

## Unlocking Children's Math Potential

May 3, 2020

Jo Boaler, Professor, Stanford University; CEO of youcubed <https://www.youcubed.org/>

There is a huge elephant standing in most math classrooms: it is the idea that only some students can do well in math. Students believe it, parents believe it and teachers believe it. The myth that math is a gift that some students have and some do not is one of the most damaging ideas that pervades education in the United States and that stands in the way of students' math achievement.

In the last few years scientists' understanding of ability and learning have changed dramatically. The advent of brain scans and other technological advances have enabled researchers to gain new and important information about learning and ability.

### 1. All Students Can Achieve at High Levels.

Studies show that students' brains can adapt and grow in a short space of time, and that ideas that some students are not capable of learning high-level content should be rejected.

### 2. Students' Ideas About Their Ability Determine Their Learning Pathways and Math Achievement.

Everyone has a mindset—an idea about ability and potential—some people have a “growth mindset” whereas some have a “fixed mindset.” Those with a growth mindset believe that smartness increases with hard work and that everything they learn makes them smarter; those with a fixed mindset believe that some people are smart and some are not. When students have a growth mindset they achieve at higher levels and when students receive a mindset intervention their learning trajectories immediately accelerate upward towards higher and higher.

### 3. Mistakes and Struggle are Extremely Important for Learning.

Moser and colleagues (2007) showed that when people make mistakes, brain activity happens that does not happen when students get work correct. For people with a growth mindset the act of making a mistake results in particularly significant brain growth.

### 4. Mathematics Should Be Dissociated from Speed.

An important message that is emerging from neuroscience concerns the damage that is caused when math performance is associated with speed. In addition to the stress caused by time pressure, it rarely encourages students to be fast. Instead the fast students stay fast and the slow stay slow, and those with math anxiety become

slower. It is important to present mathematics as a subject that requires depth of thought, not fast recall.

## **5. Teachers' Messages are Hugely Powerful.**

It is extremely important that neither parents nor teachers praise children in fixed ways, telling them they are “smart.” When children are told they are “smart” they often feel good, but later when they fail in some situation, and everyone does, they think “Hmm, I am not so smart.” Always praise what children have done, instead of the person.

## **Conclusion**

Gloria Ladson-Billings refers to teachers as “dreamkeepers.” I like this description because it communicates, accurately in my view, the opportunities that teachers have to help students achieve their dreams. In mathematics this starts with believing that all students can achieve at the highest levels, as research on the brain shows. It also involves working with students in groups of mixed abilities that encourage high achievement for all and provision of challenging and interesting work for all students. If we can bring about these changes in mathematics teaching, many more students will enjoy mathematics, achieve at high levels, and develop the quantitative literacy they need to become effective citizens in the 21st century.

Jo Boaler's has been abridged for the translation competition; the full text can be accessed here: <https://www.parentsleague.org/blog/unlocking-children%E2%80%99s-math-potential>