Young Mathematicians

STEM Skills for Success

Lindsey Herlehy

April 13, 2021

Webinar Presenter & Objectives:

- Reflect on our own journey as a mathematician and understand the charge for early childhood educators in developing confident, proficient, and fluent math students

- Examine the big ideas of early childhood mathematics and what they look like in a physical and virtual classroom.

- Explore STEM applications that integrate early childhood foundational math concepts and skills

Lindsey Herlehy, NBCT

Curriculum Writer & Professional Development Specialist

Illinois Mathematics and Science Academy

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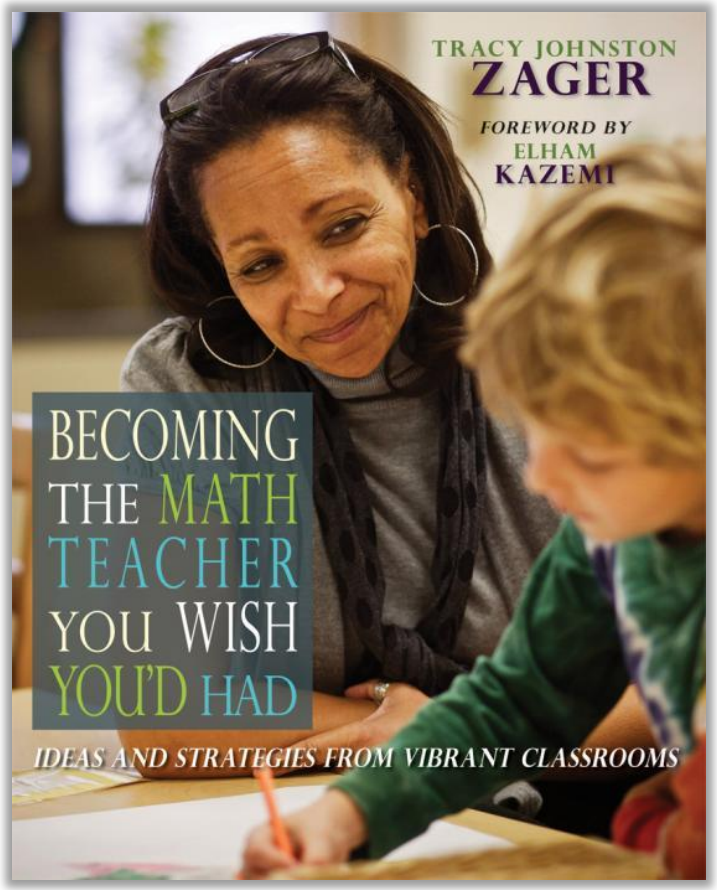
What is your math story?

If you feel comfortable, you are welcome to share your experience in the Chat.

What is your math story?



- *"Math is when they hand you a sheet of paper, and it has a word problem you don't understand on it."*
- *"Being good at math means you answer the teacher's questions fast, right, easily."*
- *"Math is you can have these sheets of paper and it has math on the board. And also, math can be learning how to write sheets of paper."*
- *"They thought the only way to learn math was to be taught it by someone who knew more, usually a teacher in school."*

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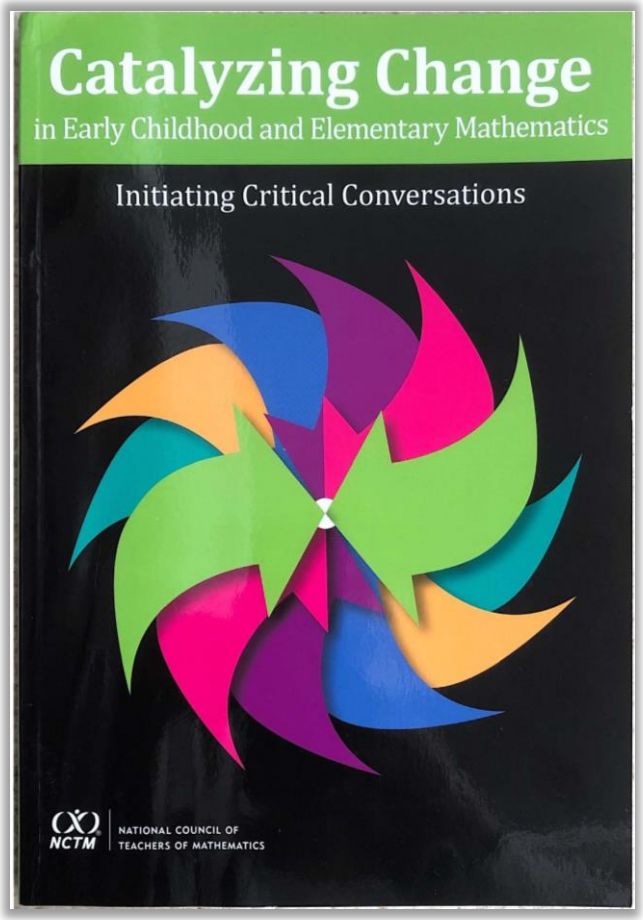
What is your math story?



