

EMBEDDING EARLY STEAM LEARNING WITHIN FAMILIES EVERYDAY ACTIVITIES



Image from Bing stock photos

FOCUS OF TODAY

- The What and Why of inclusive STEAM learning
- The Role of families
- Practical and hands on activities
 - Our Communication
 - Interests and strengths
 - Connections through storybooks



Parent holding child up in front of bunch of apples.

Stock image, Bing 2025

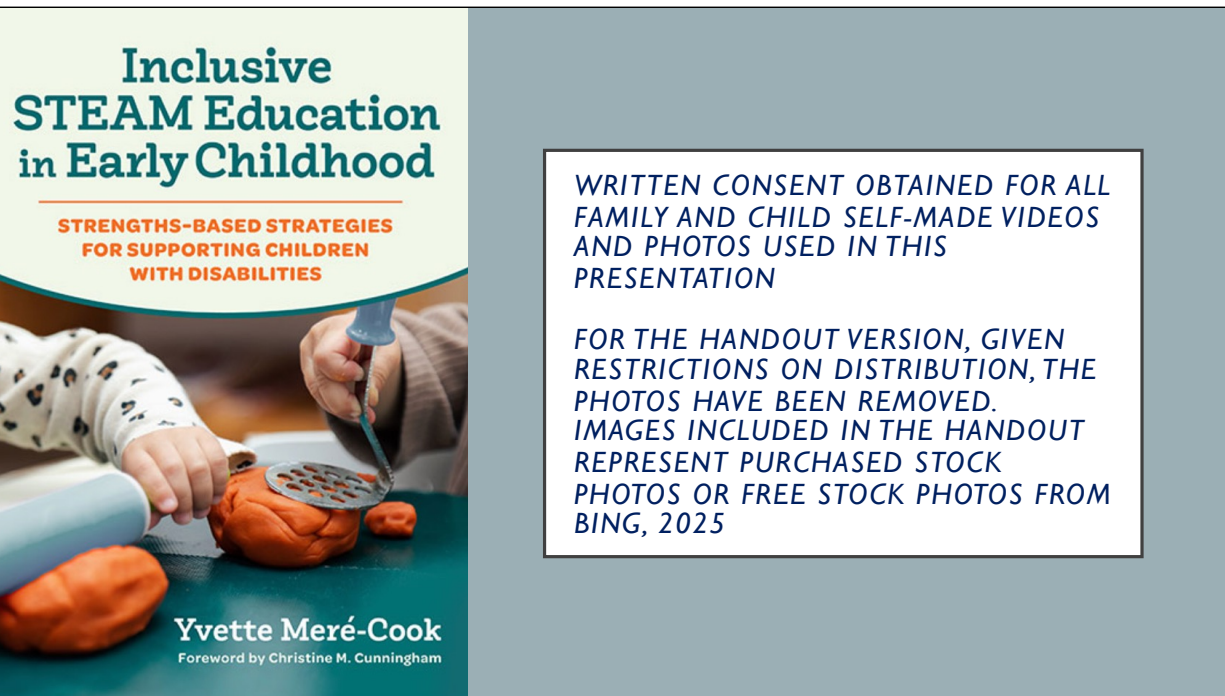
Through discussions, videos, and hands on STEAM activities, my focus is that you leave today with a deeper understanding of

1. The importance of embedding STEAM learning into the lives of young children, especially those with disabilities; This discussion also includes how STEAM experiences can not only address the opportunity gap for open-ended explorations, but how STEAM is a vehicle to address the developmental progressions of young children in the areas of motor development, social-emotional regulations, communication, thinking skills, and friendship development.

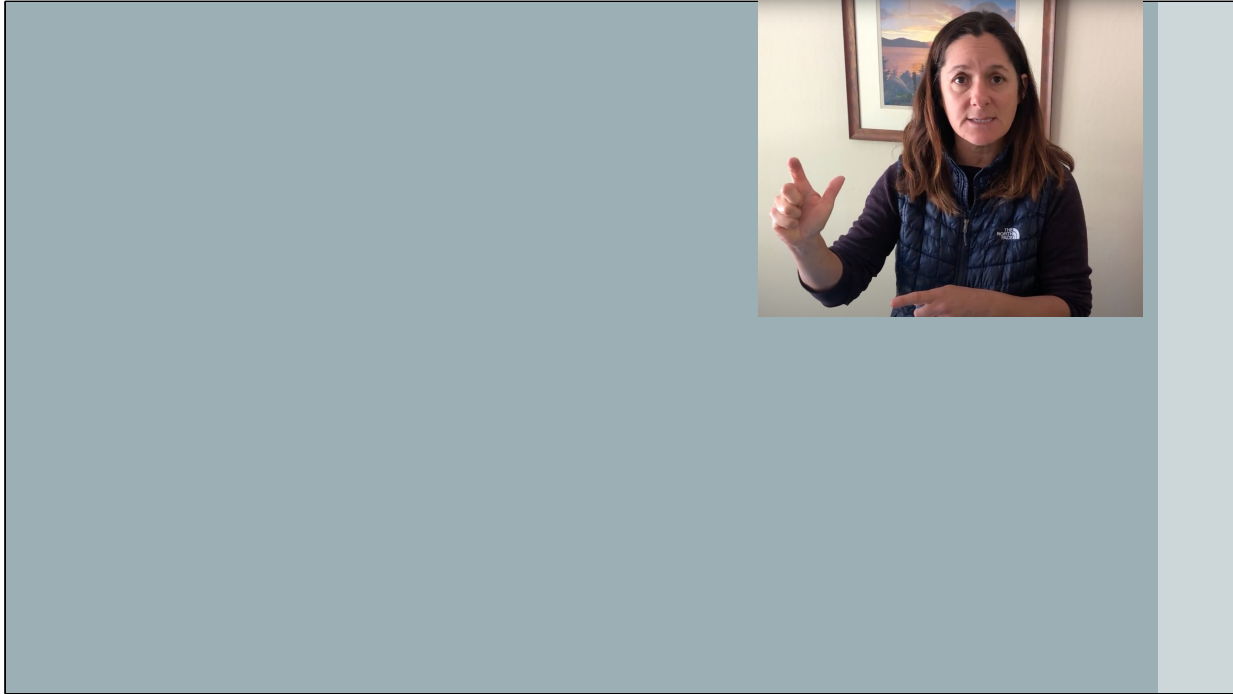
to highlight use of everyday materials and activities for embedding STEAM

2. We will highlight the critical role that families play, as young children's first teachers

3. We are going to Play!!! We will explore different ways to embed STEAM into everyday routines and play leveraging storybooks, examining our use of communication



This presentation is drawn from my experience as a Program Coordinator and researcher



A little about me . . .

26 years as a pediatric occupational therapists, partnering with families and children with disabilities.

Enter career in higher education to research inclusive practices for children and families

Embedding engineering design process: Boise State

Program Coordinator, to transform lab school into a more inclusive educational environment,

Now Samuel Merritt University and return to school based practice.





