

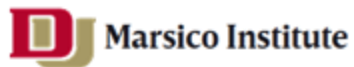
STEM Meets EI Series: Become a STEMcaster

Tanna Neufeld, MA, MS, CCC-SLP

September 3, 2025



FRANK PORTER GRAHAM
CHILD DEVELOPMENT INSTITUTE





Welcome & Introduction

STEMIE EI TA Team

Dr. Philippa Campbell , Dr. Hsiu-wen Yang,
Tanna Neufeld, & Dr. Kellen Reid



Housecleaning items

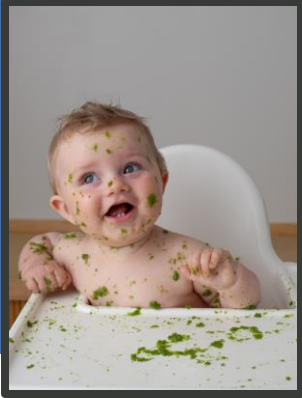
- The **CEU** is for live session participants who complete the evaluation.
- **Once the series is finished** in September, you will receive a request form about CEU.
- If you encounter any tech issues, please message Kellen Reid via the Zoom chat.
- The webinar will be recorded, and you can find the recording and resources a week after the session.



Disclosures & Acknowledgements

- This content was developed under a Cooperative Agreement between the U.S. Department of Education (DOE), Office of Special Education Programs (OSEP) and the FPG Child Development Institute at University of North Carolina at Chapel Hill (#H327G230002) in partnership with the Marsico Institute for Early Learning at the Denver University.
- This content does not necessarily represent the policy of the DOE, and you should not assume endorsement by the Federal Government.
- Presenters declare no conflicts of interest.





Session 1

STEM
Around the
House



Session 2

Brilliance of
Babies'
Thinking



Session 3

Brilliant
Babies in
Action

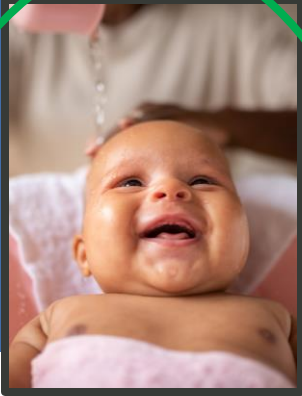


Session 4

What Does
STEM have
to Do with
Me?



STEM Meets EI: Series Recap



Session 5

Become a
STEMcaster



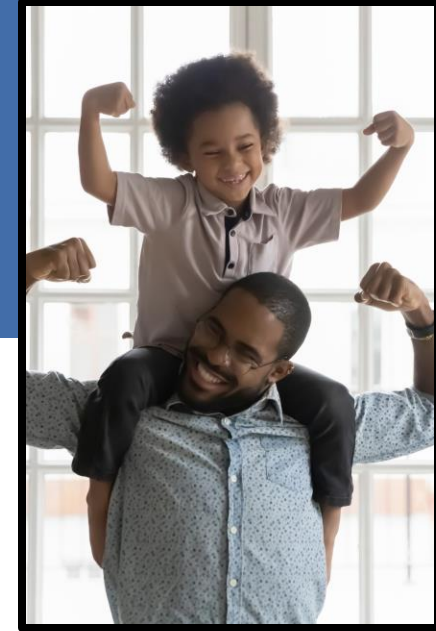
Session 6

Parents as
STEM
Teachers



Session 7

STEM at
Childcare



STEM Meets EI: Still to Come!



Today's Big Idea

Learn language stimulation strategies that highlight STEM and thinking concepts, scaffold children's learning, and keep their interests and engagement at the center.

Objectives

- **Explain** how language stimulation strategies can be used to highlight STEM and thinking concepts during everyday routines.
- **Demonstrate** ways to scaffold children's learning by choosing intentional language beyond simple description.
- **Apply** strategies that keep children's interests and engagement at the center while supporting developmental growth through STEM-rich interactions.





