



## Presentation

FULL DETAILS AND TRANSCRIPT

### Ability Is Expandable

November 2007

Topic: Encouraging Girls in Math and Science  
Practice: Ability Is Expandable

#### Highlights

- There are two ways to view intelligence: that it is “fixed” and can’t be changed, or that it is “expandable” and that with effort abilities can improve or expand.
- Combining the fixed mindset with gender stereotypes can be particularly harmful for girls, who are frequently exposed to the idea that they are not supposed to be good at math.
- Students with the expandable mindset are more likely to take on challenges, explore new concepts, enroll in advanced courses, and join a math or science club.
- Students’ beliefs about their abilities are reinforced through social interactions. Teachers are in a powerful position to help.
- When students get frustrated, they need to be reminded that improvement just takes effort. When they do well, they need to understand that it is the result of their effort.

## Full Transcript

### Slide #1

Welcome to the overview on how to teach students that their abilities are expandable.

### Slide #2

In elementary school, Rachel got good grades with little effort, but now that she's in middle school, she's struggling in math. And she's not sure why.

Her older brother told her that girls just aren't good at math, and Rachel thinks he might be right. Suddenly, Rachel has started to doubt her own ability to learn math.

### Slide #3

Research continues to show a connection between how students perceive their ability and their academic success. If students believe they can do it, then they're motivated to put in the effort. But when students doubt their abilities, they are less likely to try.

Without realizing it, most people think about their ability to learn in one of two ways—as either “fixed” or “expandable.” In the “fixed” mindset, people believe that their intelligence can't change—you're either born with certain skills and abilities, or you're not. People who believe in the “expandable” mindset think their abilities can improve and expand—that, with effort, they can constantly learn new skills.

### Slide #4

In school, students who believe in the “fixed” view often avoid challenges and reduce their level of effort to match their own expectations. The “fixed” view can be damaging even for students who consider themselves successful in math and science. If learning these subjects has always come easy, then they are less likely to overcome difficult challenges or even failure.

### Slide #5

In contrast, students who believe that their ability in math and science is “expandable” usually behave differently. They are more likely to take on challenges and explore new concepts. Instead of resigning themselves to defeat, they are willing to increase their effort and look for different ways to solve the problem; such as, asking for help, working with a tutor, or simply devoting more time to tasks. For these students, obstacles are not insurmountable.

Interestingly, these students are also more likely to enroll in advanced courses and join a math or science club than their peers who view abilities as fixed. So, clearly, how students perceive their abilities can have major implications in their academic success.

Slide #6

Student beliefs about ability develop and are reinforced through social interactions with family, peers, media, and of course, teachers.

Teachers are in a powerful position to help students examine how they perceive their abilities.

Slide #7

Teaching students about how the human brain works is an important first step. Before students see intelligence as expandable, they need to understand that our brains are constantly growing and changing—creating and refining new synaptic connections based on our everyday experiences and activities.

There are many ways to integrate these concepts into classroom instruction.

First, scientific research has proven that repeated practice of a skill can increase the number of neurons and the strength of connections between the neurons in the brain. Learning a new skill is not immediate. Students need opportunities to practice the same skill many times in many different contexts before they can master it.

Second, teachers can provide students with a wide variety of new and challenging experiences—reminding them that difficult work is actually what helps their brains grow. And, when students express frustration or lack of confidence in their math and science abilities, teachers can remind them that improvement is always possible. It just takes effort.

Lastly, when students earn a good grade or master a new skill, we need to make sure they know that their success is the result of persistent effort—not fixed, innate ability.

As Black Elk, a famous leader of the Lakota tribe, once said: “Continuous effort—not strength or intelligence—is the key to unlocking our potential.”

Slide #8

None of this is effective unless the teacher also has a “growth mindset”. All educators must believe that every student can increase his or her abilities through effort.

Research suggests that how a teacher perceives students' ability can affect their achievement—especially in the younger grades. Teachers who think of intelligence as fixed may expect less from students that they perceive as incapable of learning. And when teachers don't believe students can succeed, students can become less motivated and unwilling to apply themselves to academic challenges.

When the entire school supports this growth mindset, students get constant reinforcement and may start believing it themselves.

#### Slide #9

Why is this so important for girls in math and science? Combining a fixed view of ability with gender stereotypes is particularly harmful to girls as they learn math and science.

If girls believe that they have inherently low abilities in math and science—regardless of their actual skill level—they may not actively develop their math and science skills, let alone pursue careers in these fields. The belief that boys are inherently better at math and science is a common misconception, and many girls grow up believing this is true.

When this is knowingly or unknowingly reinforced in class, it becomes easier for girls to believe that any difficulties they encounter in these subjects is due to their gender—attributing failures to a permanent cause rather than temporary causes such as inadequate preparation or low effort.

#### Slide #10

For example, when Rachel's brother experiences problems in math he attributes it to a fluke accident or not feeling well that day—an external cause not related to his ability. But when Rachel has problems in math she attributes it to her lack of ability—concluding that girls just can't do math. And she's completely unmotivated to do better in class.

Of course, with the proper teacher support, Rachel and other girls can easily overcome these beliefs. First, teachers can directly address these issues when they arise, either individually or through class discussions. They can remind girls that there is no such thing as a "math gene" or a "science gene."

No one is born with these skills, and boys struggle with math and science just as much as girls. Also, teachers can frequently highlight the mathematic and scientific accomplishments made by both men and women, especially people who overcame difficult challenges through persistent effort.

#### Slide #11

Building a classroom environment that encourages students to view abilities as expandable and improvable

is vital for student growth. It helps students feel safe to take risks, tackle new challenges, and strengthen their minds. As a result, students will become more confident about their abilities and build new connections in their brain—helping them succeed both now and in the future.

### Slide #12

To learn more about teaching students that their abilities are expandable, please explore the additional resources on the [Doing What Works](#) website.