

Sharing the Complexity and Joy of Mathematics

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Our students bring in several preconceptions about learning mathematics as the school year begins each fall. They may have heard that a family member was good at math or hated math in school. Siblings may talk about how math is an easy course or a hard one. Students may perceive that mathematical learning is rigorous and that may mean opportunities for challenge or frustration.

Our students also bring in memories of past learning experiences. Often these memories are very specific things that they have learned—whether it be a math fact, a geometric property or a concept such as counting to infinity. Broadly they have a sense that they are either good at math or not and it feels good to learn it or it does not.

Unlike the fields of reading, writing, science, music, art and other areas, rarely do I hear students talk of how complex math is as a field and about the joy of learning mathematics.

One of my goals with students is to let them know that mathematical learning is complex. It's one of the key learning experiences in preparing for our quickly evolving world. When we learn a concept or skill, we talk about how this connects to future learning. We highlight how this kind of thinking is similar to the ways people in science, engineering, business, healthcare, and manufacturing are working on the world's problems and challenges. I let students know that new mathematical fields are still being developed—that there are new and long standing mathematical puzzles no one has solved—yet.

Elementary students are often surprised that number sense as a class sunsets in middle school. Each year I watch my student's faces each time we talk about how there is a whole course in variables and patterns, a whole course in shapes, and even a whole class based on triangles.

We talk about how there are courses in colleges about fractals, topology, and game theory. Local trades in my area use machine-tool precision or the maintenance of the complex mathematics and engineering of wind turbines. We mention how adults face challenges of understanding finance or making the many daily decisions adults need to do.

All of these help connect students to future pathways. Math isn't just about today's learning, it's about lifelong learning and future opportunities.

However, we also owe our students one more thing. Math has its own unique joy. Figuring out and understanding the patterns and beauty of mathematics is powerful stuff. Some of people's earliest learning memories are connected to a sense of learning something new about the universe in mathematical ways. Share your joy of mathematics with your students. Really tell them when something is fun, amazing, or inspires your sense of wonder. Students need this along with the nitty gritty stuff we teach each day.

Wishing you and your students joy in mathematical learning this school year as you passionately explain an aspect of math yet another time, often in a different way, as you help students make connections, and as you prepare our students for the mid-21st century and beyond.