**What *are* these
STEM concepts
you've been
talking about?**

Science

- The study of structures and processes in the physical and natural world.
- Science in the first three years is about sensory-rich experiences.
- Infants and toddlers learn foundational science concepts by touching, watching, hearing, and moving through their daily routines.

Science involves 7 Big Ideas:

1. Weather
2. Living Things
3. Light
4. Sounds
5. Forces & Motion
6. Structure & Properties of Materials
7. States of Matter



[Explore this domain on STEMIE](#)

Science: 7 Big Ideas

1. Weather

- What occurs in the atmosphere.
- Babies and toddlers experience weather with their senses—feeling sun, wind, or rain.
- **Examples:** Pointing out rain on the window, putting on a coat when it's cold, or watching leaves move in the wind.

2. Living Things

- Plants and animals (including people) that grow and need food, water, and care.
- Children notice that living things act differently than toys or objects.
- **Examples:** Feeding a pet vs. playing with a stuffed animal, smelling flowers, or watering plants.

3. Light

- Energy that lets us see, coming from the sun or tools/objects.
- Children explore how light changes what they see (and don't see).
- **Examples:** Turning lights on/off, playing with shadows, or looking at sunlight streaming through curtains.

4. Sounds

- Vibrations that we hear.
- Children explore how sounds change during everyday experiences with voice, music, and other sounds in their world.
- **Examples:** Shaking a rattle, listening to a parent's singing, or clapping hands to a rhythm.

5. Forces & Motion

- Pushes and pulls that make things move or stop.
- Every time a child throws, rolls, or pushes, they're exploring forces and motion.
- **Examples:** Dropping a spoon, rolling a ball, sliding down a slide, or pushing a toy truck.

6. Structures & Properties of Materials

- How things are made, what they're made of, and what they can do.
- Children learn that soft, hard, heavy, or light materials behave differently.
- Squeezing playdough vs. stacking blocks, choosing a soft teddy bear for comfort.

7. States of Matter

- The forms things take—solid, liquid, gas (like air).
- Children discover how water, ice, and steam behave differently.
- Playing with ice cubes in water, noticing steam from a bath, or drinking milk (liquid vs. frozen).



Explore this domain on STEMIE

Technology (CT)

- Computational thinking (CT) is the method used to problem-solve by determining 'what', 'how', and 'why'.
- CT in the early years isn't about computers—it's about how children notice patterns, repeat actions, put things in order, and problem-solve when things don't work.

CT involves 3 Big Ideas:

1. Repetition & Looping
2. Sequencing
3. Debugging



[Explore this domain on STEMIE](#)

Technology (CT): 3 Big Ideas

1. Repetition & Looping

- **Repetition:** doing an action over and over again.
 - Young children learn through repetition—like dropping the spoon repeatedly, or clapping the same pattern.
 - **Examples:** Singing the same nursery rhyme verse multiple times; child enjoys the predictability.
- **Looping:** Doing a sequence of steps over and over again until a condition is reached that tells the sequence to stop.
 - Loops are when children notice and enjoy patterns that keep happening and achieve desired outcomes from those patterns.
 - **Examples:** Peek-a-boo (“cover face → uncover → repeat”), or stacking blocks and knocking them down, over and over.

2. Sequencing

- Doing the steps of an activity or task in a particular order.
- Sequencing is when children learn that things happen in steps, one after another.
- **Examples:** Washing hands (turn on water → soap → rinse → dry) or getting dressed (socks before shoes).

3. Debugging

- The process of recognizing and removing errors.
- Debugging is when children adjust their actions to solve a problem.
- **Examples:** Trying a different grip on a spoon or turning a puzzle piece until it fits.



Engineering

- Exploring materials and building knowledge about them so that they can be used to solve problems and/or create something.
 - Using an iterative method for solving problems.
- Engineering in the early years looks like curiosity, creativity, and problem-solving through play.
- Children investigate, design, and evaluate when they explore their environment.

