WELCOME
Activity

Take a few minutes to write your “math autobiography”:

The last math course I took was ______________________________________________________.

When I think about doing math, I feel _________________________________________________.

An early experience in a math class that stands out for me was when
________________________________________________________________________________.

One math teacher I remember is ___________________ because ___________________________.

My family’s attitude toward math was __________________________________________________.

I think I learned my present attitude toward math when____________________________________.

I believe I (have or have not) been successful in math because______________________________.
Discussion

Would you describe your relationship to math as mostly positive, mostly negative, or somewhere in between? Why?

How do you think your experience with math as a young person shaped your “math life?”

In what ways, do you think, does your relationship to math influence or impact your child/children?
Elements of math success

- Conceptual understanding
- Mathematical reasoning ability
- Procedural skill and fluency

Math Success
Elements of math success

Math Success

Math identity
Procedural skill and fluency
Mathematical reasoning ability
Supportive environment
Conceptual understanding
Math agency
Elements of math success

Math identity

Math agency
What is math identity?

- Beliefs about one’s self as a math learner.
- Beliefs about how one is perceived by others as a math learner.
- Beliefs about math and the nature of math abilities.
What is math identity?
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- Beliefs about how one is perceived by others as a math learner,
- Beliefs about math and the nature of math abilities.

What is math agency?
- Outward expression of math identity.

Content source: Aguirre, Mayfield-Ingram, & Martin, 2013
Why should we care about identity and agency?
Prevalence of negativity about math

Amongst adults
- 93 percent report experiencing some level of math anxiety

Content source: Luttenberger, Wimmer, & Paechter, 2018
Prevalence of negativity about math

Amongst adults
• 93 percent report experiencing some level of math anxiety

Amongst students
• 59 percent report worrying math will be difficult

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Prevalence of negativity about math

Amongst adults
- 93 percent report experiencing some level of math anxiety

Amongst students
- 59 percent report worrying math will be difficult
- 33 percent report they get very tense when completing math homework

Content source: Luttenberger, Wimmer, & Paechter, 2018
Prevalence of negativity about math

Amongst adults
- 93 percent report experiencing some level of math anxiety

Amongst students
- 59 percent report worrying math will be difficult
- 33 percent report they get very tense when completing math homework
- 31 percent state they get very nervous doing math problems

Content source: Luttenberger, Wimmer, & Paechter, 2018
Negativity about math

Math, more than other domains, carries baggage that can set students up to hold negative attitudes and beliefs.

I’m just not a letters person.
I’m so bad at reading.
I’m just not a numbers person.
Stereotypes about math

Math ability is a "gift"

Certain people are more likely to get the "gift"
Stereotypes about math

Math ability is a "gift"

Certain people are more likely to get the "gift"

Some students will be less likely to develop strong math identities

Content source: Chestnut, Lei, Leslie, & Cimpian, 2018
What’s the harm?

• Math is a gateway and gatekeeper
  • Access to advanced courses
  • Entrance to college
  • Access to math-dependent careers

• Evident at a young age – early math skills are the strongest predictor of later academic outcomes

Content source: Douglas & Attewell, 2017; Duncan et al., 2007
Key aspects of math identity and agency
Key aspects of math identity

Math anxiety → Math Identity → Sense of belonging
Growth mindset
Perceived utility
What is belonging?

Feeling like an accepted, valued, and legitimate group member.
Belonging is a fundamental need

The need for social connections is innate and universal. 
*It is a need, not a want.*

Content source: Baumeister & Leary (1995)
Do I fit in intellectually?

I'm not sure I belong...

I hate math. I'm not cut out for this.

Disengagement

Interpretation

Negative critique from partner in math class

Yes, I belong!

I need to be more precise when I describe my ideas.

Response

Rephrase ideas

Do I fit in socially?

I'm not sure I belong...

No one at this school likes me.

Interpretation

Response

Classmate didn't say “hi” in hall

Less effort toward relationships.

Response

Yes, I belong!

It was loud in the hallway.

Be more direct next time.
Belonging as a “Psychological Hub”
Key aspects of math identity

Math anxiety

Math Identity

Sense of belonging
Growth mindset
Perceived utility

REL NORTHWEST
What is a growth mindset?
The belief that intelligence and ability can be developed with effort, strategies, and support.

Content source: Blackwell, Trzesniewski, & Dweck, 2007
What are mindsets?

Fixed Mindset
Intelligence and ability are fixed qualities from birth that cannot be changed significantly.

Growth Mindset
Intelligence and ability can be developed with effort, strategies, and support.

Content source: Blackwell, Trzesniewski, & Dweck, 2007; Claro, Paunesku, & Dweck, 2016
Mindsets are domain specific
Growth mindset and math

Student mindset predicts math success

- Students with growth mindsets tend to have better math grades and test scores than students with fixed mindsets.

Content source: Blackwell, Trzesniewski, & Dweck, 2007; Claro, Paunesku, & Dweck, 2016
How does growth mindset impact math achievement?

When students have a growth mindset, they are MORE likely to:

- Believe that effort pays off. (“The harder you work at something, the better you will be at it.”)
- Set learning goals for themselves. (“The main reason I do my schoolwork is because I like to learn new things.”)
- Believe effort-based strategies will help them overcome failures. (“If I got a bad grade, I would work harder.”)

When students have a growth mindset, they are LESS likely to:

- Attribute failures to things they cannot control (“The test was unfair.”)
Key aspects of math identity

Math anxiety

Math Identity

Sense of belonging
Growth mindset
Perceived utility
What is perceived utility?

Belief that math is useful, worthwhile, and relevant to life outside of school, now and in the future.
Why does perceived utility matter?

- Students are more motivated when they see the connections between what they are learning, how it relates to their own life and goals, and how it might be useful later on in life.
Key aspects of math identity

Math anxiety

Math Identity

Sense of belonging
Growth mindset
Perceived utility
Reflection

Given what you heard today, what do you think the math autobiography of your child might look like?

How can you apply what you learned to help boost your child’s math autobiography?