"Many children do not see themselves as mathematically capable or as doers of mathematics. When asked to draw what a mathematician "looks like," children consistently draw the same character...pictures of old, disheveled bald White men wearing glasses, working alone, and writing equations on a board."

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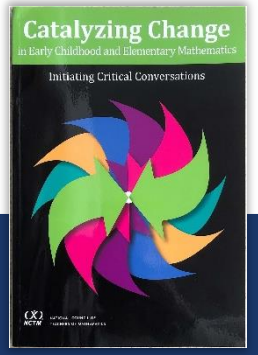
So what do we do about this?



National Council of Teachers of Mathematics
Key Recommendations

Broaden the Purposes of Learning Mathematics	Create Equitable Structures in Mathematics	Implement Equitable Mathematics Instruction	Develop Deep Mathematical Understanding
Each and every child should **develop deep mathematical understanding** as confident and capable learners; understand and **critique the world** through mathematics; and **experience the wonder, joy, and beauty of mathematics**.	Early childhood and elementary mathematics should **dismantle inequitable structures**, including **ability grouping and tracking**, and **challenge spaces of marginality and privilege**.	Mathematics instruction should be consistent with research-informed and equitable teaching practices that **nurture children's positive mathematical identities and strong sense of agency**.	Early childhood settings and elementary schools should **build a strong foundation** of deep mathematical understanding, **emphasize reasoning and sense making**, and ensure the highest quality mathematics education for each and every child.

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The Foundations of Early Childhood Mathematics

- Sets
- Number Sense
- Counting & Operations
- Measurement
- Patterns
- Data Analysis
- Space & Shape

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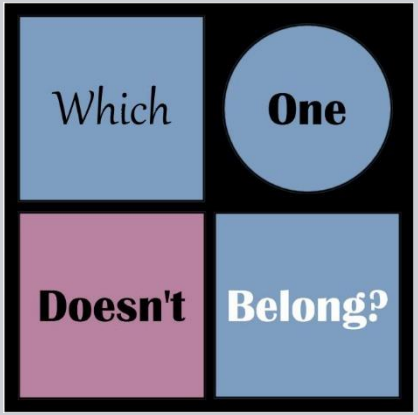
Foundations are compiled from Erikson Institute's Big Ideas and NCTM's Catalyzing Change.

Sets

- Attributes can be used to sort collections into sets.
- The same collection can be sorted in different ways.
- Sets can be compared and ordered.

In the classroom...	For remote learning...
	