Engineering involves 3 Big Ideas:

1. Investigation
2. Design
3. Evaluation



[Explore this domain on STEMIE](#)

Engineering: 3 Big Ideas

1. Investigation

- The study of something to learn how it works.
- Young children are natural investigators—they poke, pour, shake, and watch closely
- **Examples:** Exploring which toy makes noise when shaken, feeling water pour from different cups, or trying out puzzle pieces.

2. Design

- The development of a plan that will be used to create something.
- Design is when children build or arrange objects to solve a problem or create something new.
- **Examples:** Stacking blocks into a tower, lining up toy cars, or filling a bucket with sand to make a castle

3. Evaluation

- Determining if something works and if not, deciding what to change.
- Evaluation happens when children notice whether their idea worked—and try something new if it didn't.
- **Examples:** Rebuilding a tower after it falls, adjusting a toy ramp so the ball rolls further, or trying different cups until one holds water without spilling.



Math

- Early math is the study of patterns in numbers and space, encompassing how children perceive counting, quantity, shapes, measurement, relationships, and logical thinking
- Math for infants and toddlers is about hands-on experiences: counting crackers, noticing small quantities without counting, noticing more/less, playing with shapes, and repeating patterns.

Math involves 5 Groups of Big Ideas:

1. Number & Operations
2. Data Analysis
3. Measurement
4. Geometry
5. Algebra (Early Forms)



[Explore this domain on STEMIE](#)

Math: 5 Big Groups of Ideas

1. Number & Operations

- Understanding quantities, counting, and how numbers work in simple ways.
- Children explore 'how many' when they show, point, count, or share
- **Examples:** Counting toes during diapering, giving one cracker to each child, dropping blocks in a bucket while saying numbers.

2. Data Analysis

- Sorting, classifying, and noticing differences among things.
- Children love to group objects by what they see—colors, sizes, shapes.
- **Examples:** Sorting socks during laundry, noticing there are more blueberries than strawberries on a plate.

3. Measurement

- Comparing size, weight, length, or amount.
- Children discover measurement when they explore 'bigger/smaller,' 'heavier/lighter,' or 'more/less'.
- **Examples:** Talking about which toy is bigger, comparing who has more juice, or filling/emptying different-sized cups in the bath

• Geometry

- Understanding shapes, space, and how objects fit together.
- Children explore geometry when they recognize shapes or figure out how things fit.
- **Examples:** Fitting puzzle pieces, noticing a ball is round, stacking blocks in a line or tower

• Algebra (Early Forms)

- Recognizing and creating patterns, predicting what comes next.
- Children enjoy repeating rhythms and noticing simple patterns
- **Examples:** Clapping or stomping in a pattern, alternating blocks by color, or repeating a game like "up-up-down!"



Reminder: A Framework for STEM in EI

1

Use or Create

Naturally occurring
learning
opportunities

2

Embed

STEM **foundational**
learning concepts

3

Adapt

The **environment**,
materials, and
instruction.

From - Campbell & Harradine_3/30/2021_STEMIE Infant Toddler Webinar

Reminder: TEMIE's Approach to Adaptations

Environment, Activities, And Routines



For example: Room set-up, equipment, how an activity is done, length of time

01

STEP

Materials



For example: Modifications to toys, materials, assistive technology devices

02

STEP

Instruction



For example: Adding information, reducing steps

03

STEP



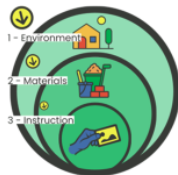
A GUIDE TO...

ADAPTATIONS

Every child is different, and these are only suggested adaptations. Do what works best for the child. The child's therapist can give you more ideas.

Are you interested in helping your child learn about STEM? Are you looking for ways to help your child participate in STEM?

Use this guide to adapt activities for your child. Every child is different, and these are only suggestions. Do what works best for your young child or children you are working with. You might also work with the child's speech or occupational therapist to adapt activities.



INCLUSION FRAMEWORK

The inclusion framework is informed by evidence-based inclusive practices (e.g., Milbourne & Campbell, 2007; DEC, 2014) and helps adults support all children in STEM.

