



Tips and Tactics for Better Math Teaching

Category: Content Instruction

Workshop Overview

Following is a general overview of this workshop, including desired participant outcomes, an explanation of the workshop’s alignment with Learning Forward Standards for Professional Learning, and resources that are included in print and electronic form.

Category: Content Instruction

Duration: Full workshop – 3 hours

Desired Outcomes:

Participants will...

- Identify fundamental concepts in mathematics.
- Identify strategies for working with students in the area of mathematics.
- Apply strategies to help students learn problem solving.

Learning Forward Standards for Professional Learning:

- **Learning Communities:** Occurs within learning communities committed to continuous improvement, collective responsibility, and goal alignment.
- **Resources:** Requires prioritizing, monitoring, and coordinating resources for educator learning.
- **Learning Designs:** Integrates theories, research, and models of human learning to achieve its intended outcomes.
- **Implementation:** Applies research on change and sustains support for implementation of professional learning for long term change.
- **Outcomes:** Aligns its outcomes with educator performance and student curriculum standards.

Resources in This Binder:

- Handouts
 - Activity Sheet: Showdown
 - Workshop Agenda
 - Attendee Notes
 - 3-2-1 Evaluation Form
 - Certificate of Completion
- “Think About It” Exercise
- Ready, Set, Go Planning Activity



Topic Outline

Understanding the general flow of topics to be covered is an important part of giving a strong presentation. This allows the presenter(s) to lead effective group discussions and speak extemporaneously. Following are the main topics covered in this PowerPoint presentation. As you prepare to give the workshop, you may want to refer to this page often.



Main Topics:

1. Fundamental Concepts in Mathematics
2. Problem Solving
3. Teacher's Role in Mathematics Instruction

Subtopics:

1. Fundamental Concepts in Mathematics

- a. Definition of Mathematics
- b. Relevance of Mathematics
- c. Importance of Math Skills

2. Problem Solving

- a. Significance of Problem Solving
- b. Polya's Four-Step Recipe for Problem Solving
- c. Problem-Solving Strategies
- d. Prompting

3. Teacher's Role in Mathematics Instruction

- a. Research Shows...
- b. Ensuring Success in Math

Presentation Outline



This outline is designed for you to see the PowerPoint presentation at a glance. Note that slide numbers and the approximate amount of time needed per slide are shown in the right two columns. **The times in bold print show the approximate total time needed for that topic, which includes the approximate times for the activities, shown in parentheses.** You might consider keeping this page within reach during the presentation.

Section of Presentation	Slide #	Timing (mins)
Getting Started		
Introduce self, co-teacher, participants	1-2	
Explain materials issued to participants		
Cover objectives (from Workshop Overview)	2	10
Topic 1 – Fundamental Concepts in Mathematics		
Activity – Quick-Write	4	(10)
Discussion Point – Relevance of Dictionary		
Definition of Mathematics	6	(5)
Discussion Point – Value of Mathematics		
	9	(5)
Topic 2 – Problem Solving		
Activity – Structured Problem Solving	13	(20)
Discussion Point – Effectiveness of Problem-Solving Strategies		
	14-15	(10)
Break		
Topic 3 – Teacher’s Role in Mathematics Instruction		
Discussion Point – How can you help students have a positive attitude toward math?	17-29	40
	18	(5)
Discussion Point – Research Findings about Mathematics		
	19	(5)
Activity – Showdown	24-29	(10)
Closing Thoughts		
	30	15
Total of 2 hours and 40 minutes (not including break)		

Helpful tip!

This workshop can be broken up into shorter sessions so that you can adapt the presentation according to your time constraints.

Slide 11

Ask a volunteer to read aloud the first bullet point on the slide. Point out that this statement comes from the National Council of Teachers of Mathematics (NCTM). Then ask how participants think this relates to the second bullet point.

Participants might agree that the significance of learning problem solving is that students will face problems all their lives, and that the decision-making process—weighing up alternatives, speculating on outcomes, making choices—is a form of problem solving.

Slide 12

PDXPERT
PROBLEM SOLVING

Polya's Four-Step Recipe for Problem Solving

1. Understanding the Problem.
2. Devising a Plan.
3. Carrying out the Strategy.
4. Evaluating the Results.

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Bridge Support Team

*George Polya, in his book *How to Solve It*, identified a four-step recipe for problem solving. Each step tackles questions that can be used as prompts to reach the correct answer. This method is useful for students who are just learning the problem-solving process. With proper teaching, the student will learn to work independently.*

Step 1: Understanding the Problem.

- *What is the unknown? What do you need to figure out?*
- *What are the data? What information do you have?*
- *What are the conditions?*
- *What is the problem?*

Step 2: Devising a Plan.

- *Can you select a strategy to use in solving the problem?*
- *What plan or strategy can you use in solving the problem?*

Step 3: Carrying out the Strategy.

- *Can you work out the problem?*
- *How can you solve it?*

Step 4: Evaluating the Results.

- *Can you look back at the solution obtained?*
- *Can you check the results?*
- *Does your answer make sense?*

Slide 13

PDXPERT PROBLEM SOLVING

A student you are working with has very little confidence in his math ability and potential, especially in problem solving. What can you do to help the student in this area?

ACTIVITY: Structured Problem Solving

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Develop. Support. Inspire.

Activity: Structured Problem Solving

Allow 20 minutes for this activity.

Instruction:

Ask the participants to form groups of four. Then have them count off: 1, 2, 3, and 4 in each group. Have the members of the group discuss the situation described on the slide and solve the problem, making certain that every group member can explain the problem or summarize the group's discussion. Ask them to apply Polya's Four Step Recipe for Problem Solving.

Then call a specific number and ask the designated team members (1, 2, 3, or 4) to respond as group spokespersons. To avoid repetition, ask for responses from only three to six groups.

Debrief: Evaluate whether Polya's problem-solving technique helped the group solve the problem. Think of other strategies you can use to solve this problem.

“Think About It” Exercise

Have staff complete this exercise to begin implementing what they learned during the workshop. Distribute this document to staff by attaching the file to the Next Day Follow-Up Email, or make copies for the staff.



1. Circle the problem-solving strategies in the list below that you have used in your classroom.

Act it out or use manipulatives.

Make or use a pattern.

Make a picture or diagram.

Work backwards.

Use or make a table.

Use logical reasoning.

Make an organized list.

Make it simpler.

Use trial-and-error.

Brainstorm.

2. How will the new knowledge and skills you have gained from the workshop affect your teaching of mathematics? In what ways will these new insights affect student learning?

3. Are there any aspects of supporting instruction for mathematics that the workshop failed to cover? What are they, and how do you propose to address these aspects?

4. Research shows that a student’s motivation toward mathematics is influenced by a student’s perception on how successful he or she is in the subject. How would you apply this knowledge in instructing and supporting students in mathematics?
