

Rich and Safe Mathematical Environment

Children's attitude toward learning math has a great impact on achievement. Often students come to us with a *fixed mindset*, or belief that they are born good or poor at math, and sometimes parents or other adults either reinforce this belief or are the source of it.

Generally, it is much more acceptable for people to verbalize their dislike for math or the sentiment that they are not good at math than any other subject. Teachers and schools need to reverse this trend and

create a growth mindset environment that supports the belief that all students can learn math.

Sometimes this involves conversations with other teachers, parents, and administrators as well! Math is a literacy for everyone.

- Teachers need to monitor language around mathematics, and embrace and celebrate errors. Cognitive science has shown that errors and misconceptions are essential to learning. Everyone will make errors, and they should be seen as a normal part of math learning. We must continually reinforce respectful listening and sharing in a safe environment.

- Math is not about "being finished". We are never finished! We are *engaging in mathematical thinking* for a class period every day.

- We need to help our students feel comfortable with **productive struggle** to instill persistence. Even if we never reach a correct solution, just struggling with a mathematical problem or puzzle creates neural development.

- Students should set goals for themselves and self-monitor their progress. Avoid competition and timed tasks. Speed does not equate to proficiency.

DEVELOPING A GROWTH MINDSET



INSTEAD OF.....	TRY THINKING....
I'm not good at this	What am I missing?
I give up	I'll use a different strategy
It's good enough	Is this really my best work?
I can't make this any better	I can always improve
This is too hard	This may take some time
I made a mistake	Mistakes help me to learn
I just can't do this	I am going to train my brain
I'll never be that smart	I will learn how to do this
Plan A didn't work	There's always Plan B
My friend can do it	I will learn from them

Image from <https://www.langshott-surrey.co.uk/page/?pid=196>

"A lot of scientific evidence suggests that the difference between those who succeed and those who don't is not the brains they were born with, but their approach to life, the messages they receive about their potential, and the opportunities they have to learn."

— **Jo Boaler**

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- Be careful to praise effort and not ability. Praising mathematical ability may lead to a fixed mindset. As Eduardo Briceno says: "If I am winning because I am a winner, then the first time I lose I must be a loser."
<https://youtu.be/pN34FNbOKXc>

My Favourite No

<https://www.youtube.com/watch?v=2zrtHt3bBmQ&t=29s>

Mathematical Mindset Resources

The Power of Belief (Eduardo Briceno, Ted Talk):

<https://www.youtube.com/watch?v=pN34FNbOKXc&t=7s>

Jo Boaler on Mathematical Mindset

<https://www.youtube.com/watch?v=3icoSeGqQtY&t=61s>

The Importance of Mistakes:

<https://www.youtube.com/watch?v=LrapKjiQbQw&t=48s>

For Students:

<https://www.youtube.com/watch?v=ZoYDHUGlwuE&t=34s>

For young students:

<https://www.youtube.com/watch?v=2zrtHt3bBmQ&t=29s>

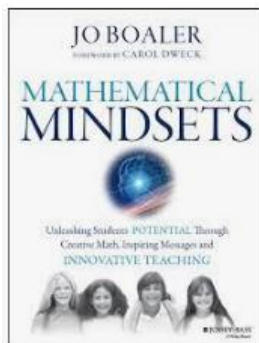
Image from Fuquay-Varina Middle School



Further reading: *Mathematical Mindsets* by Jo Boaler



On the other end of the spectrum from a growth mindset is math anxiety. This is a very real impediment for some students and seems to get progressively more acute as students move up through grades. **Embracing errors as necessary for learning** and **not timing tasks** are two effective ways to battle math anxiety. Our focus needs to be on learning, not grades.



Poster available at Newell's Nook and Ben Heyman, TPT