ADAPTATIONS FRAMEWORK

Adaptations to the environment and materials align with the Division for Early Childhood (DEC) Recommended Practices on environment while instructional adaptations align with the Recommended Practices on instruction.

1. **ENVIRONMENT** - Environmental, activity, and/or routine adaptations are broad changes and/or accommodations in the setting and/or activity that support learning for all children (e.g., room set-up, equipment, how an activity is done, length of time).



Follow your child's lead and interests. Enthusiastically ask your child questions about what they are doing and what they like.



Answer your child's questions. If you do not know the answer, work together with your child to discover the answer.



Encourage your child to participate in the activity as much as possible. Praise your child's efforts and successes.

STEMIE

- ▶ General Teaching Practices
- ▶ Descriptive Talking/Verbal Guidance
- ▶ Modeling
- ▶ Prompting



Follow your child's lead and interests. Enthusiastically ask your child questions about what they are doing and what they like.



Answer your child's questions. If you do not know the answer, work together with your child to discover the answer.



Encourage your child to participate in the activity as much as possible. Praise your child's efforts and successes.

STEMIE

- ▶ Reinforcement
- ▶ Scaffolding
- ▶ Wait Time



Encourage your child to participate in the activity as much as possible. Praise your child's efforts and successes.

STEMIE



A GUIDE TO...

DIALOGIC READING

Are you spending more time at home reading with your young child? Are you interested in helping your child gain language skills and learn?

Cultivate and encourage ALL young children (0-5; with and without disabilities) to explore STEM concepts through activities as independently as possible with adaptations in their natural environments.

opportunity to work in conversations! Your child's story. This is easy! And we have you can use digital paper or board



Cultivate and encourage ALL young children (0-5; with and without disabilities) to explore STEM concepts through activities as independently as possible with adaptations in their natural environments.

STEP ONE

book. Look up your child's interests to give your child a screen. Interpillar by

py of this samantha

g books: is.dec- :CHandout

The Very Hungry Caterpillar is a book written and illustrated by Eric Carle. Follow the caterpillar as they count and eat their way through the days of the week. Which of the caterpillar's meals is your child's favorite?



STEMIE



A Guide to...

STEMcaster Strategies

- Start with Routines & Activities (and the child's interest)
- Tune-In to Communication
- Use STEM Talk
 - Descriptive Talking
 - STEM vocabulary
- Ask & Wonder
 - Use open-ended questions
 - Wonder out loud
 - **Ask even when you don't expect an answer**



Start with Routines & Activities

The main goal with STEM-infused early learning opportunities:

- Use everyday routines and play (blocks, water play, snack time, outdoor walks) to highlight STEM “big ideas”.
- Connect STEM concepts to what children are already doing.
- Model new vocabulary, expand utterances, and promote back-and-forth interaction that encourages and stretches thinking.



Tune-In to Communication

- Wait for children to initiate
- Recognize and respond to all forms of communication—gestures, sounds, facial expressions, body movements.
- Expand on what children express: *Child points → “Yes, you’re showing me the big ball! Let’s roll it.”*
- Use (and provide access to) multimodal strategies (speech, gesture, facial expression) to support understanding and model expression.



Use STEM Talk

Descriptive Talking

- Consider how concepts and STEM-specific words relate to what you are doing
- Narrate what the child is doing: *"You stacked the red block on top of the blue one."*
- Repeat and expand on children's gestures, sounds, or words.
- Model (actions & ideas) and narrate your own actions and thinking: *"I'm putting this shorter block here to see if it balances."*

STEM Vocabulary

- Build STEM vocabulary by using and defining words (e.g., you chose a red block; you put that on top), and connecting them to what you/the child are doing.
- Layer affect and tone to support meaning, especially for babies and pre-verbal toddlers.
- Use **multimodal communication**, including AAC, spoken words, and signs as your model, depending on the child's needs.

