# 2. Leading Effective Math Discussions with Students

 “Discussions are a central component of mathematics instruction,” say University of Michigan researchers Timothy Boerst, Laurie Sleep, Deborah Ball, and Hyman Bass in this *Teachers College Record* article. “Successful discussions require substantial teaching skill. This is because students must be helped to engage in complex mathematical practices such as giving explanations, making connections, and using representations, and, at the same time, teachers’ moves must be contingent on what students say and do. Furthermore, leading a discussion requires mathematical knowledge for teaching, given that teachers need to size up mathematical ideas flexibly, frame strategic questions, and keep an eye on core mathematical points.”

The authors go on to suggest ways to help new teachers understand the how and why of improving classroom math discussions. They suggest that teachers choose problems carefully (not all are amenable to discussion), have students work on the problems themselves, and then launch a discussion. Here are the suggested steps:

• Identify the mathematical content and instructional purpose:

* Do the problem yourself.
* What is the math that students are supposed to be working on?
* What is your instructional purpose for using the problem?

• Anticipate student thinking:

* What knowledge and skills will students need in order to do the problem?
* What methods are students likely to use? What solutions or responses are students likely to generate?
* What misconceptions are students likely to have? What errors do you anticipate they will make?

• Set up the problem:

* How will you present the problem to students?
* What materials will you and students need?
* How will you familiarize students with representations used in the problem?

• Launch and orchestrate the discussion: initial eliciting of students’ thinking:

* Does anyone have a solution they would like to share?
* How did you begin working on this problem?
* Does someone have a different idea?
* What have you found so far?
* Did anyone approach the problem in a different way?

• Prove students’ answers, try to figure out what a student means or is thinking, check whether right answers are supported by correct understanding, probe wrong answers to understand student thinking:

* How do you know?
* So what you’re saying is \_\_\_\_
* When you say \_\_\_\_, do you mean \_\_\_\_?
* Could you explain a little more about what you are thinking?
* Why did you \_\_\_\_?
* How did you get \_\_\_\_?
* Could you use some concrete materials to show us how that works?

• Focus students to listen and respond to others’ ideas:

* What do other people think?
* How does what \_\_\_\_ said go along with what you were thinking?
* Who can explain this using \_\_\_\_’s idea?
* Would someone be willing to add on to what \_\_\_\_ said?

• Support students to make connections, for example, between a model and a mathematical idea or a specific notation:

* How is \_\_\_\_’s method similar to (or different from) \_\_\_\_’s?
* How does one representation correspond to another representation?
* Can you think of another problem that is similar to this one?
* How does that match what you wrote on the board?

• Guide students to reason mathematically – making conjectures, stating definitions, generalizing, proving:

* Can you explain why this is true?
* Does this method always work?
* What do these solutions have in common?
* Have we found all the possible answers?
* How do you know it works in all cases?

• Extend students’ current thinking and assess how far it can be stretched:

* Can you think of another way to solve this problem?
* What would happen if the numbers were changed to \_\_\_\_?
* Can you use this same method to solve \_\_\_\_?

“Preparing Teachers to Lead Mathematics Discussions” by Timothy Boerst, Laurie Sleep, Deborah Ball, and Hyman Bass in *Teachers College Record*, December 2011 (Vol. 113, #12, p. 2844-2877), purchase at <http://www.tcrecord.org/Content.asp?ContentId=16496>

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