



## PRESENTATION

4:59 min

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## Talking Through Problems and Their Solutions

January 2012

**Topic** IMPROVING MATHEMATICAL PROBLEM SOLVING IN GRADES 4 THROUGH 8

**Practice** REFLECT AND DEBRIEF

- Highlights**
- » Students who are successful problem solvers think about what they are doing and why they are doing it.
  - » Teachers can facilitate monitoring and reflecting by prompting students with questions that will guide them through the process.
  - » Students can use support tools including lists of problem-solving steps and sample questions to guide their thinking. Examples of lists of steps and prompting questions are provided.
  - » Teachers can model using steps and questions through a thinkaloud. An example of a teacher's shared thinking process is provided.
  - » The goal of debriefing is to help students verbalize alternative ways to think about the problem and how to proceed at each step.
  - » Students should know that they are expected to provide valid explanations of their problem-solving steps, and not simply give a solution. Consistently having to justify steps in problem solving becomes more important as problems become more challenging.

## Full Transcript



### Slide 1: Welcome

Welcome to the overview on Talking Through Problems and Their Solutions.



### Slide 2: Rationale for monitoring and reflecting

Students who are successful problem solvers think about what they are doing and why they are doing it. They evaluate the strategies they are using and connect new concepts to what they already know.

Students become better problem solvers when they learn to monitor and reflect on their thinking throughout the problem-solving process



### Slide 3: Supporting struggling learners

Research shows that teaching reflection strategies and providing feedback to scaffold problem-solving steps can be effective with students who struggle with mathematics and English learners.



### Slide 4: Teacher's roles

There is strong evidence that scaffolding steps in problem solving and modeling self-questioning lead to better achievement.

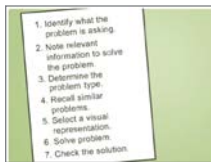
Teachers can facilitate monitoring and reflecting by prompting students with questions that will guide them through the process. As students answer these questions, teachers can build on students' understanding to help them use the appropriate steps for each problem.



## Slide 5: Modeling and prompting tools

Support tools that students can use when confronting a problem include lists of problem-solving tasks and sample questions to guide students' thinking.

When introducing these tools, teachers should work through each step, checklist item, or question with the class, sharing their thoughts out loud at every point of the process. Later, students will be able to use these tools on their own to guide their reasoning.

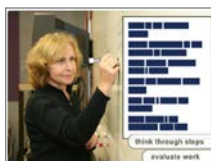


## Slide 6: Task list

Here's a sample list of tasks for solving a problem:

1. Identify what the problem is asking.
2. Note relevant information to solve the problem.
3. Determine the problem type.
4. Recall similar problems.
5. Select a visual representation.
6. Solve the problem.
7. Check the solution.

Such a list might be posted on the board or turned into a graphic organizer.



## Slide 7: Question prompts

Another helpful tool that teachers can provide is a list of questions designed to prompt students to explicitly think through steps needed

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to solve a problem and evaluate their work at each stage of the process. Here are some examples of question prompts:

What is the problem asking?

Which information in the problem is relevant?

What similar problems have I solved?

Does the solution make sense?

How can I verify the solution?

What would I do differently next time?



### Slide 8: Using prompts and sharing reasoning

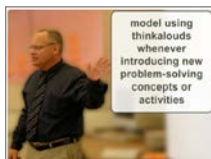
Students will need help learning how to use prompts effectively.

Teachers can model using the prompts, thinking out loud as they respond to each step or question and being sure to explain their reasoning to the class.

Or teachers might model only the responses to the prompts and ask students to explain how they think the teacher arrived at that answer.

Or teachers can ask students to explain their responses to each of the prompts, providing feedback as appropriate.

Once students have grown comfortable with the questions, they can move on to working in pairs or small groups, prompting one another as they work through problems.



### Slide 9: Thinkalouds

It is helpful for teachers to model using thinkalouds whenever introducing new problem-solving concepts or activities.

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Here's how a teacher's modeling might sound:

“First, I ask myself, ‘What is this problem about and what do I need to find the answer? I see that the problem asks me to compare two different product sizes to see which is the better value. So I'll need the product sizes, and I'll need to know the cost of each item.

“Once I've got that answer, I ask myself, ‘Have I ever seen a problem like this before?’ I think this is similar to the problems we had about finding the volume of different containers and also the problem of comparing prices.

“Then I ask myself, ‘What steps should I take to solve the problem?’”

This practice is also beneficial when reviewing concepts and activities that the students have encountered before. Thinking aloud through the process helps students build good problem-solving habits.



### Slide 10: Dialogue

As teachers identify their students' level of understanding, they should look for ways to build on students' ideas. Teacher-student dialogue around problem solving should be geared toward helping students verbalize alternative ways to think about the problem and how to proceed at each step.



### Slide 11: Explanation of steps

Students should know they are expected to provide valid explanations of their problem-solving steps, and not simply give a solution.

Consistently having to justify steps in problem solving becomes more important as problems become more challenging.



## Slide 12: Debriefin

Teachers can organize a session in which students debrief their problem-solving strategies with the whole class. This gives students the opportunity to learn from each other while practicing the steps in the process.

Presenting problem-solving approaches to peers emphasizes for students the importance of explaining their reasoning and builds their confidence in solving problems

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