Sorting Station	**Which One Doesn't Belong?**

Source: Erikson Institute's Big Ideas of Early Mathematics

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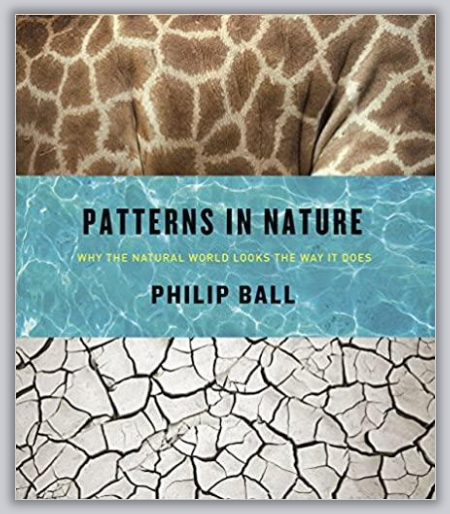
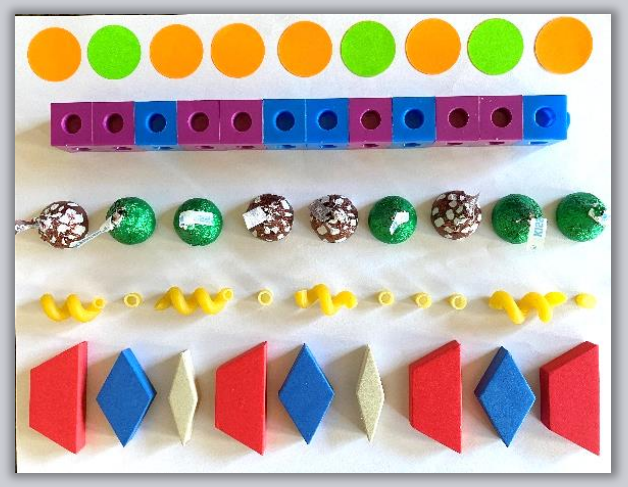
Pattern

- Patterns are sequences governed by a rule and exist in both the world and mathematics.
- Identifying the rule of a pattern brings predictability and allows us to make generalizations.
- The same pattern can be found in many different forms.

In the classroom...	For remote learning...
 **Informational Text**	 **Where's the Error**

Source: Erikson Institute's Big Ideas of Early Mathematics

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Number Sense

- Numbers are used in many ways, some more than others.
- Quantity is an attribute of a set of objects and we use numbers to name specific quantities.
- The quantity of a small collection can be intuitively perceived without counting.

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In the classroom...	For remote learning...
	
Daily Activities	**Card Games**

Source: Erikson Institute's Big Ideas of Early Mathematics and Building Math Minds.

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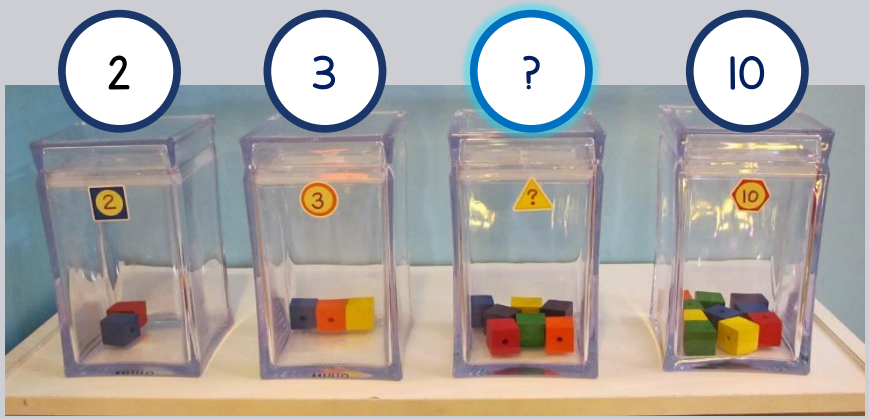
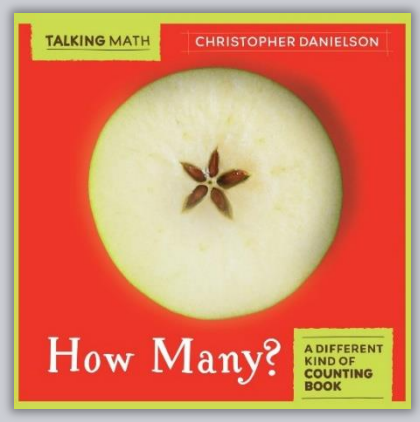
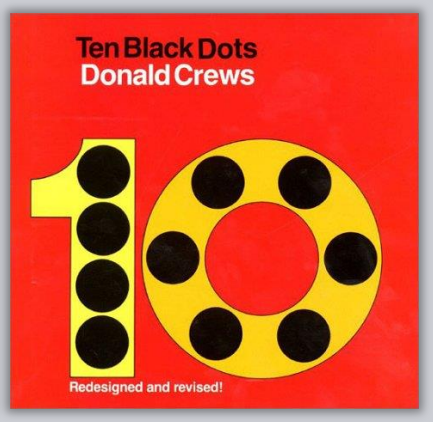
Counting & Number Operations

- Counting has rules and can be used to find out "how many" in a collection.
- Sets can be *changed* (joining or separating), *compared*, and *ordered*.
- A quantity can be *decomposed* into parts; the parts can be *composed* to form the whole.