Science



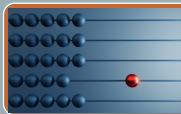
Technology



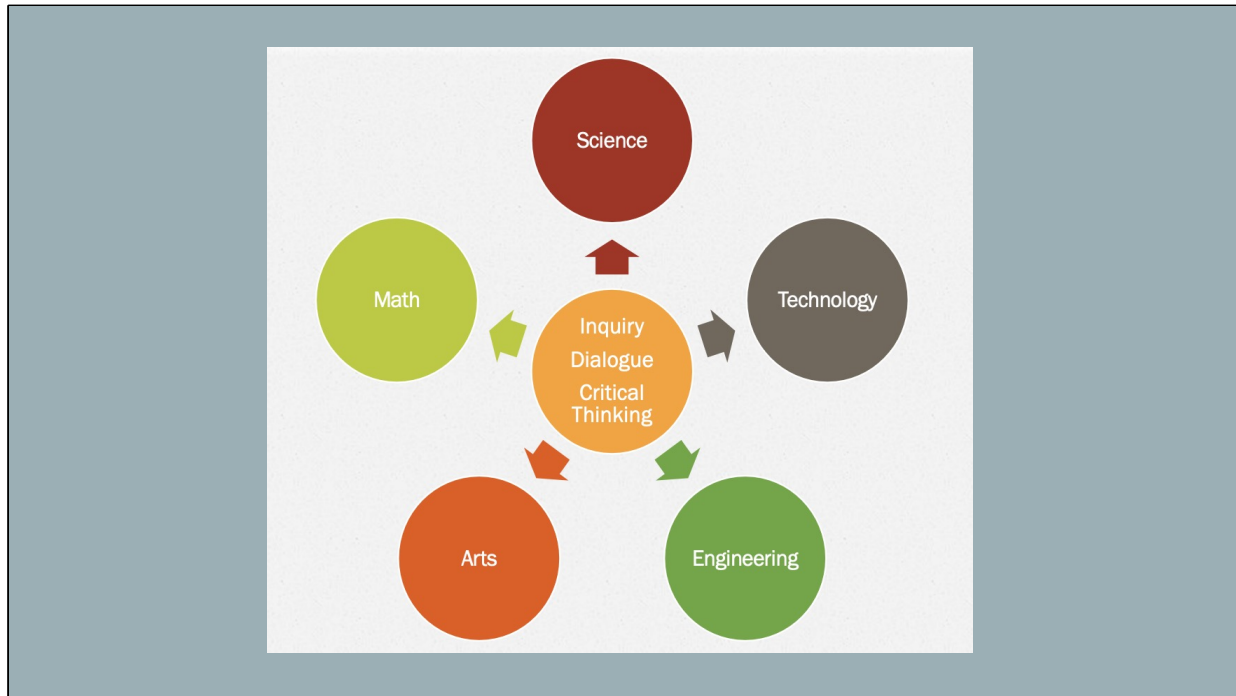
Engineering



the Arts



Math



- Similar to engineering that includes science and technology, the process of art includes science, technology, engineering, and math. The process of art also involves all of the types of art that we explore in early childhood:
 - Visual arts (painting, sculpture, creating with loose parts)
 - Performance arts (puppet show, plays)
 - Music (dancing to music, playing instruments, using music to learn about patterns and numbers)

Placing STEAM also helps to remind the adults working with young children the importance of design thinking as children progress through their education. Also, by leaving it out, it signals what we value in early childhood experiences.



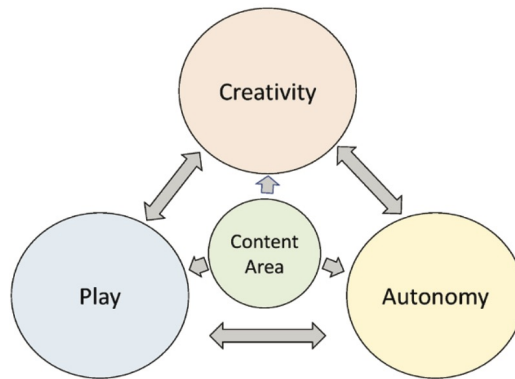


Figure 3. The creativity, autonomy, and play (CAP) model.

The Arts also offer our young children with disabilities, more access points to content knowledge, play, creativity, and autonomy.

Donegan-Ritter. (2017). STEM for ALL Children: Preschool Teachers Supporting Engagement

of Children With Special Needs in Physical Science Learning Centers. *Young Exceptional Children*, 20(1), 3–15. <https://doi.org/10.1177/1096250614566541>



The largest reason I choose STEAM,



Let's Get Started ... Essential Foundations for Supporting Your Child's Early STEAM Learning



BABIES ARE BORN READY TO ENGAGE IN STEAM

In fact, babies were born ready. Babies are born observing and experimenting as they learn about the world around them. They even are born with hard-wired precursor math skills that set the stage for early math learning (Chen et al., 2017).

Chen, J. Q., Hynes-Berry, M., Abel, B., Sims, C., & Ginet, L. (2017). Nurturing Mathematical Thinkers from Birth: The Why, What, and How. *ZERO TO THREE*, 37(5), 23.

Show Video next slide

Optional Video:

Babies do STEM (Idaho STEM Action Center, 2017)

<https://www.youtube.com/watch?v=aGBAfSOrLCQ>

Image: Atlas Newsgroup [Online Image](2016.). Charles Murray: Widening class chasm drives exclusionary U.S. political rhetoric. Retrieved from

<https://www.atlasnetwork.org/news/article/charles-murray-widening-class-chasm-drives-exclusionary-u.s.-political-rhet>



CHILDREN NEED ENGAGED ADULTS

One – children need engaged adults to wonder alongside them . . .

Images from left to right:

Image 1 retrieved from: Bing online free images, Microsoft PPT

Image 2 retrieved from: <https://bettercarenetwork.org/news-updates/events/making-ecd-inclusive-addressing-the-needs-and-rights-of-young-children-with-developmental>

Image 3 retrieved from: <https://brightpathbehavior.com/understanding-autism-related-shopping-meltdowns/>

COMMUNICATION DURING STEAM ACTIVITIES:

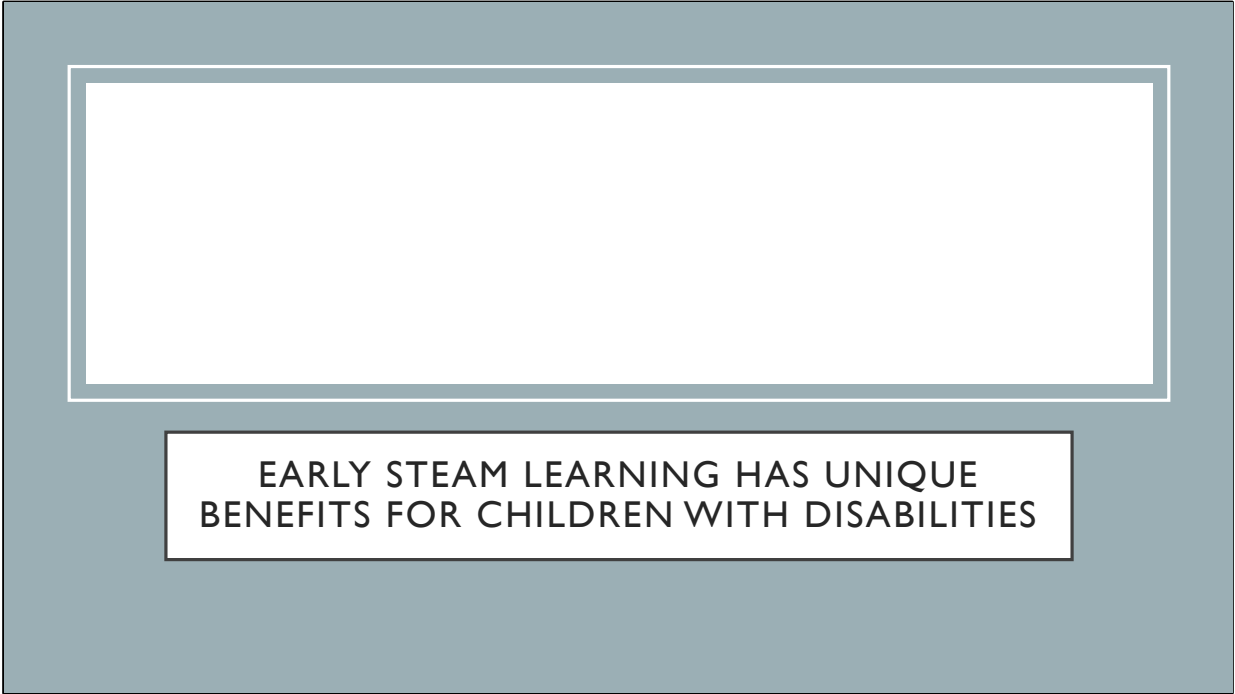
VIDEO I

Science focused: <https://vimeo.com/180894660>

Table 1.2

Communication Strategies for Young Children

Self-talk	The adult narrates what they are doing as the child listens and watches. [Example: "I am pouring the watercolor slowly into the beaker so that I can mix the same amount of yellow and the green solution" (Salmon et al., 2016)]
Parallel talk	The adult describes what the child is doing. [Example: "I see Oliver using the magnetiles in the Science Area. It looks like he is building a castle." (Salmon et al., 2016)]
Child-directed speech	The adult repeats or rephrases a child's expressive speech to model rather than grammar and linguistic patterns. [Example: Child: "broke car"; Adult: "The car broke." (Gooch, 2019)]
Reflective speech	The adult describes the child's non-verbal communication and/or facial expressions to help child gain awareness of their emotions. [Example: "Connor, I see your arms are crossed and your brows your furrowed. You seem angry with Oliver." (Gooch, 2019)]
Open-ended questions	Asking questions that require more than a yes-no response to a question. [Example: Ruby, I see you are gluing the gems on the paper. What are you making? (Strasser & Mufson Bresson, 2017)]

