



# 5 Things to know about teaching and learning math

by Jessica Miller



## ABOUT THE AUTHOR

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Parents, students, friends—and sometimes even colleagues who are less familiar with balanced math—often ask me why we are teaching math in a new way. I ask them in return, “Do you understand the math you learned in school? Or did you simply memorize the formulas that led to the right answers?”

Teaching evolves just as every profession does. As we learn more about how students learn, we refine our practices. As the demands placed on graduates in higher education and the workforce change, what we do in the classroom changes, too. We balance what we know about teaching and learning with the needs of an ever-changing world.

One of my goals as a teacher is to help students think and solve problems like professional mathematicians. The following five truths about math provide a foundation for my teaching:

**1 Conceptual understanding helps students learn and use algorithms.** One of the first things parents and other observers notice about math workshop is the reduced emphasis on traditional algorithms, or formulas. It isn't that we've banned traditional algorithms from the classroom. Students do learn and use them—but not until they're able to understand what the formula means and why it works. We build toward a procedure by experiencing many different problem solving strategies first. This way, students often arrive at the traditional algorithm on their own, as they think about how to describe what they did to get an answer.

**2 Fact speed does matter, but it isn't everything.** As children, lots of us memorized math facts and raced to answer them correctly on worksheets. Of course, the more quickly students can solve basic facts, the more quickly they can complete other, more sophisticated problems. But, again, we don't want to teach memorization without understanding. Our goal is fact fluency. Fluency with math means that we are accurate, efficient, and flexible when solving problems.



Students should have many opportunities to use different strategies to solve facts so they build the understanding that leads to speed. The more they practice using their strategies, the more fluent (accurate, efficient, and flexible), they will be. Speed will develop naturally with continued practice.

3

**Efficiency is important.** As students discover and invent strategies for solving problems, they are not always working in the most efficient way. That doesn't mean that their strategies are wrong. Efficient strategies develop with time and plenty of practice. Using the term "efficient" in teaching is important, as we must support students in finding strategies that use their time and brain-power wisely. We do this by scaffolding instruction to help students identify, develop, and refine more efficient strategies. Students build from the strategies they love and are comfortable with to strategies that are efficient and promote a productive use of their time.

4

**Math isn't a grade-specific checklist.** Mathematics isn't just a set of individual skills to check off at each grade level; rather, our goal is to move students forward when they are ready. When we treat our own grade level as an isolated study, we take away the opportunity for our students to make mathematical connections. I have had students tell me that they can't use negative numbers because that isn't something that they do in their grade. "That's more of a middle school thing," they say. If students are ready for content that includes negative numbers, let them have it!

5

**Flexible mathematicians is the goal.** Students are successful in mathematics when they are able to think flexibly about numbers and work with numbers. The mathematics our students will encounter throughout their lives will not be as clean and organized as the problems in a textbook or workbook. We need to give students an opportunity to work with messy math. That may mean getting them comfortable with not knowing the "real" answer, or understanding that there's more than one way to solve a problem. The process of learning mathematics is not linear and is not identical for all students. We strive to foster students' inquisitiveness and build on what they know. We want them to love math!



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