In the classroom...	For remote learning...
	 
Estimation Station	**Connection to Literature**

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Source: Erikson Institute's Big Ideas of Early Mathematics and PreKinders

Measurement

- Many different attributes can be measured.
- All measurement involves a "fair" comparison.
- Quantifying a measurement helps us describe and compare more precisely.

In the classroom...	For remote learning...
	
Using Non-Standard Tools	**Filling Station**

Source: Erikson Institute's Big Ideas of Early Mathematics and Days With Grey

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Data Analysis

- The purpose is to answer questions when the answers are not immediately obvious.
- Data must be represented in order to be interpreted.
- It is useful to compare parts of the data and draw conclusions about the data as a whole.

In the classroom...

Trends in Data

For remote learning...

- Would you rather...?
- What is your favorite...?
- Do you like...?

- Some questions can be answered with mathematics.
- Organizing information, using tally marks, asking more questions.
- Practice in public speaking.

Conduct a Survey

Source: Erikson Institute's Big Ideas of Early Mathematics

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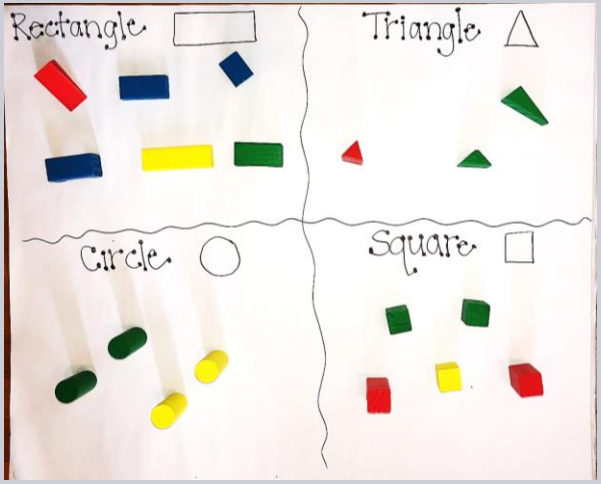
Spatial Relationships & Shape

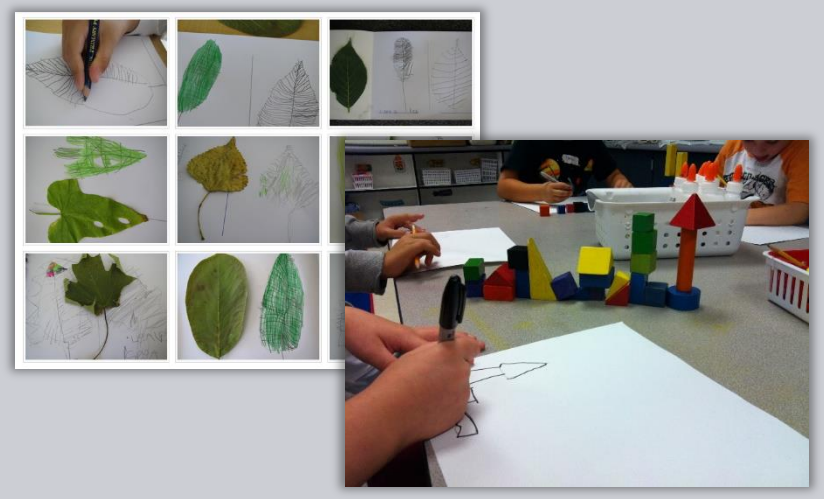
- Relationships between objects and places can be described with mathematical precision.
- Spatial relationships can be visualized and manipulated mentally.
- Shapes can be defined and classified by their attributes.
- The flat faces of solid shapes are two-dimensional shapes.
- Shapes can be combined and separated to make new shapes.

In the classroom...



Sorting Blocks

For remote learning...