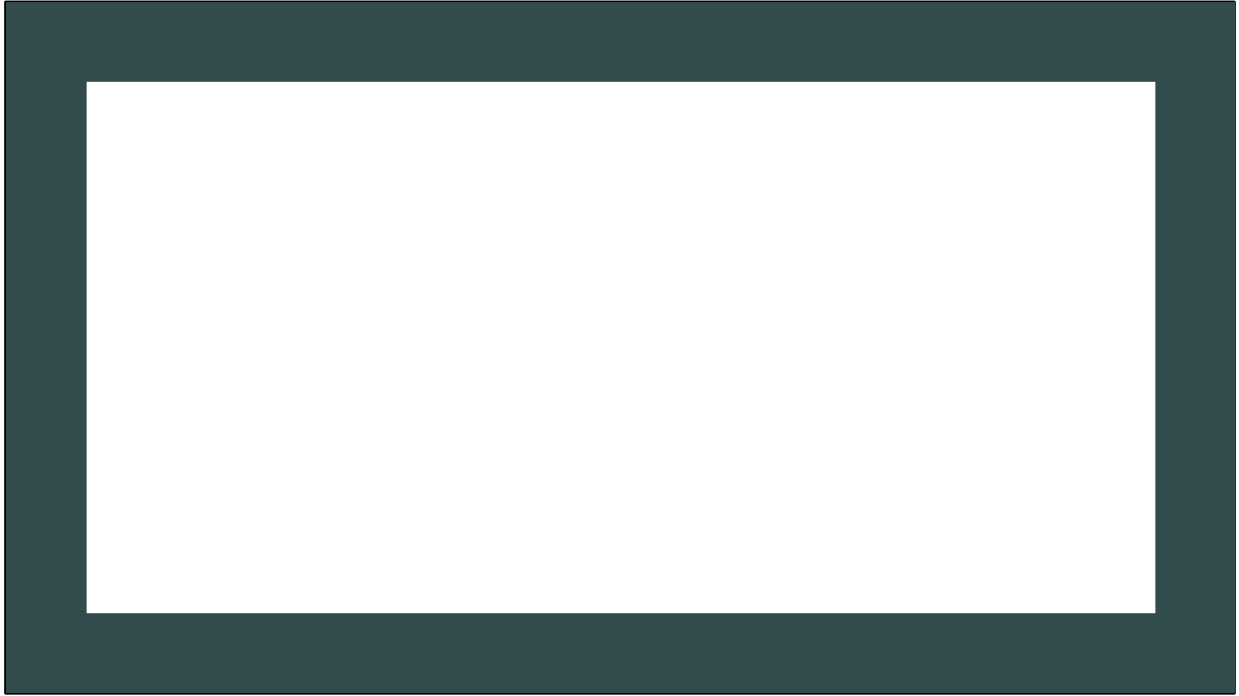


EARLY STEAM LEARNING HAS UNIQUE
BENEFITS FOR CHILDREN WITH DISABILITIES

LET'S GET
STARTED ...

SCIENCE
IN THE
EVERYDAY LIVES
OF
YOUNG CHILDREN
AND THEIR
FAMILIES





What is science: According to the Oxford dictionary, it is "the systematic study of the structure and behavior of the physical and natural world through observation, experimentation, and the testing of theories against the evidence obtained." Science is grounded within the Scientific Method where one forms a hypothesis and tests it. Babies were born ready to engage in this type of inquiry-based learning. For children with disabilities, science offers an opportunity to dive deeper into their interests. Babies are born observing and experimenting as they learn about the world around them. They even are born with hard-wired precursor math skills that set the stage for early math learning (Chen et al., 2017).

Chen, J. Q., Hynes-Berry, M., Abel, B., Sims, C., & Ginet, L. (2017). Nurturing Mathematical Thinkers from Birth: The Why, What, and How. *ZERO TO THREE*, 37(5), 23.

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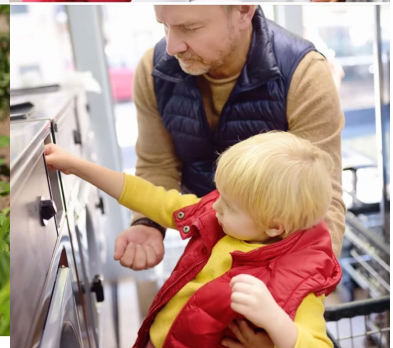
KEYS FOR FAMILIES: ENCOURAGE ENGAGE EXCITE	ENCOURAGE	ENCOURAGE YOUR CHILD TO MAKE COMPARISONS THROUGH OBSERVATION AND EXPERIMENTATION DURING EVERY DAY ACTIVITIES AND PLAY EXPERIENCES
	ENGAGE	ENGAGE IN SCIENCE TALK
	EXCITE	CHOOSE BOOKS THAT PROMOTE QUESTIONS

PREDICTIONS, EXPERIMENTATION, AND COMPARISONS :
VIDEO 2: EARLY STEM (STEAM) WITH INFANTS

<https://www.youtube.com/watch?v=aGBAfSOrLCQ>

HOW COULD YOU HELP
CHILDREN MAKE CLOSE
OBSERVATIONS AND
COMPARISONS IN EVERY
DAY LIFE ACTIVITIES?

-
-
-
-
-
-
-



ADL'S: Cooking, bath time, plants, animals, laundry (washer, spinning, dryer – role of heat and evaporation)

Images clockwise:

Image 2 retrieved from:<https://dreme.stanford.edu/news/easy-recipes-that-will-get-your-family-talking-about-math/>

Image 3 retrieved from:<https://www.laundrysolutionscompany.com/tips-for-bringing-kids-to-the-laundromat/>

Image 4 retrieved from:<https://www.reconnectwithnature.org/news-events/the-buzz/want-your-kids-to-respect-nature-start-gardening-with-native-plants/>

SCIENCE TALK

OFFER DESCRIPTIVE OR JUICY WORDS

ENCOURAGE MAKING PREDICTIONS
USING "I WONDER" STATEMENTS

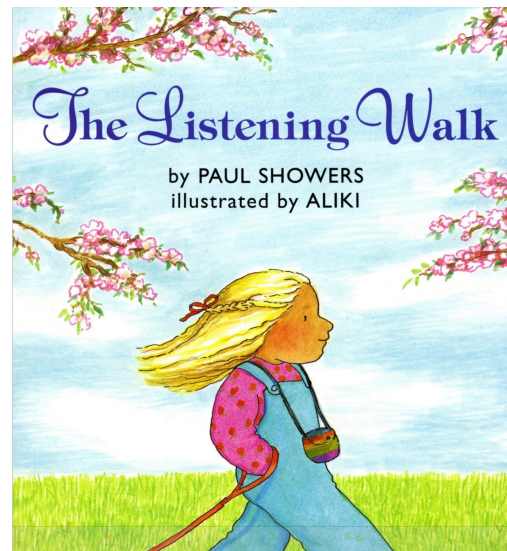
EXPAND ON THEIR IDEAS

LET'S PLAY:

I WONDER,
WHAT IS
MAGNETIC?



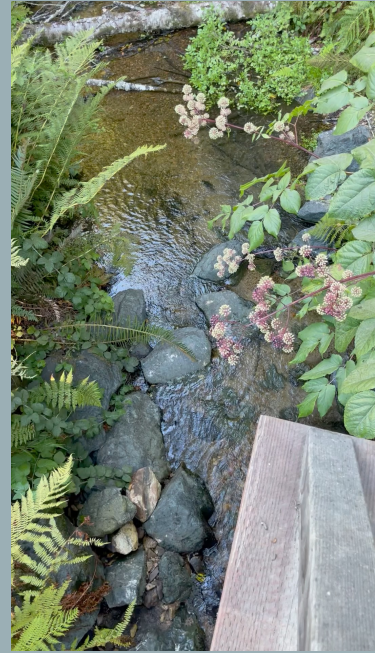
CONNECT
SCIENTIFIC
INQUIRY TO
STORYBOOKS





What do you notice about the sounds in the two recordings?
What conclusions can you draw based solely on what you hear?

