

# President's Message

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**T**HIS ISSUE OF *Colorado Mathematics Teacher* focuses on assessment. Recently, there has been a lot of conversation about assessment at the state and national levels. Many of these conversations, particularly those external to educators, tend to focus on high stakes, summative state assessments. But as a classroom teacher, assessment refers to more than just these types of tests. We as teachers assess students every time we ask a question, have students share work on the board, review a homework assignment, or solicit student questions during a lesson.

Statewide summative assessments have an important place in the world of math teaching, but let's consider the more immediate and classroom-oriented practices that support learning. The eight Mathematics Teaching Practices in *Principles to Actions* serve as a guide to effective math teaching and learning, and in particular, two of the eight help teachers think about effective formative assessment: *Pose Purposeful Questions* and *Elicit and Use Evidence of Student Thinking*.

"Effective teaching of mathematics uses *purposeful questions* to assess and advance students' reasoning and sense making about important mathematical ideas and relationships" (NCTM, 2014, p. 35). We all ask questions all day long, in every aspect of our lives! However, when it comes to effective math teaching, questioning is quite complex, and when done well, can have a huge impact on students' understanding of important mathematical ideas. It is well worth the time teachers take to carefully craft questions and plan for their strategic use during a lesson. Good, purposeful questions can guide students to deeper levels of sense-making during math class, whereas poor ones can frustrate students and teachers alike.

In considering what is meant by "purposeful questions," teachers must attend to both the types of questions being asked, as well as the patterning of the questions. High quality questions will focus on revealing students' understanding of key math-

ematical ideas, and will lead to adjustments in the instruction as a result of student responses. The questions asked should gather information, probe thinking, make the mathematics visible, and encourage reasoning and justification.

Additionally, the patterning of questions is a component of effective questioning. When the questions force students into a singular path of thinking, or are disconnected from the student responses (a pattern called "funneling"), student understanding is less likely to be enhanced or developed by the questions. Instead, a question pattern that meets students in their current thinking and extends it toward important mathematical ideas (a "focusing" pattern) can be a powerful teaching tool during instruction.

*Principles to Actions* includes many sample questions and guidelines for teachers. In addition, my two favorite go-to sites for additional resources on this topic are: 1) [Asking Effective Questions](#) and 2) [Never Say Anything a Kid Can Say!](#) Here you can find sample questions to use with students, such as: What led you to that idea? and How does your idea connect to <another student>'s idea?"; and guidelines to consider while formulating your questions during lesson planning such as posing open-ended questions, using verbs that connect to higher levels on Bloom's Taxonomy, or attending to wait time.

Closely related to questioning is the teaching practice of *eliciting and using evidence of student thinking*. "Effective teaching of mathematics uses evidence of student thinking to assess progress toward mathematical understanding and to adjust instruction continually in ways that support and extend learning" (NCTM, 2014, p. 53). Questioning, and other forms of formal and informal assessment, allow teachers to elicit evidence of student thinking, and use this evidence strategically in instruction.

It is important that students can find correct answers to math problems; however, correct answers are only one part of a deep understanding of mathematics. The [Progressions Documents for the](#)

[Common Core Math Standards](#) provide guidance for teachers in identifying indicators of student understanding. When the teacher has a learning trajectory in mind, as well as common pitfalls and misunderstandings that accompany the specific math concepts with which students will work, the required instructional adaptations become more fluid.

Using high-level tasks with strategically planned questions—at key points during the lesson—creates the opportunity for teachers to interpret and respond to students’ learning during class. Effective teacher responses will guide students to a deeper conceptual understanding while supporting their advanced math reasoning. When these instructional methods are a regular part of the teacher’s practice, students can become more adept at monitoring their own learning. When they can reflect on their mistakes or misconceptions and ask questions that add clarity and purpose, students are even more motivated and engaged in their math experiences.

Planning for effective questioning and determining how to elicit student thinking are great conversations for grade-level or PLC meetings. *Principles to Actions* and other books and articles from NCTM provide guidance as teachers engage in this work together. Teaching math is a craft, and when teachers collaborate to improve their classroom practice, students reap benefits in achievement, engagement, and enjoyment.

### References

National Council of Teachers of Mathematics (2014). *Principles to Action: Ensuring Mathematical Success for All*. Reston VA: NCTM.