Observational Drawings

Source: Erikson Institute's Big Ideas of Early Mathematics

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Resources

Professional Development Resources	Manipulatives and Books
Becoming the Math Teacher You Wish You'd Had by Tracy Zager	Virtual Manipulatives: Free Math Apps from The Math Learning Center
Catalyzing Change in Early Childhood and Elementary Mathematics by National Council of Teachers of Mathematics (NCTM)	Which One Doesn't Belong?
Erikson Institute's Big Ideas of Early Math Website	*Ten Black Dots* by Donald Crews
Big Ideas in Early Math: What Teachers of Young Children Need to Know by Erikson Institute.	*How Many?* by Christopher Danielson
Building Math Minds by Christina Tondevold	Patterns in Nature: Why the Natural World Looks the Way It Does by Philip Ball
	Tiny Polka Dot Card Game
	Estimation Station by PreKinders
	Graphing by Attribute by Erikson Institute

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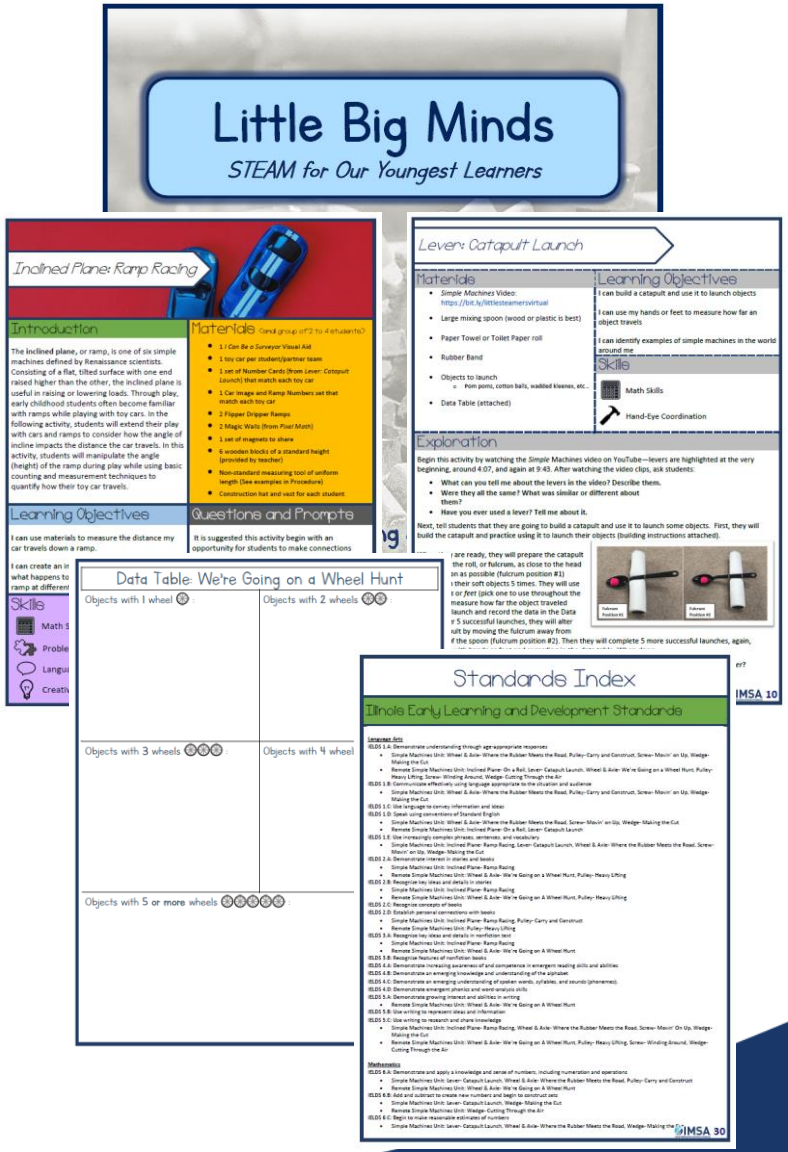
To download this presentation and available resources, navigate to:

http://bit.ly/youngmathematicians

To download free early childhood STEAM activities, navigate to:

http://bit.ly/littlesteamers

Instructional Book includes instructional pages for in-person and remote learning, all student pages, and standards (IL and MO). Student learning objectives, materials, and STEAM skills indicators are included. Units of study include **Colors, Water, Simple Machines, Playing with Code, Buildings,** and **Animals**.



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Questions?

Please complete the evaluation for this session. Thank you for your feedback!

Lindsey Herlehy

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