Video Link and Info for Principle 2: Making Sense

Making sense of the mathematical meaning of words, symbols, and diagrams in contextualized and decontextualized problems is fundamental to finding and evaluating solutions.

https://vimeopro.com/wested/math-pathways-and-pitfalls-principle-2

Have You Wondered?

What can I do to help my students make sense of both the math problems they work on and the solutions they generate?

Using the Principle With *Math Pathways & Pitfalls*

All *Math Pathways & Pitfalls* books contain Clipboard Prompts, a list of questions that teachers can use to help guide students' thinking. These prompts can help students make sense of math problems. In the following short video segments from a 45-minute lesson, you will see how a 6th grade teacher, Ms. Kean, uses Clipboard Prompts and applies the Making Sense principle during Day 2 of a *Math Pathways & Pitfalls* lesson. Day 2 of every *Math Pathways & Pitfalls* lesson involves using these prompts.

Teaching Practice 1**: Have students describe the meaning of the problem in their own words.**

In this clip, 6th grade teacher Ms. Kean is on Day 2 of the *Math Pathways & Pitfalls* lesson "Changing Ratios to Percents." The class was working on the three "Our Turn" problems for the lesson. Ms. Kean is using the Clipboard Prompts to help students make sense of the problem and the solution options for the first problem:

6/40 = __%

She uses the Clipboard Prompts to help her think of the kinds of questions to ask students about the meaning of the problem itself. Even if you do not teach 6th grade, you might notice the kinds of questions she asks students to help them describe the meaning of the problem, and you can consider how these questions might apply to the mathematics you teach.

Ms. Kean reads the problem and then asks a student to explain what he had to do to solve the problem. Why might this be important to do, and why is it important for all students to hear their peer's response?

1. A common thread in *Math Pathways & Pitfalls* is to develop a shared understanding of problems and solution processes. This is one reason the whole class needs to hear peers' ideas.
2. The teacher in the video does not assume students all understand the meaning of the percent symbol or of percent itself … and makes sure to reiterate the meanings of these ideas prior to having students work on the problem.

Teaching Practice 2: Involve students in generating, analyzing, and discussing solutions.

In this video clip, the students are still working on the same problem. Ms. Kean prompts the students to work in pairs to solve the problem and talk about their proposed solutions. She is focusing on the Understanding the Problem section of the Clipboard Prompts. Notice the kinds of questions she asks students to ensure the problem and solution processes are understood by the class.

Teaching Practice 3: Have students justify why a mathematical idea or solution makes sense.

Ms. Kean continues to work with her students on the Our Turn problems in the *Math Pathways & Pitfalls* lesson. She asks students if they could have predicted if the percent for the ratio would be more or less than 50 percent and asks them to explain their reasoning. She then moves on to the second problem:

> 8/5 = __%

Notice how she continually asks students to explain their reasoning and justify their solutions.

Using the Principle With District-Adopted Materials

Ms. Scharfenkamp is a 4th grade teacher. You will see how she applies the three teaching practices related to the Making Sense principle in a lesson from her district-adopted materials. Like Ms. Kean did with a *Math Pathways & Pitfalls* lesson, Ms. Scharfenkamp uses Clipboard Prompts for this lesson.

Teaching Practice 1: Have students describe the meaning of the problem in their own words.

To prepare for the lesson, Ms. Scharfenkamp selected a lesson from her textbook. The problem the students are discussing is as follows:

> Daniel has 12 pencils. He sharpened 6 of them. In the simplest form, what fraction of his pencils has he sharpened?

She thought about which Clipboard Prompts would help her students make sense of the problem and potential solution processes. In this video clip, she focused on the first set of prompts.

Teaching Practice 2: Involve students in generating, analyzing, and discussing solutions.

In this video clip, Ms. Scharfenkamp continues to use the Clipboard Prompts to ask questions about students' solution processes. Notice that after students talk about the meaning of the problem, she still asks sense-making questions before having the students work on the problem on their own. She then asks them to discuss their solutions with a partner before inviting a few students to share their thinking.

Teaching Practice 3: Have students justify why a mathematical idea or solution makes sense.

In this video clip, Ms. Scharfenkamp invites students to show solution processes with pictures and numbers. Notice that she continues to use the Clipboard Prompts and to ask questions that require students to justify their reasoning.