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# MAKING SENSE OF MATH

*How to Help Every  
Student Become a  
Mathematical Thinker  
and Problem Solver*

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Introduction.....	1
Who's Smart in Math?.....	3
Math Is <i>Supposed</i> to Make Sense!.....	11
What Mathematics Do Students Need?.....	18
Can Struggling Be Good for Students?.....	22
What If We Turn Teaching Upside Down?.....	29
Where Can I Find Support?.....	40
Conclusion .....	44
Encore .....	45
References .....	50
About the Author .....	52



## Introduction

When I learned how to teach mathematics many years ago, it seemed like a fairly straightforward task—prepare well and explain clearly. Whenever I could, I tried to elaborate why a particular procedure worked or a particular kind of problem might be solved a certain way. If I wanted the students to really stay with me, I learned to focus on asking good questions and challenging students to go beyond their comfort zone, always with enthusiasm and a smile on my face. I worked hard to find interesting puzzles and games that might have some slim connection to what I was teaching. And I made myself available for students before and after school. I like to think that I got better every year, and I also like to think that most of my students thought I was a pretty good teacher overall. Many of them came to not hate math, and perhaps they even learned most of what they needed to know in order to move on. I tried not to focus on the fact that the math I was teaching might not have been very relevant to their lives or might not make sense to some students, even with my “clear” explanations.

I’ve learned a lot since those early days in my teaching career. Today we know much more about what it takes to equip students to become mathematical thinkers who can take on any problem they encounter. We also know that

students—all students—have more ability and even more intelligence than we might have imagined. As we think about how to nurture and help students develop their abilities and intelligence, I'm convinced that their success in the future depends at least as much on *how they think* as it does on *what they know*. Likewise, I'm convinced that if we're going to help them succeed, we need to pay at least as much attention to *how we teach* as to *what we teach*. We need to challenge some of our old ideas about struggling and frustration and consider structuring our classrooms differently from how classrooms might have been structured when we were students. We may even need to turn those structures upside down. And we need to recognize that professional learning communities—if used appropriately—can offer a powerful vehicle for teachers to learn how to more effectively help students gain the mathematical knowledge, problem-solving skills, and habits of mind they need for living and working in the 21st century.

In this brief look at mathematics teaching, let's think together about what it takes for every teacher to help every student become a mathematical thinker. To look at broader issues related to prioritizing math at the school level and creating and supporting strong math programs, see my companion volume for leaders, *Building a Math-Positive Culture* (Seeley, 2016).

## Who's Smart in Math?

Students have difficulties in mathematics for many reasons. They may have learning problems. They may not speak English as their primary language. They may be too shy to ask questions or have behavior or attendance problems. They may have missed or misunderstood an important concept in the past. They may not see the relevance of what they're learning. But the biggest barrier for many students is their belief that some people are naturally good at math and some people simply aren't. Students come to believe this myth largely because the adults around them, including their parents and teachers, may also believe it. Unfortunately, this idea has been reinforced by some long-standing practices and underlying beliefs, particularly structuring classrooms around teacher-centered lectures, using timed tests to assess mathematical fluency, and believing that good students shouldn't make mistakes.

Traditionally, we may have thought of a "good" or "smart" math student as one who is quick to respond to a teacher's question, accurate at computing the answer to a computation problem, and able to apply a newly learned procedure to solve a word problem. But the truth is that there are many ways to be smart in math. Some students may be creative problem solvers. Others may be visual thinkers who can see and analyze quantitative or spatial relationships.