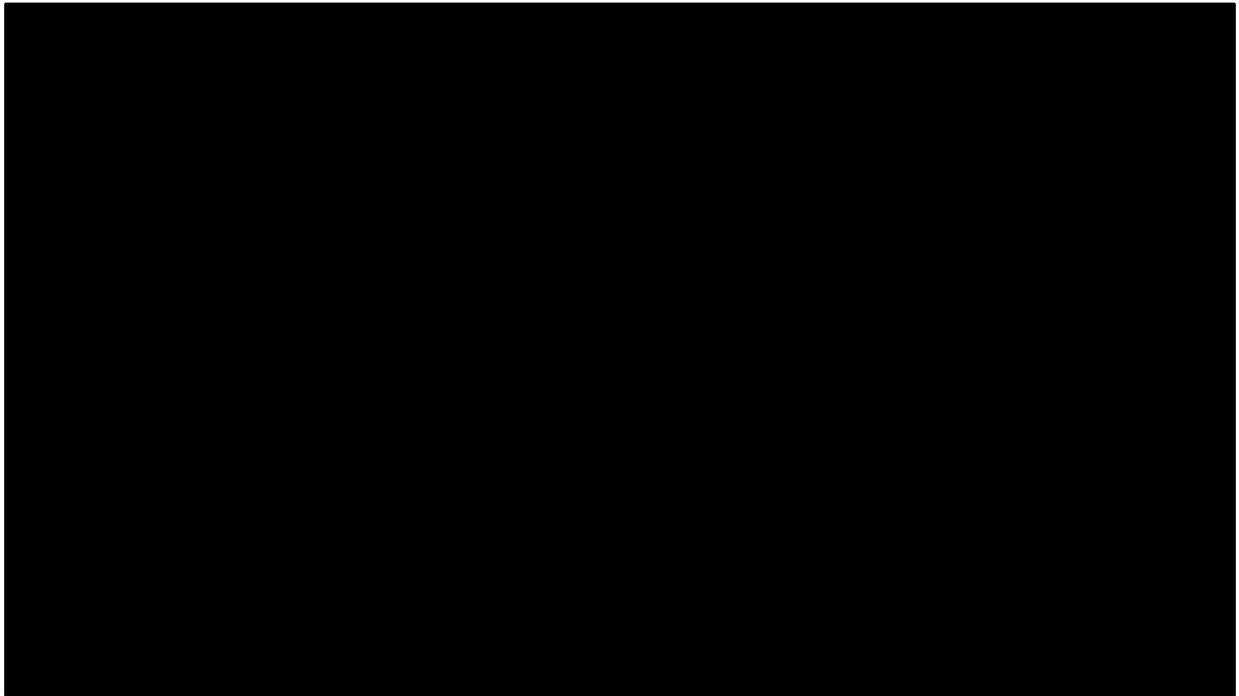




BREAK TIME

ENGINEERING
DESIGN
PROCESS





There is no other discipline that facilitates friendship skills like engineering. These two children spent their first year in my classroom. However, they became best friends through engineering. When children are engaged in solving problems through building solutions, they learn to collaborate and cooperate.

WHAT IS ENGINEERING?

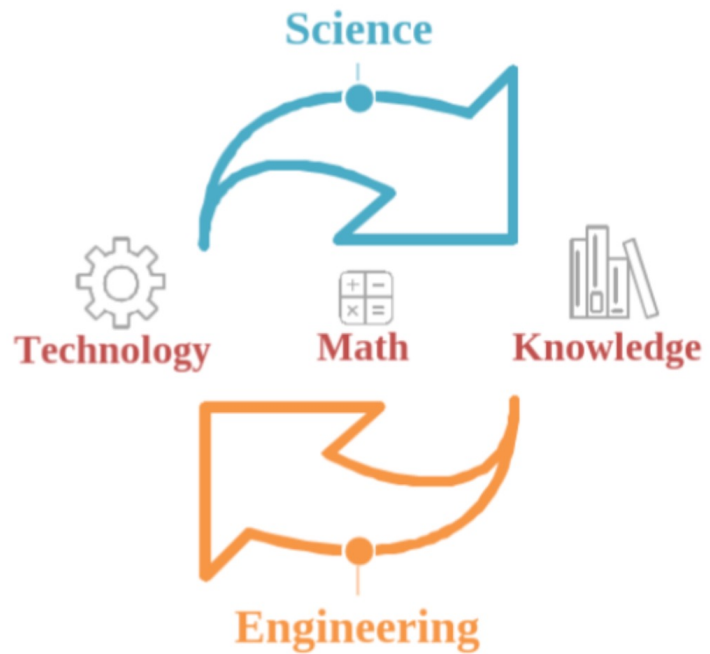
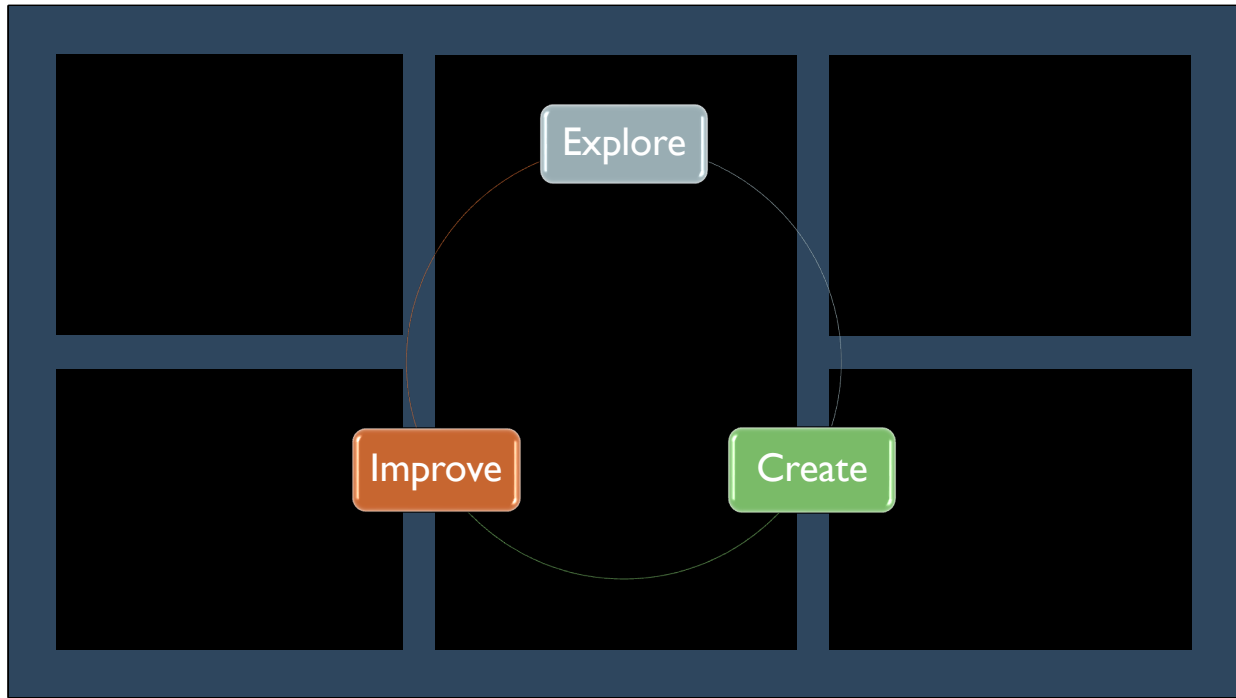


Image retrieved from <https://www.knowatom.com/blog/what-science-technology-engineering-and-math-really-are>
“Engineering is defined as solving problems using scientific knowledge.”
(Vigeant, 2016)

What is engineering in early childhood?



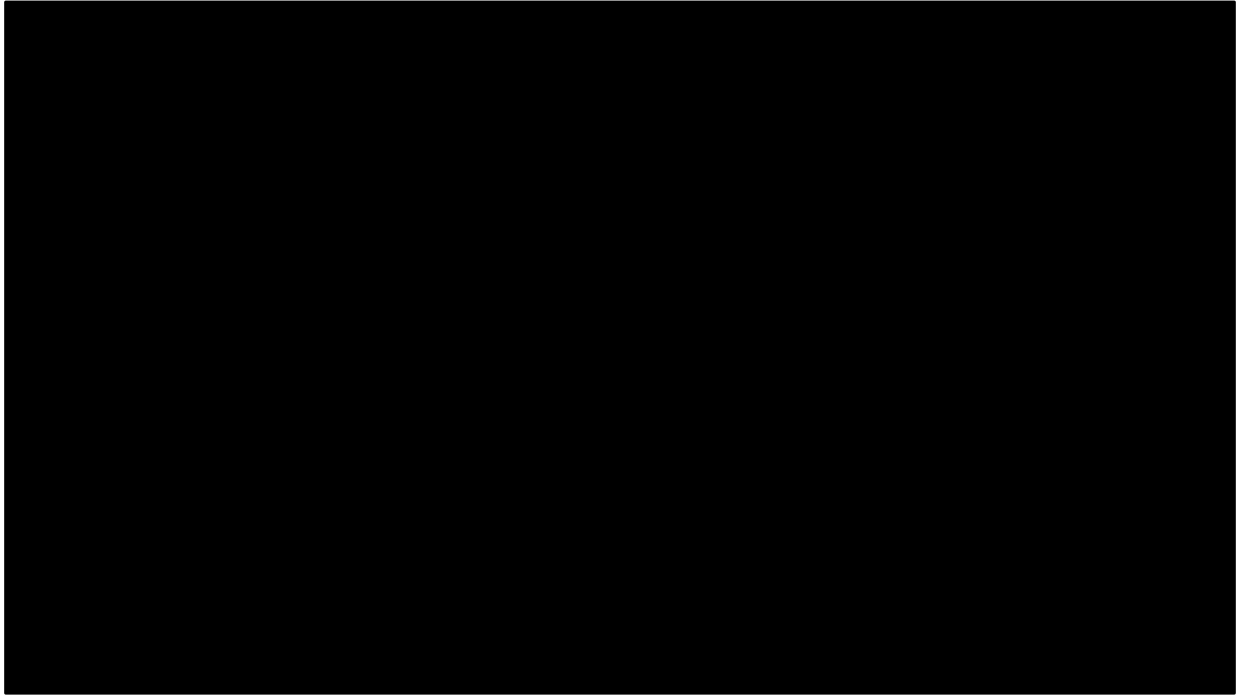
What does Engineering look like in Early Childhood? Within our inclusive preschool, we were looking at embedding Wee Engineer, a preschool engineering curriculum published by the Museum of Science in Boston, Engineering is Elementary.

