Struggling Secondary Math Learners?
How to Insure Equitable Education For All

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bit.ly/UtahMath
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Math Anxiety

“Many children in the US, and beyond, grew up thinking that either you can do math or you can’t. When they struggle, they assume they can’t. From that point on any struggle is a further reminder of their perceived inadequacy. Procedural mathematics teaching and high pressure testing combined with the prevalent ideas that only some students belong in mathematics, has led to the development of widespread mathematics anxiety across the world. Researchers now know that when people with math anxiety encounter numbers, a fear center in the brain is activated—the same fear center that lights up when people see spiders or snakes. As the fear center of the brain becomes activated, activity in the problem-solving centers in the brain is diminished. It is no wonder that so many people struggle in mathematics—as soon as people become anxious about it, their brains are compromised.”

Source: in "Failure Affirmation and Growth A Pivotal Perspective on Special Education" (2019)

Culture Strategy #1: Mathography

Resource: Mathography Project

Key idea: Mathography is a great way to dig deep into your students’ math praxis and get to know them.

Culture Strategy #2: Four Corners

Sample statements:

• In general, I like math
• I have been disappointed by a teacher
• I want to graduate from high school
• I have disappointed a teacher

Key idea: Four Corners is a great way to quickly and easily gather data about the math experiences and views of your whole class. You have to start with a friendly question.

Math Engagement Strategy: Math Wars

Process:

• Organize problems into clusters
• Always model the first question in a new chunk
• Post one problem, allow time for students to work in groups and agree on an answer; call a sort if there is a tear

Key idea: Math wars is a great way to bring competitiveness and depth to understanding into your classroom.

What more?

Email me: I’d love to hear from you
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● Slides
● Article
● Resources
● Notes summary
● More!
My Why

Help struggling high school students graduate and have the opportunity to go to college
Objectives

- Learn and experience transformational classroom culture building strategies to help break down barriers for students who struggle to learn mathematics.
- Learn and experience a classroom structure to insure an equitable education experience for all students in secondary math classes.
- Empower general education, special education, and intervention math teachers to create classroom conditions in which every student can excel.
Agenda

- Math Anxiety
- Classroom Culture Activity #1
- Classroom Culture Activity #2
- Mathematics Engagement Strategy
- Closing
Why do so many students struggle in mathematics?
Math Anxiety

“Many children in the US, and beyond, grow up thinking that either you can do math or you can’t. When they struggle, they assume they can’t. From that point on any struggle is a further reminder of their perceived inadequacies. Procedural mathematics teaching and high-pressure testing combined with the prevalent ideas that only some students belong in mathematics, has led to the development of widespread mathematics anxiety across the world.”

Valuing Difference and Growth: A Youcubed Perspective on Special Education
Dr. Jo Boaler
Math Anxiety

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Math Anxiety

“In our own work teaching mathematics as a multi-dimensional subject, valuing the different ways students think and reason, we have found that math anxiety disappears when students see that they can learn successfully and they are given the opportunity to build a new relationship with mathematics.”
Math Anxiety

“In our own work teaching mathematics as a multi-dimensional subject, valuing the different ways students think and reason, we have found that math anxiety disappears when students see that they can learn successfully and they are given the opportunity to build a new relationship with mathematics.”
What can we do to help our students?
We need to create classroom environments where students feel safe to share their thinking, make mistakes, learn to persevere, and find success in mathematics.
Classroom Culture Strategy

#1: Mathography
Mathography Prompt

Tell me about your experiences as a math student from Kindergarten until now? What kind of math are you good at? What kind of math do you struggle with? How are you feeling about taking this class? (100 word minimum)
Mathography Share

- Choose a partner
- First partner has 1 minute to read their mathography or speak about their math experiences
- When time is called, switch partners
- Second partner reads or shares
Discuss

- What would you learn about your students through a mathography?
- How could or would you use the information you gather from the mathography?
Key Idea #1

*Mathography* is a great way to dig deep into your students' math pasts, get to know them, and make them feel known in your classroom.
Classroom Culture Strategy

#2: Four Corners
Four Corners

When each statement is posted, walk to the corner that describes your answer:

● Strongly agree
● Agree
● Disagree
● Strongly disagree
For vacation, I prefer to go somewhere beachy and tropical.
I always knew I wanted to be a teacher
Math has always been easy for me.
Now put your student hat on

- Hand-up and pair-up to form groups of 4
- Sit or stand with your group
- Discuss how your students would respond to the following statements
Student Prompts

- In general, I like math
- I want to graduate from high school
- I have been disrespected by a teacher
- I have disrespected a teacher
- I want to pass this class
- I’m willing to try this year in math class
Discuss

- What would you learn about your students with an activity like this?
- What kind of classroom culture would asking these questions create?
- What other statements might you give to your students?
Key Idea #2

*Four Corners* is a great way to quickly and easily gather data about the math experiences and views of your whole class. You have to start with a friendly question.
Math Engagement Strategy: 

*Math Wars*
Students aren’t going to conquer their anxiety and fear of math if they continue to sit passively in our classes. We have to get them involved. We have to start changing their math experiences.
Math Wars Overview

- Offers opportunity for competition and collaboration
- Provides teacher with a check for understanding and immediate formative assessment data
- Positive and safe classroom culture is a prerequisite for using math wars
Math Wars

- Have students sitting in groups of 4+
- Always model the first problem together as a class
- Display problem
- Start timer
- When time is up, randomly call a seat number then a group number. That student gives the answer
- Use cold call to randomly call on a student from another group to agree or disagree
- Points are given to the group if the answer is correct
- Teacher creates a reward for group with the most points
Today’s Prize:
#1) Find the value of each expression.

$$16 \div 2 + 4 \times (7 - 3)$$
#2) Find the value of each expression.

\[ 15 \times 3 \div 9 + 6 \]
#3) Find the value of each expression.

\[(3 + 4)^2 - 14\]
#4) Find the value of each expression.

$$10 \times (5 - 2)^2 - 9 \times 5$$
#5) Evaluate each expression when \( a = 4 \), \( b = 7 \) and \( c = 12 \).

\[
\frac{4+c}{a}
\]
#6) Evaluate each expression when \( a = 4, \ b = 7 \) and \( c = 12 \).

\[ c - 2a + 4b \]
#7) Evaluate each expression when a = 4, b = 7 and c = 12.

\[ 4(c + a) \]
#8) Evaluate each expression when $a = 4$, $b = 7$ and $c = 12$. 

\[
\frac{c}{a} + b
\]
Discuss

- Think about your feelings as a student. What were you feeling during this activity?
- What do you learn about your students mathematical knowledge during this activity?
- When could you use *math wars* in your class?
Key Idea #3

*Math wars* is a great way to bring competition and checks for understanding into your classroom.
Closing
Objectives

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Final Reflection

- What? What did you do today?
- So what? Why was it important?
- Now What? What will you do as a result of today?
Want More?

I’d love to come to your site or district to collaborate with your special education or general education math teachers and/or leaders!

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