders
4. Continue collaborative practice sessions until students meet a criterion of 5 out of 6 problems correct for that problem type

Stage 7: Independent Practice
1. During the math instructional period, remind students to use the strategy and self-instructions for addition-change problems, but do not provide assistance for that problem type. If students experience difficulty, return to the collaborative practice stage until they demonstrate mastery again
2. Return to the collaborative practice stage for the next problem type (subtraction-change problems). Continue introducing word problem types sequentially, alternating collaborative practice and independent performance stages until students are performing at the criterion level on change and equalize problem types in both addition and subtraction. Then follow the same procedure for combing and compare problem types

Evaluation (Select one or both)

Option 1
1. Compare individual student and/or class average percent-accuracy scores on word problem-solving tests before and after implementation

Option 2
1. Compare grades on math quizzes and tests for the target group or the entire class before and after implementation
### Examples of Word Problem Types Used in Math Strategy Instruction

<table>
<thead>
<tr>
<th>Problem Type</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Addition</strong></td>
<td><strong>Change</strong> (result unknown)</td>
</tr>
<tr>
<td><strong>Combine</strong></td>
<td>(total set unknown)</td>
</tr>
<tr>
<td><strong>Compare</strong></td>
<td>(quantity unknown)</td>
</tr>
<tr>
<td><strong>Subtraction</strong></td>
<td><strong>Change</strong> (result unknown)</td>
</tr>
<tr>
<td></td>
<td><strong>Equalize</strong> (must get)</td>
</tr>
<tr>
<td></td>
<td><strong>Compare</strong> (difference unknown-more than)</td>
</tr>
</tbody>
</table>