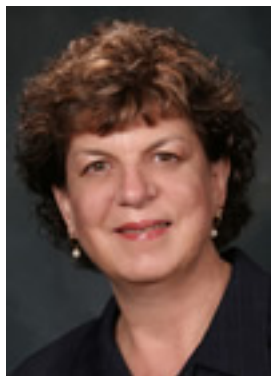


What's All This Talk about Rigor?



By NCTM President Linda M. Gojak
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Recently, I had a conversation with a group of math coaches who are working with elementary teachers on implementation of the Common Core Standards for Mathematics. The discussion turned to a description of rigor in the classroom. The coaches commented that many of their teachers were confused by exactly what was meant by teaching and learning with rigor. The coaches weren't sure how to respond.

Rigor in the Common Core State Standards

The word “rigor” is widely used in policy discussions, but it’s rarely understood or defined, and often it merely passes as code for “better.” It is interesting that the term “rigor” does not appear in the Common Core State Standards for Mathematics, although it is certainly implied. “Rigor” appears multiple times in the U.S. Department of Education’s paper, [“A Blueprint for Reform: The Reauthorization of the Elementary and Secondary Education Act,”](#) as well as its recent document, [“ESEA Flexibility”](#)—both of which include a call for rigorous academic content standards.

Rigor in Instruction

The coaches and I began our work of exploring the notion of rigor with an online search of the word “rigor.” The thesaurus led us to a list of synonyms, including “affliction,” “inflexibility,” “difficulty,” “severity,” “rigidity,” “suffering,” and “traditionalism”—none of which describe characteristics of rigorous mathematics instruction. No wonder the teachers were confused! However, two additional words included in the list—“thoroughness” and “tenacity”—provided avenues for some serious thought about what “rigor” implies. We generated the following chart, which led to an interesting discussion with the classroom teachers. There are certainly other characteristics that can be added to the list.

| Learning experiences that involve rigor ... | Experiences that do not involve rigor ... |
|--|---|
| challenge students | are more “difficult,” with no purpose (for example, adding 7ths and 15ths without a real context) |
| require effort and tenacity by students | require minimal effort |
| focus on quality (rich tasks) | focus on quantity (more pages to do) |
| include entry points and extensions for all students | are offered only to gifted students |
| are not always tidy, and can have multiple paths to possible solutions | are scripted, with a neat path to a solution |
| provide connections among mathematical ideas | do not connect to other mathematical ideas |
| contain rich mathematics that is relevant to students | contain routine procedures with little relevance |
| develop strategic and flexible thinking | follow a rote procedure |

| | |
|---|--|
| encourage reasoning and sense making | require memorization of rules and procedures without understanding |
| expect students to be actively involved in their own learning | often involve teachers doing the work while students watch |

Rigor Involves Everyone

Rigor involves all partners in teaching and learning. Teachers must consider rigor in planning lessons, tasks, and assignments. Rigorous lessons build on and extend prior knowledge. They encourage productive struggling. Although the objective of a lesson should be clear in the teacher’s mind, the lesson should not focus on one correct path to a solution or even one correct answer. A rigorous lesson embraces the messiness of a good mathematics task and the deep learning that it has the potential to achieve.

Students who are successful in a rigorous learning environment take responsibility for their learning. They learn to reflect on their thinking. They persist in solving a problem when the path to solution is not immediately obvious. They recognize when they are not on the correct path and need to switch directions during the solution process. Students must learn to ask productive questions rather than expecting to be shown how to proceed. (And, teachers must answer those questions with just enough information to move students forward while preserving the challenge of the task!

Rigorous teaching and learning require rigorous formative assessment throughout a unit so the teacher knows what the student has learned and can plan additional activities, or adjust them, to address student needs. Students also have a role in formative assessment—they must approach tasks with tenacity and ask clarifying questions when they are unsure how to proceed. All assessments must include opportunities for students to demonstrate the processes and practices in their approach to doing mathematics. Good formative assessment can be incorporated into daily instruction and prepare students for the summative assessments that take place at certain points throughout the unit of study.

Moving toward Rigor

How can we support classroom teachers and pre-service teachers (pre-K–16) in working toward greater rigor in mathematics instruction? Professional development experiences that model rigor through the use of rich tasks, rich discourse, and good questions allow teachers to experience rigorous instruction. When selecting tasks, teachers must be sure that mathematical ideas are explicit and the connections are clear. The days of a few word problems at the end of multiple skill exercises in the textbook are over! Concepts must be introduced and explored in contexts that are interesting and motivating for students. Tasks must provide entry points for all students, offer them well-defined opportunities to make connections to other mathematics, and include both opportunities and expectations for them to develop deeper understanding. The focus and coherence of the Common Core State Standards lead the way to rigorous instruction. It is time for us to begin the journey.