

The Magic of Mathematics: The Intersection of Skills and Attitudes

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Closing Keynote

Georgia Council of Teachers of Mathematics

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The following resources were mentioned in the keynote as we explored ways to support teachers and students with the development of positive dispositions toward mathematics. I hope they will help you explore the topic with your schools and districts.

Books Mentioned in the Keynote:

Liljedahl, Peter. *Building Thinking Classrooms in Mathematics K-12*. Corwin, 2020.

Shiraishi, Ashima. *How to Solve a Problem: The Rise (and Falls) of a Rock-Climbing Champion*. Make Me a World, 2020.

Strong, Sarah and Gigi Butterfield. *Dear Math: Why Kids Hate Math and What Teachers Can Do About It*, Times 10 Publications, 2022.

Van de Walle, John. Close, Far, In Between routines from *Elementary and Middle School Mathematics*, 2001.

Resource Books for Teaching through Investigations K-5:

Math in Practice: www.MathinPractice.com

Math by the Book: www.MathbytheBook.com

Websites for Engaging Open-Ended Tasks and Math Investigations:

Desmos: <https://www.desmos.com/>

Graham Fletcher's 3-Act Tasks: <https://gfletchy.com/3-act-lessons/>

NRich: <https://nrich.maths.org/>

Number Sense and Reasoning Routines K-12 from Henrico County Public Schools, Richmond VA:
<https://sites.google.com/henrico.k12.va.us/hcpsmathematics/number-sense-routines>

Open Middle Math: www.openmiddle.com

Steve Wyborney number tasks: www.stevewyborney.com

You Cubed: <https://www.youcubed.org/>

Padlet of K-2 Children's Literature Related to Math Skills/Concepts

<https://padlet.com/sueoc46/math-literature-k-2-j3uevoy154m1fuhb>

Padlet of Grades 3-5 Children's Literature Related to Math Skills/Concepts

<https://padlet.com/sueoc46/math-literature-3-5-who7w8089bm6r6k2>

Padlet of K-5 Culturally Diverse Children's Literature with Math Connections

<https://padlet.com/georginarivera123/culturally-relevant-math-literature-2ygfo12jusaomm7s>

Interactive K-5 Practice Tasks Built on Learning Progressions:

Navigating Numeracy: <https://www.hand2mind.com/supplemental-curriculum/math/navigating-numeracy-learning-progression-centers>

People to Follow to Build Teacher Confidence with Content Skills:

Howie Hua - Twitter @howie_hua

You Tube @HowieHua1

Pam Harris - Twitter @pwharris

Facebook – Math is Figureoutable

Sue O’Connell – Twitter @SueOConnellMath

Facebook: <https://www.facebook.com/groups/MathinPractice>

www.qualityteacherdevelopment.com

Unnoticed by Cathy Marks Krpan, 2018

I am sitting at the back of the class, *unnoticed*.

You instruct us at the front of the class, *unnoticed*.

Patterns and the rich meaning of mathematics pass us by, *unnoticed*.

I feel invisible in this sea of numbers and equations. I am drowning, *unnoticed*.

With just one question you would unlock my curiosity.

With just one question you would have me look up.

With just one question you would value who I am and what I think mathematically.

With just one question you would tell me that I can have my own mathematical thoughts and ideas.

What do you notice? What do you see? What do you think? Do you agree?

I would venture a guess. I would take a risk to share my thoughts with you.

But for now, I sit. At the back of math class, drowning and *unnoticed*.

Quotes for Teacher Reflection

“The research tell us that mathematical disposition is much more than an attitude. It is about ways of thinking, doing, being, and seeing math. It includes confidence, flexibility, perseverance, interest, inventiveness, appreciation, reflection, and monitoring.” Alice Merz, *Journal of Educational Thought*, 2009

“A students’ emotional relationship with math is foundational to their cognitive relationship with math.”
Liesl McConchie

“We do not learn from experience, we learn from reflecting on experience.” John Dewey

“Start from where your students are, not from where you would like them to be.” Dylan Wiliam

“Students development of number sense should move through increasingly sophisticated levels of constructing ideas and skills, of recognizing and using relationships to solve problems, and of connecting new learning with old.” Principles and Standards for School Mathematics, 2000, NCTM

“Sometimes telling kids where they are going spoils the journey.” Dylan Wiliam

Good mathematics is not about how many answers you know...It's how you behave when you don't know.
Author unknown

Quotes Related to Self-Efficacy and Perseverance

“If I have ever made any valuable discoveries, it has been due more to patient attention than to any other talent.” Isaac Newton

“I haven’t failed. I’ve just found 10,000 ways that won’t work.” Thomas Edison

“It’s not that I’m so smart, it’s just that I stay with problems longer.” Albert Einstein

“Productive disposition refers to the tendency to see sense in mathematics, to perceive it as both useful and worthwhile, to believe that steady effort in learning mathematics pays off, and to see oneself as an effective learner and doer of mathematics.”

National Academies of Sciences, Engineering, and Medicine. 2001. *Adding It Up: Helping Children Learn Mathematics*. Washington, DC: The National Academies Press.

Quotes Related to Imperfection/Making Mistakes

“Imperfection is a part of any creative process and of life, yet for some reason we live in a culture that has a paralyzing fear of failure, which prevents action and hardens a rigid perfectionism. It's the single most disempowering state of mind you can have if you'd like to be more creative, inventive, or entrepreneurial.”
Jo Boaler, *Mathematical Mindsets: Unleashing Students’ Potential through Creative Math, Inspiring Messages, and Innovative Teaching*

“Many children 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. This affects millions of people. One study found that 48 percent of all young adults in a work-apprentice program had math anxiety” Jo Boaler, *Limitless Mind: Learn, Lead, and Live Without Barriers*

Students “need to know it’s not about speed and always being right—it’s about curiosity, passion, and dedication. Children need to feel empowered as mathematicians and recognize that they are equipped with everything they need to be successful in mathematics. Deborah Peart, *Guiding Students to a Healthy Math Identity*, Edutopia, 2018

Stay in touch with Sue O’Connell:

Facebook: <https://www.facebook.com/groups/MathinPractice>

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