The Engineering Design Process for this age focuses on designing something to solve a problem, using three steps, Explore, Create, and Improve.

Ways of Thinking (Habits of Mind):

- Systems Thinking
- Optimism
(problems as opportunities)
- Collaboration

As I mentioned in a previous slide, infants are born ready for STEAM learning. Research also suggests that children in preschool show early learning dispositions that motivate them to solve problems. In the reading for this class, Lippard and colleagues (2019) observed preschoolers using engineering habits of mind or ways of thinking during their everyday play. Specifically, children used systems thinking (figuring out how objects relate and connect to one another and how this contributes to how things work), optimism (problems as opportunities and includes perseverance and could impact cultivating a growth mindset), and collaboration (actively seek out peers when working on solutions). The researchers also noted these habits of mind occurred most often in the block area, but also within other areas of the classroom. Interestingly, this study discussed that children did not demonstrate the habit of mind of creativity in problem solving and hypothesized that this could be due to the engagement of the teacher in responding and nurturing the children's pre-engineering thinking during play.



In our young preschool classroom, every learning area in the Indoor and Outdoor Classroom incorporated the engineering design process.

1. Outdoor Classroom: Butterflies: “We need to find our family – we are monarch butterflies that got lost during our migration.”
2. Art Area: “What can we make with our natural materials?”
3. Toy Area: building together with bristle blocks
4. Toy Area: KIBO, exploring the different blocks
5. Block Area: Building a ramp – “how do we make our cars go really fast?”
6. Dramatic Play Area: “How do we make our Knight’s horses unicorns instead?”

HOW CAN
FAMILIES EMBED
ENGINEERING
DURING DAILY
ACTIVITIES?



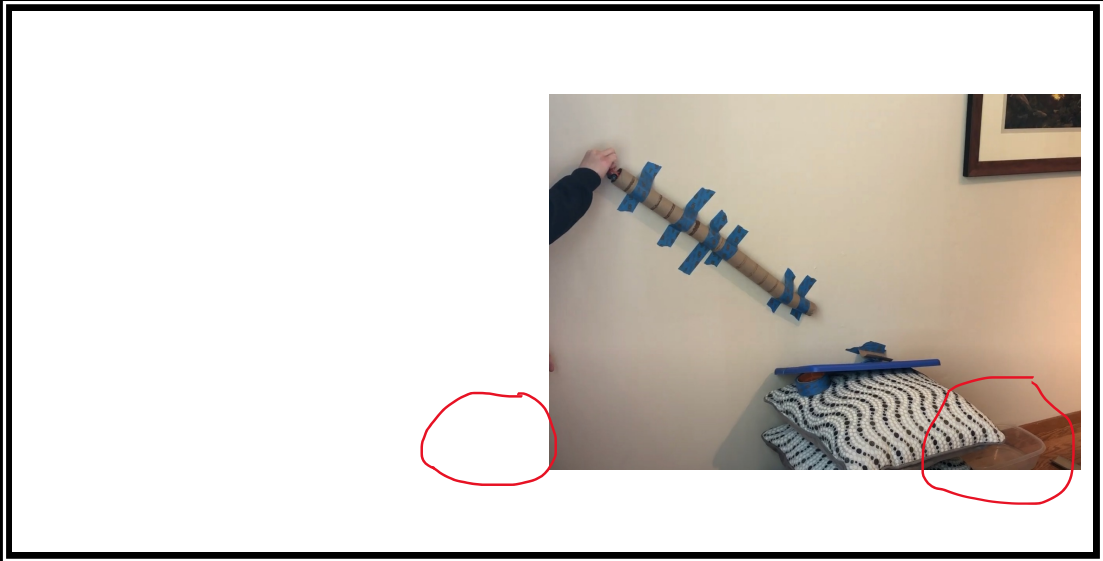


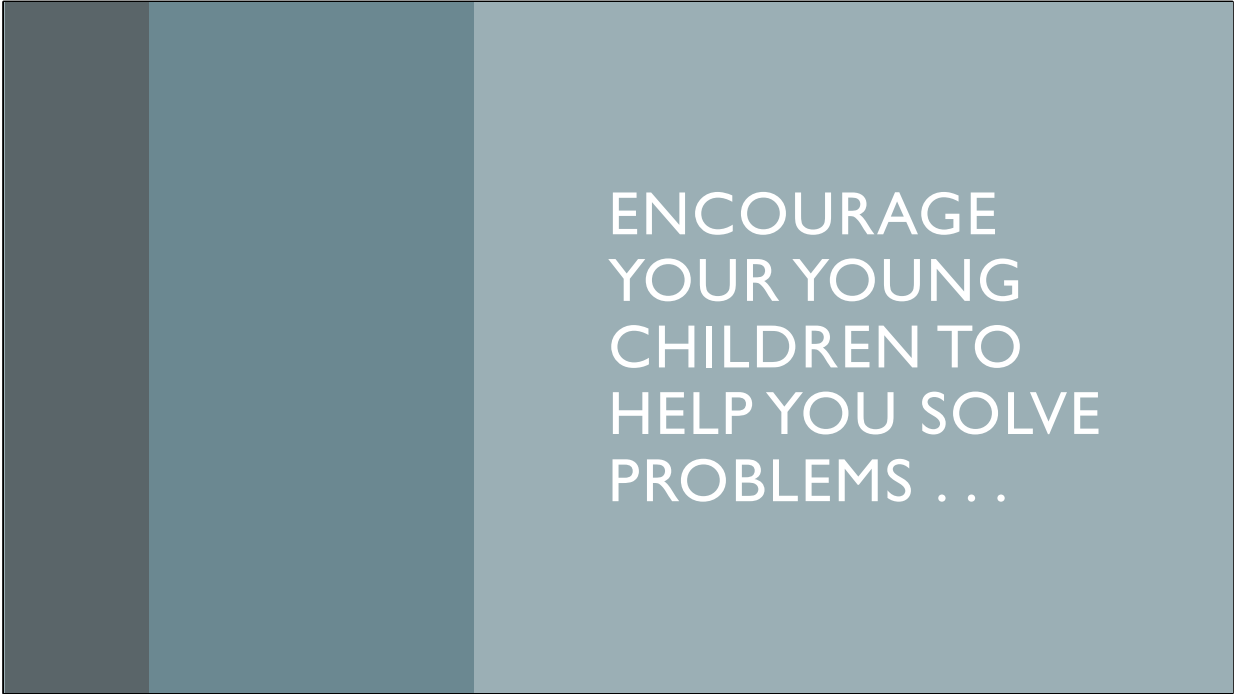
Encourage Inventive Play through asking your child to solve a problem:

I wonder if you could sort the pom poms through tubes and ramps?

I wonder how fast your car will travel when ...

Image and more ideas through <https://busytoddler.com/pom-pom-tube-ramp/>





ENCOURAGE
YOUR YOUNG
CHILDREN TO
HELP YOU SOLVE
PROBLEMS ...

What could we do to clean up
this room because someone
may trip?



