Getting Students to Talk About Math Helps Solve Problems

Having students put their math thinking into words engages more students and boosts achievement, proponents say

By Catherine Gewertz

May 5, 2020

Getting students to talk about their thinking process in math can give teachers insight into where they need help. But it’s also a potentially powerful equity strategy, experts say.

And as teachers learn how to move instruction online because of the coronavirus, they’re all too aware of the equity issues involved: Some students have computers and good internet connections, and others don’t. Some have parents who can help with schoolwork, and others don’t. In that situation, teachers wonder how they can manage to reach all their students, let alone how they can create a class conversation about students’ math thinking.

The good news, according to experts, is that math discourse is a technique that works as well virtually as it does on paper or in face-to-face classrooms. And now, when students and teachers risk feeling disconnected and adrift, there’s even more reason to consider using “math talk” techniques to help students feel engaged and see themselves—and their classmates—as valued mathematical thinkers.

A well-designed math conversation can make it easier for all students—even those who rarely talk in class—to participate, experts say. And by including all class members, a well-structured conversation can help students feel that their thoughts have value.

Dawn Carl, the superintendent of the Winship-Robbins Elementary school district in Robbins, Calif., started focusing intently on a range of math-conversation techniques two years ago, when the English-language learners at the district’s one school, a K-8, dropped 12 points on state math tests.

But it turned out that the techniques helped all students in the school. English-learners improved their proficiency rates by 5 percentage points between the 2017 and 2019 test administrations, and native-English speakers increased theirs by 7 points, Carl said.

“It’s really made a difference for us,” she said.

The idea that “math talk” can have academic payoffs isn’t new. Research studies have described the benefits of discussing mathematical thinking for decades, and the idea crops up in a stream of publications from the National Council of Teachers of Mathematics dating back 40 years, said Robert Q. Berry, the immediate past president of the organization.

But math discourse got a boost in 2010, when the new Common Core State Standards put a high priority on ensuring that students understood the concepts underlying their calculations. Mastery of the common core’s standards for “mathematical practice” means students must know how to do things like construct viable arguments and critique others’ reasoning.

“These aren’t new ideas, but they’re practices many teachers have been working on,” Berry said. “Good math talk can help students with math sense-making.”

https://www.edweek.org/ew/articles/2020/05/06/getting-students-to-talk-about-math-helps.html?print=1
Here are four ways that experts Education Week consulted—researchers and practitioners—suggest you can help your students build their “math talk” muscles.

1. **Create a culture that welcomes “rough draft” thinking.**

   Amanda Jansen, a professor of mathematics education at the University of Delaware, argues that **sharing rough drafts in math** can serve two powerful purposes at once: It can deepen students’ understanding of math ideas and practices, and it can create an equitable learning environment.

   Here’s one way to do that, and it can work as well remotely as it does face to face, she said. Students write a first draft of a solution to a math problem. They read and comment on their classmates’ drafts. Then they submit a revised solution, explaining how and why their thinking changed.

2. **Highlight the way students’ thinking influenced the outcome.**

   Asking students to reflect on how their thinking changed, and what changed it, allows teachers to call attention to the value each student’s draft brought to the progression of the class’ thinking, Jansen said.

   “This can really elevate the thinking of their peers,” she said. “They realize their ideas can help their classmates grow their thinking.”

   Jansen is using these techniques right now, remotely, with her college students, who are aspiring math teachers. They log into Zoom and review a Google Slides deck that presents one math problem at a time. In small groups in Zoom breakout rooms, they work on solutions to the problem, compare their drafts, and choose one to share via Google Slides when they reconvene. The whole class then discusses “what’s powerful and what could be improved” about each draft, Jansen said.

   This approach fosters equity, she explained, “because it means we can see the potential in anyone’s ideas.” The conversation centers not on who has the right idea but how seeds in each person’s ideas can contribute to the group’s understanding, she said.

   And, importantly, the technique allows more students to contribute to the discussion, Jansen said. In her research, she’s seen this strategy draw out students who tended not to share their thinking often.

3. **Foster small-group conversation about word problems.**

   At Robbins Elementary, one of the new areas of focus for teachers is helping students tackle word problems. Once teachers model solutions for the class, they let students try on their own, in pairs or small groups, Superintendent Carl said.

   The children take turns discussing ways to solve a problem as their teacher circulates and provides feedback. This small-group setting is particularly important for English-learners, who might feel more comfortable asking questions in a small group than in front of the whole class, Carl said.

   As teachers listen to students’ discussions, they ask open-ended questions, Carl said. “Saying things like, ‘Tell me why you believe that,’ or, ‘Let’s think about this,’ doesn’t feed them the answers, and it gets them to think more deeply,” she said.
4. Teach students explicitly how to have math conversations.

“We find that students don’t really know how to have mathematic conversations with one another,” Carl said. “We have to teach them.”

A popular strategy, in Winship-Robbins and other districts, is teaching students to use “sentence stems” or “sentence starters”—opening lines that promote good conversation. The NCTM’s Berry offered examples.

Learning to say things like, “When Robert uses this strategy, it makes me think of ...” or, “This makes sense to me because ...” can help students learn how to “get mathematical ideas out into the classroom space” and build respectfully on one another’s thinking, Berry said.

Another technique Berry likes draws inspiration from cartoons. As a teacher models a solution to a problem, he circles a particular section and draws a cartoon “thought bubble” next to it, then asks his class, “What do you think I’m thinking right here?” Teaching online, this can be done through a text box, Berry noted. In a paper version of the exercise, students could fill in the thought bubble.

Whether they’re teaching virtually or in person, teachers can also harness new technologies to get students talking about math. Tools like FlipGrid or TikTok let students get creative making videos of themselves solving a math problem or explaining their thinking about a possible solution, Berry said.

Maybe, just maybe, when students are having fun, they might not notice that they’re learning more deeply about math. Research suggests that when students talk more about their math thinking, they are more motivated to learn and they learn more. Talking about math thinking can also serve as a stealth form of assessment, giving teachers insight into what students have mastered and where they still need help.