

Everyone Can Learn Math and Enjoy it Too!

by Carol Mercier, Village School 2nd and 4th grade math teacher.

Is learning math a matter of talent and ability? Or, is it a matter of interest and persistence? Historically, it has been a somewhat polarizing subject, dividing the haves from the have nots - those who *have* a natural talent for mathematics and those who *haven't*. Entire generations of disenfranchised students believed that some of us "just don't get math." However, this notion is unsupported by research. To the contrary, we now know that the brain is malleable and can learn and grow in unprecedented ways.

Carol Dweck, in her book *Mindset*, revolutionized the field of education, challenging conventional wisdom about learning and intelligence with her discovery of fixed and growth mindsets. She discovered that students' attitudes towards learning and their beliefs about intelligence play an integral role in their success as learners.

Students with a *fixed mindset* believe intelligence is "set" or "fixed" and based on a person's natural gifts and talents. Essentially, it is out of their control. People are either smart or they aren't; they're either good at math, or they're not. When faced with a setback, they might question their own abilities and intelligence, believing, "I'm just not good at this." A student with a fixed mindset who has been led to believe he or she is naturally good at math may become discouraged and give up the first time he or she experiences a failure, questioning whether or not he or she really *is* any good at math after all.

In contrast, students with a *growth mindset* see intelligence as something that can be developed with effort and persistence. These students aren't discouraged by failures; they are resilient and view mistakes and "failure" as the beginning of learning, not the end.

In my elementary math classes at the Village School, it is my goal to cultivate a growth mindset in students so all students begin to see themselves as capable math learners. In any class there are a mix of mindsets, and it's not unheard of to hear someone utter the words, "I'm great at math," "I'm terrible at math," or "I'm not really a math person" on the first day.

My first task every September is to help my students get comfortable making mistakes, *really* comfortable. I actively work to create an environment in which students feel safe to take risks and make mistakes, because it's when they are willing to take chances, to risk making a mistake, that growth and learning can happen. We don't learn by doing what we are already good at, we learn when we put ourselves out there in trying something new and risk failing in the process. Without accepting the possibility that they could fail, students may choose sit on the sidelines, too paralyzed to take the first step. They'll never know how much they could have achieved.

To create an atmosphere where risk-taking and mistake making are commonplace, we need to take the stigma out of what is, really, a normal and expected part of the learning process. That means that when a student offers up a wrong answer, I don't correct it and

move on. It goes on the board, and the class discusses it along with any other correct or incorrect answers. It is then that I see real learning take place, when finding the correct answer is the burden of the student and not merely a fact to be shared by the teacher. I like to tell students that mistakes are expected, respected, and corrected. I am careful to avoid faint praise that promotes a fixed mindset, such as “You’re great at this” or “You’re smart.” Instead, I’ve trained myself to give specific, honest feedback, both critical and positive. “Sandra, the dimensions of your array match the factors in our equation,” tells Sandra exactly what she did correctly so she can replicate her success in the future. Saying “You’re really good at this, Sandra” or “I like your array” doesn’t have the same learning value. I aim for unbiased statements about the student’s work, not comments about their math abilities.

We’ve been taught to praise a student’s efforts and not their intelligence. Generally, this is sound advice. If a student hits a roadblock in math, gets stuck, puts in effort, and is ultimately successful, it’s valuable to commend his or her hard work and perseverance. “I saw that you put a lot of time and effort into this. Your effort paid off.” We want students to see the correlation between their efforts and success. On the other hand, if you have a student who is putting in effort but is still not progressing forward, then praising the effort alone is a poor consolation prize for real learning. Instead, I try to provide students with additional strategies or math tools to support them. “I see that you’re putting a lot of effort into solving this addition problem. Can you draw a model to show what’s going on in the problem?”

When I have the opportunity, I also like to use a student’s mistake as an example for the class, saying, “Hey, everyone, take a look at what Erin did. She made a really cool mistake.” (I always ask the student’s permission in advance to share their mistake.) Then we have an open conversation about it. We discuss why this mistake is interesting and outline what steps the student might take now. It is an added bonus if classmates consider that particular student to be great at math. It sends the message that even the “best of us” struggle, fail, and have to get back up again.

When students acknowledge mistakes and take the time to analyze them closely, they can learn from them. This is why you won’t see erasers on pencils in the fourth through sixth grade math classroom at the Village School. Erasers are for hiding mistakes. We don’t want to hide our mistakes, we want to peel back the layers and pinpoint where we went astray so we can learn how to correct our mistake and keep *growing*.

So growth mindset enables *everyone* to move forward as a learner, and not only in math. The set of attitudes that make up a growth mindset are attitudes that will help us learn all subjects. This set of attitudes creates lifelong learners, our teaching goal at the Village School.