[This Photo](#) by Unknown Author is licensed under [CC BY-SA 4.0](#)

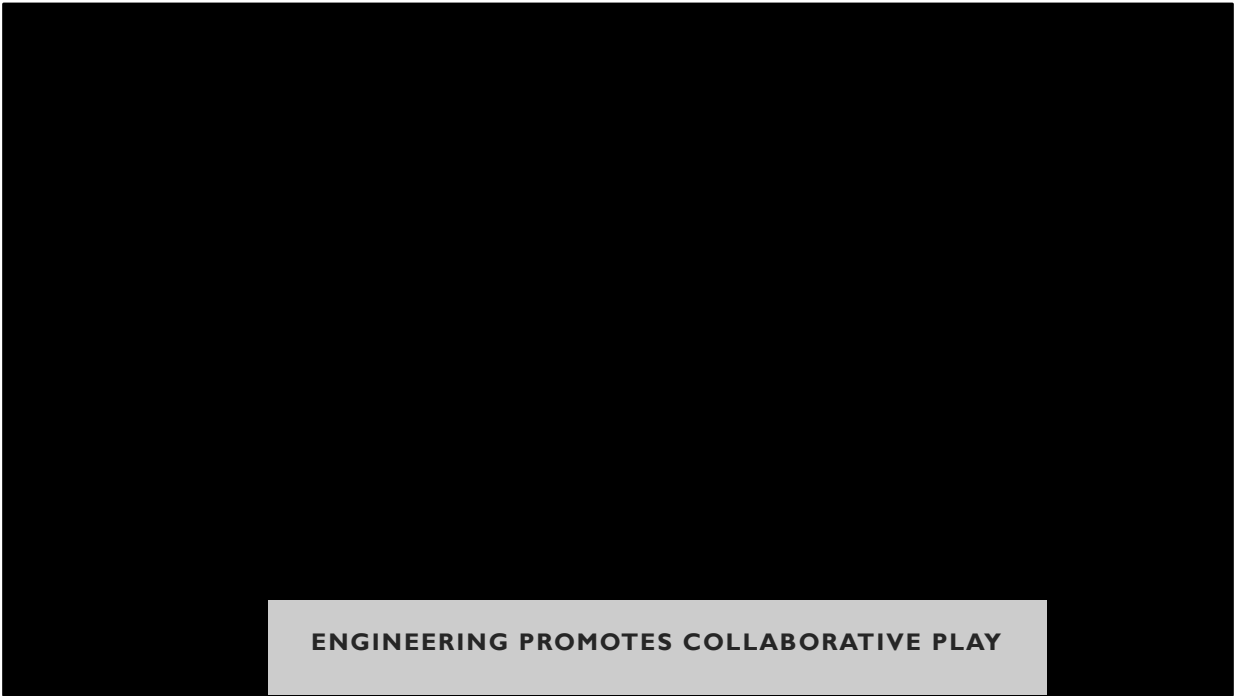
What other ways can we ask children to help solve problems during everyday activities or chores?

- 1.
- 2.
- 3.

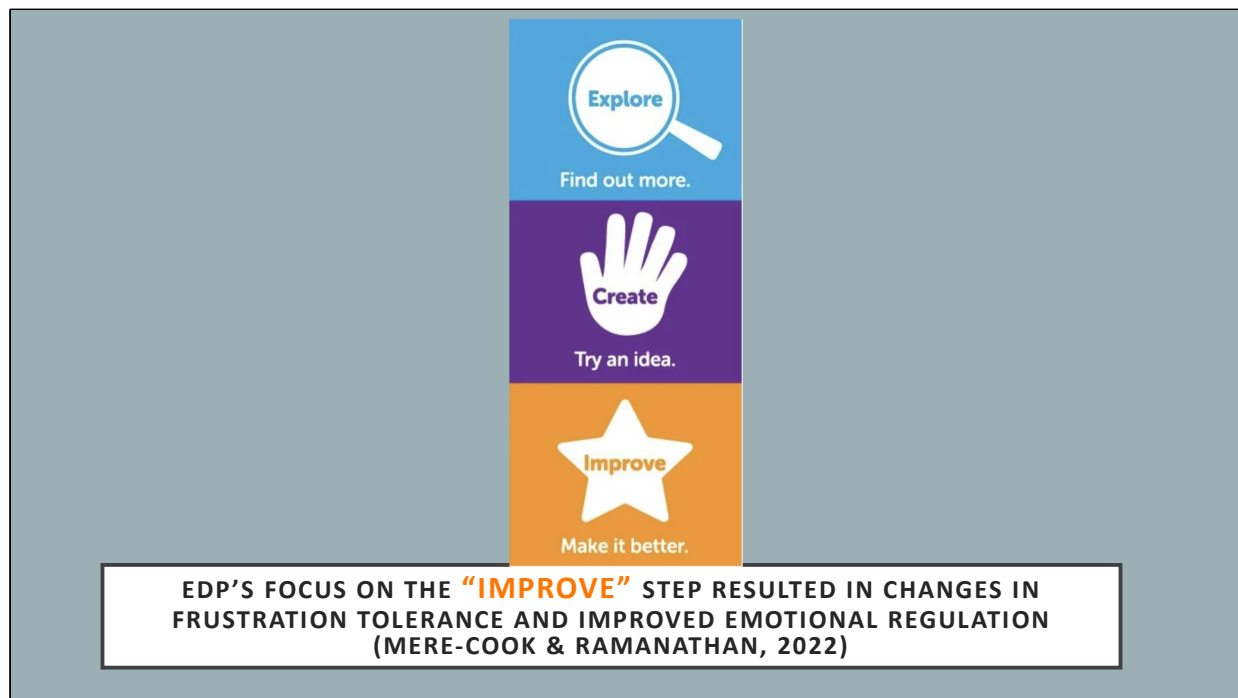
WHY IS EMBEDDING THE ENGINEERING
DESIGN PROCESS SO BENEFICIAL FOR
CHILDREN WITH DISABILITIES?



STEAM SUPPORTS
SOCIAL EMOTIONAL DEVELOPMENT



ENGINEERING PROMOTES COLLABORATIVE PLAY



“WEE” ARE ENGINEERS . . .



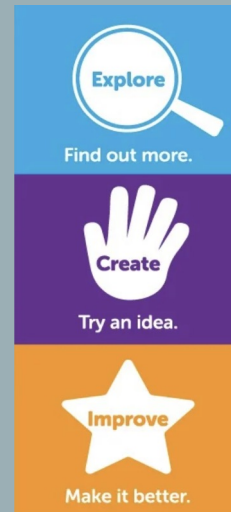
Engineering Design Challenge:
Kate Who Tamed the Wind

Engineering Design Challenge: *Kate Who Tamed the Wind*

Explore the Materials provided

Create a Structure (with a roof) that can
withstand gusts of wind

Improve (test out your creations with a fan
or other “wind source”)

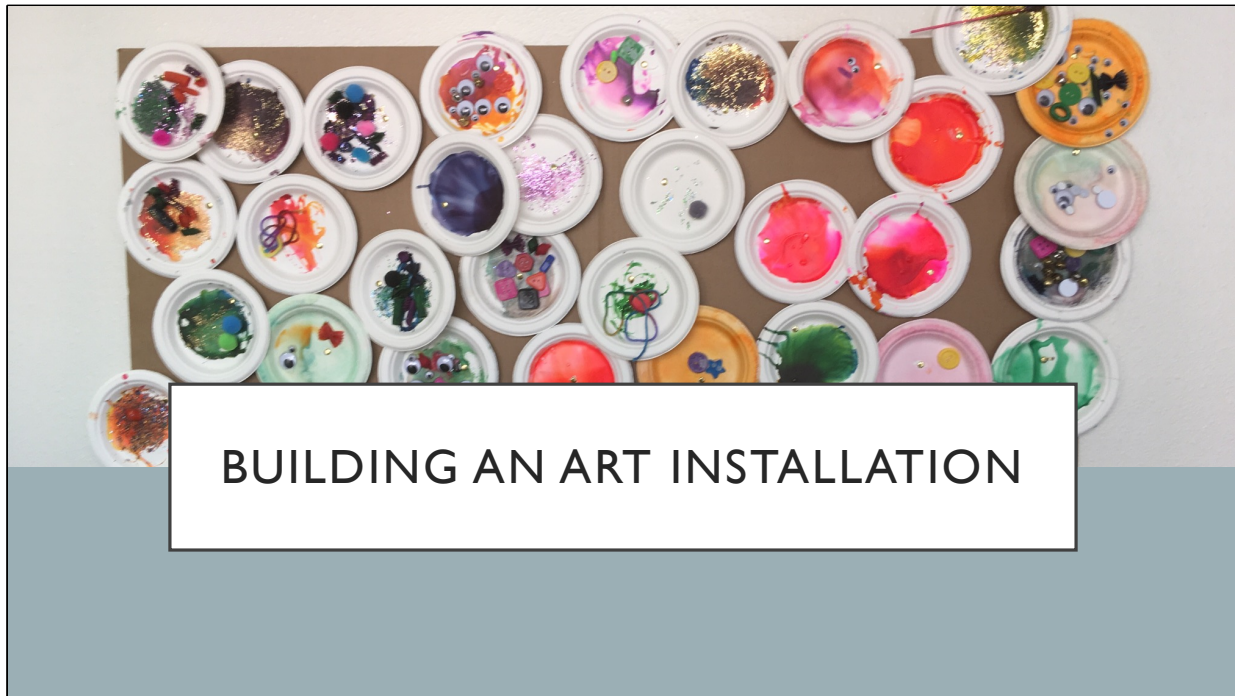


Up Next ...

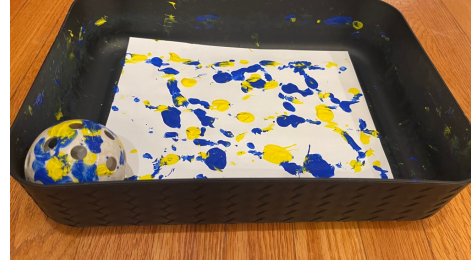
Integrating the Visual
Arts within the
Engineering Design
Project

But first, let's take a
break



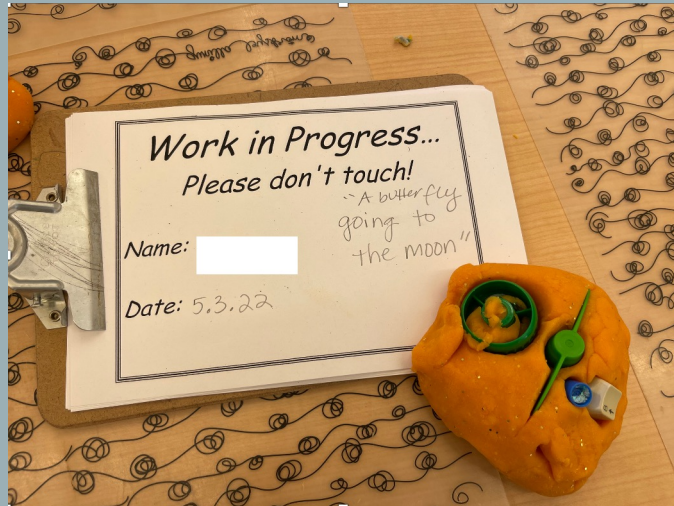
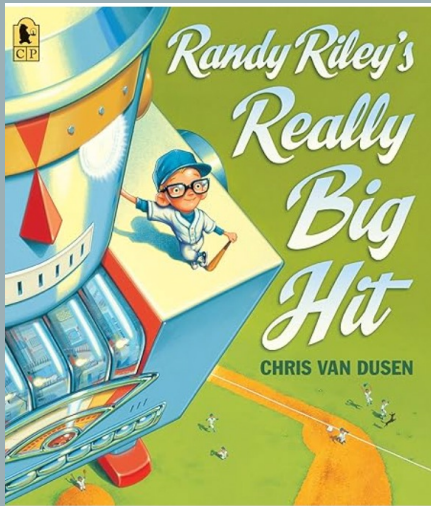


We are going to focus on two ways we integrate the arts into Engineering. One is building an art installation and the second is through intentionally planning our Playdough Area to ask children to create to solve a problem.



EXPLORED DIFFERENT TOOLS TO ACCOMMODATE
A RANGE OF FINE MOTOR SKILLS





“Problem: Randy built a robot to save his town from a meteor. What will your robot do?”

ONE MORE
BREAK ...



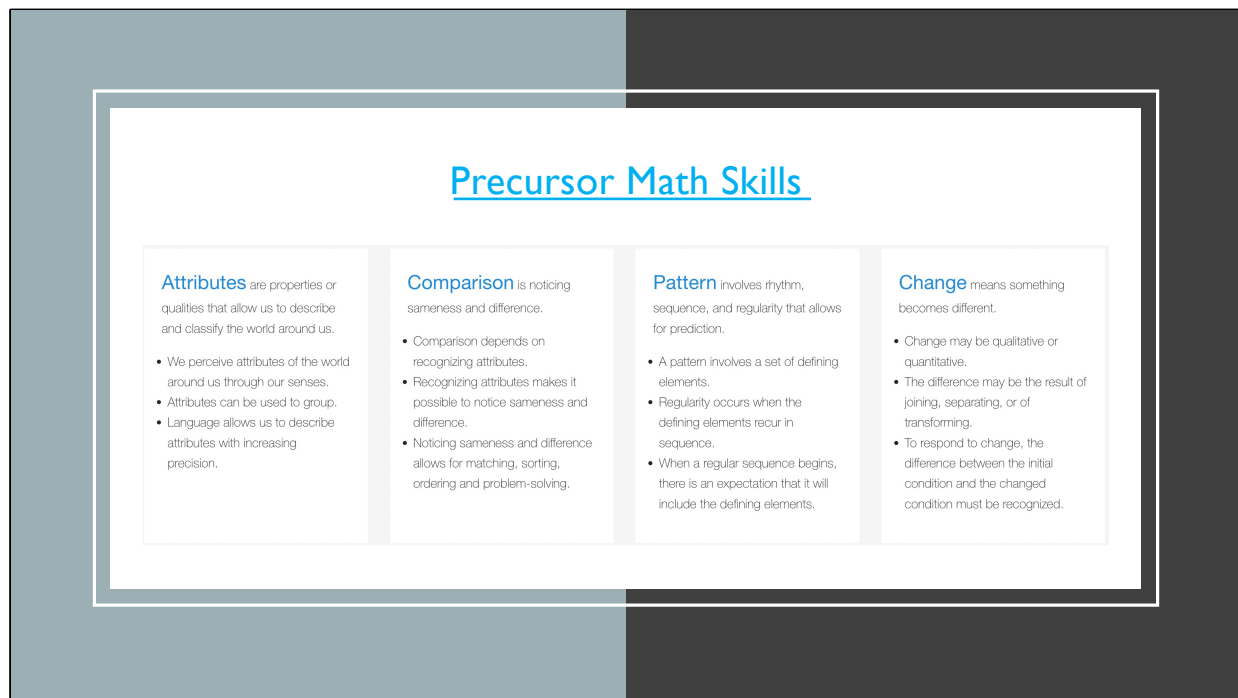


EMBEDDING EARLY MATH INTO DAILY ACTIVITIES

What do we mean when we say early math?

BABIES ARE BORN HARD-WIRED
WITH PRECURSOR MATH SKILLS
(HYNES-BERRY, CHEN, & ABEL, 2021)

Erikson Institute
Early Math Collaborative

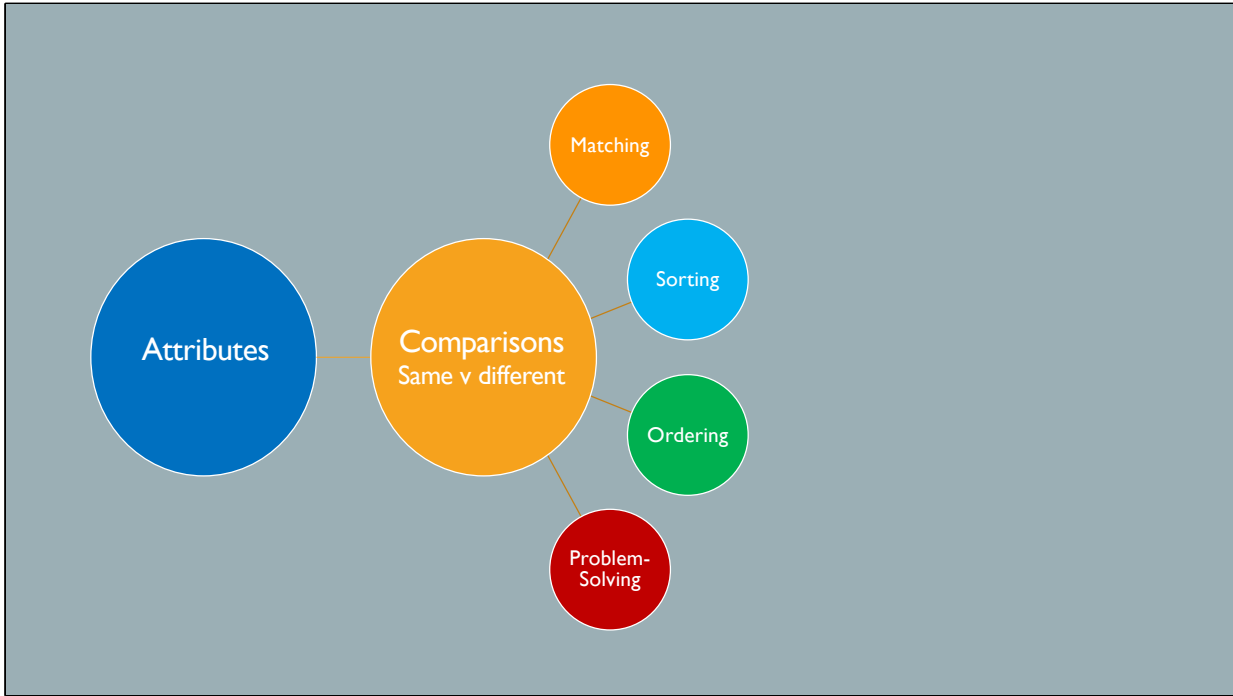


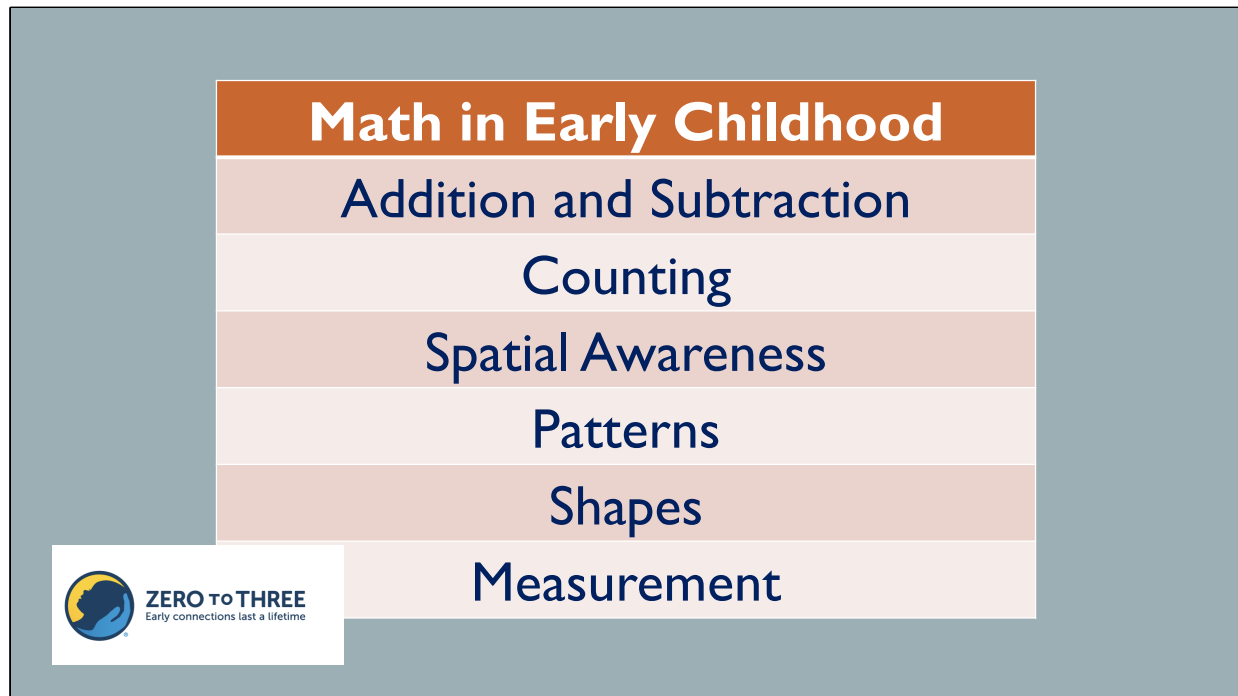
This image is a screenshot from the Erikson Institute Early Math Collaborative (https://earlymath.erikson.edu/why-early-math-everyday-math/precursor-concepts/?_gl=1*sgx1eo*_up*MQ.*_ga*MjYzNjkyNTA5LjE3NTk2NDI2ODE.*_ga_KQJ438CNZ7*czE3NTk2NDI2ODAKbzEkZzEkdDE3NTk2NDI2ODYkajU0JGwwJGg)

VIDEO 3: EXPLORING ATTRIBUTES

While you watch and listen to this video, notice the communication skills that the caregiver is providing to the child while she explores.

Video link: https://www.youtube.com/watch?v=BDiWe0_Hj4I





1. Addition & Subtraction:

2.

Counting: <https://www.youtube.com/watch?v=6aRVyWKArcY&t=12s> Spanish:

<https://www.youtube.com/watch?v=i1WIF2oufqQ>

3. Spatial

Awareness: <https://www.youtube.com/watch?v=Uttl nYIKIUg&t=26s>

4. patterns: <https://www.youtube.com/watch?v=2Gv alYFFcO8>

5. Shapes: Geometry: English:

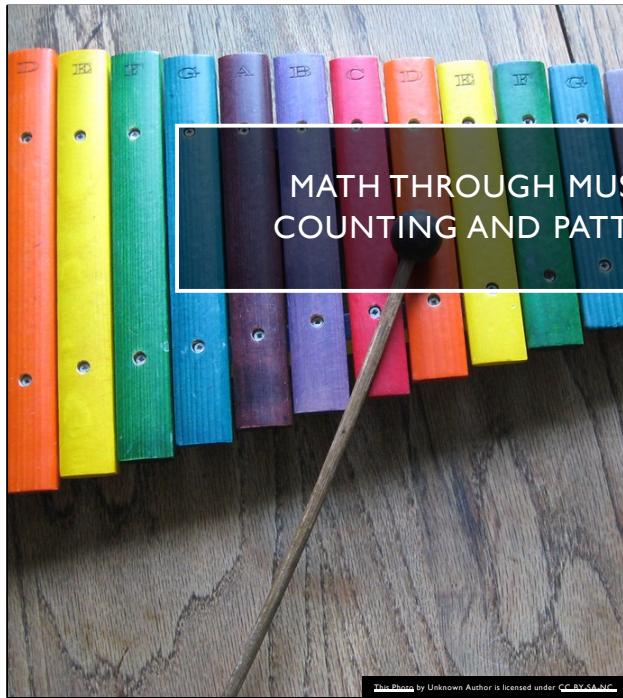
<https://www.youtube.com/watch?v=rLEjr8FdgwI>

Spanish:

<https://www.youtube.com/watch?v=17ikC3xETig>

6.

Measurement: https://vimeo.com/155854724?embedded=true&source=vimeo_logo&owner=23379941



MATH THROUGH MUSIC AND DANCE:
COUNTING AND PATTERNS (RHYTHMS)



Measurement and Counting

Let's Move!

Shapes & Spatial Relationships

Family Math



Song Lyrics

Había una vez un barquito chiquito,
Había una vez un barquito chiquito,
Que no sabía, que no podía, Que no podía navegar.

Pasaron una, dos, tres, cuatro, cinco, seis, siete semanas;
Pasaron una, dos, tres, cuatro, cinco, seis, siete semanas;
Y aquel barquito, y aquel barquito, Y aquel barquito navegó.

Y si esta historia parece corta,
volveremos, volveremos, a empezar...

English Translation

Once there was a tiny boat, Once there was a tiny boat,
That didn't know, that couldn't, That couldn't sail.

One, two, three, four, five, six, seven weeks passed;
One, two, three, four, five, six, seven weeks passed;
And that little boat, that little boat, That little boat sailed.

And if this story seems short,
Let's go back, let's go back, and start again...

Listen to the Song

"El Barquito Chiquito" song lyrics are in the Public Domain. Author unknown.

Song Lyrics

Everybody form a circle
Put your left foot in
Your left foot out
Your left foot in
And shake it all about
You do the hokey pokey
And turn yourself around
That's what it's all about.

Now put your right foot in...
You put your head in...
Put your right hand in...
Now put your tongue in...
You put your bottom in...

Let's do the hokey pokey (x3)
That's what it's all about.

Listen to the Song

The Hokey Pokey
Words and Music by Charles F. Brown
©1960 Brown and Charles F. Brown
Copyright © 1960 SongTV Music Publishing LLC
Copyright Reserved
All Rights Reserved by SongTV Music Publishing LLC
420 Church Street, Suite 1000, Berkeley, CA 94710
International Copyright Secured All Rights Reserved
Agreement by Permission of Phonocore LLC

<https://dreme.stanford.edu/news/6-resources-for-singing-dancing-and-learning-math/>

MEALTIMES

Counting

Sorting

Comparing

Exploring Attributes

Integrating Technology** for
Fine Motor Development

*(please be mindful to cut children's
soft foods in small, manageable pieces
and always closely supervise your
child.)*



<https://www.parents.com/baby/feeding/solid-foods/15-easy-finger-foods-for-babies-with-no-teeth/>

FIND PATTERNS IN NATURE







M
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HELPFUL
RESOURCES
FOR MATH
AND STEAM:

WHAT ARE
SOME
RESOURCES
YOU ENJOY?

Resource Name	Area of STEAM
DREME (Development and Research in Early Math Education), Stanford University	Math Song Guides
Erikson Institute Early Math Collaborative	Precursor Math Skills; Infants and Toddlers
Museum of Science, Boston; Engineering is Elementary; Wee Engineer	Engineering
STEMIE (STEM Innovation for Inclusion in Early Education)	Computational Thinking; Learning Trajectories; Assistive Technology



Let's keep the conversations going ...



Email: ymerecook@samuelmerritt.edu



LinkedIn:
www.linkedin.com/in/yvettemerecook-edd-ot



Website:
<https://www.yvettemerecookotr.com/>