Ask & Wonder

- Ask open-ended questions that spark curiosity rather than demand “right answers”:
“What do you think will happen if we pour more water?”
- Wonder out loud to model curiosity: *“I wonder which cup will hold more.”*
- **Ask and wonder, even if you don’t expect a spoken response**
 - Children respond in multimodal ways; we need to tune in to those responses
 - Questions are not just for answers, but encourage thinking and action





Video Activity: Spotting STEMcaster Strategies

Being a STEMcaster means...

- Finding opportunities to showcase STEM ideas within what children and families are already doing.
- Tuning-in to what kids find interesting, and how they are showing you (and telling you) what they may be thinking.
- Scaffolding thinking through STEM Talk, asking open-ended questions, and wondering aloud.



Big Ideas to Take Away



Resources to Explore

Action Plan Templates

STEM-ify Daily Activities

Turn your daily activities into STEM learning opportunities (fillable form + sample).

[Explore this resource](#)

Planning for STEM Experiences

Use this fillable form to create a STEM experience with a family and or teacher working with a young child. (framework + fillable form).

[Explore this resource](#)

STEMify-ing Your Daily Activities



Activity (Follow your child's interests):

Blowing bubbles

Where's the STEM?

Shapes, air

Strategy	What You'll Try
STEM talk	The bubbles are spheres, just like your favorite ball.
Open-ended Questions	What else is a sphere? (prompt: eyeballs, round fruits, marbles)
Reading	book about bubbles. (Pop! By Jason Carter)
Others	Explore what happens if use different widths of straws or bubble wands to see how bubbles change

Adaptations (Environment, Materials, Instruction):

Plenty of space, change of clothes handy, towel handy, grabber to help hold bubble wand, plastic glove, model how to make bubbles, break down steps into small steps

- Daily Routine Explorations
- Discovery Play Activities
- EI Cards
- Investigations
- Storybook Conversations



STEM IDEAS/WORDS

- Pattern/Sequence
- Predict
- Colors
- Repeat
- Observe/Notice

OPEN-ENDED QUESTIONS

- What is the same about these items?
- What comes next? Then?
- What part repeats?
- What does this remind you of?

OBJECTIVE OF THIS INVESTIGATION:

Children will investigate which materials are best used as paint brushes, given the properties of those materials.

MATERIALS:

- paper or other material children can paint
- a variety of materials to use as brush (toothbrushes, cotton balls, etc.)
- smocks, aprons, ground covering as needed

PROGRESSION STEPS (TOPIC):

Visit [STEMIE Learning Trajectories](#) for details.

- Properties Recognizer
- Function Recognizer
- Properties Identifier

THIS INVESTIGATION:

- Lay the materials out in the art area to examine and touch the materials.
- Ask children to identify the different properties of the materials?

"How does [insert material here] feel?" (Identifier)

- If children do not identify different properties, model doing so. See if children can name materials given certain properties.

"Can you find me something to paint soft and squishy? Yes, a sponge is squishy!" (Properties Recognizer)

- Encourage children to explore painting the different objects and to try out different materials (e.g., rub the toothbrush so the paint dries, squeeze the sponge so the paint drips).

"Which material do you think would paint puffy clouds? Why? What about red?" (Function Recognizer)

"Which materials soak up the most paint? The least? Why do you think they do that?" (Function Recognizer)

Image credit: Microsoft Stock

Did you know reading books is a great opportunity to support STEM learning?

Worm Weather is a book written by Jean Taft and illustrated by Matt Hunt.

Worm Weather uses simple rhyming words and colorful pictures to talk about the sounds and sights before, during, and after a thunderstorm.

- If you do not have a paper copy of this book, watch a YouTube video of someone reading the book. If you prefer to read it to your child yourself, just mute the audio. https://www.youtube.com/watch?v=PqQVWqX_Dak
- This book is accessible for individuals with reading disabilities through [Bookshare](#).
- Check your local library to see if it allows you to borrow a digital version of this book to read on a laptop, tablet, or phone.



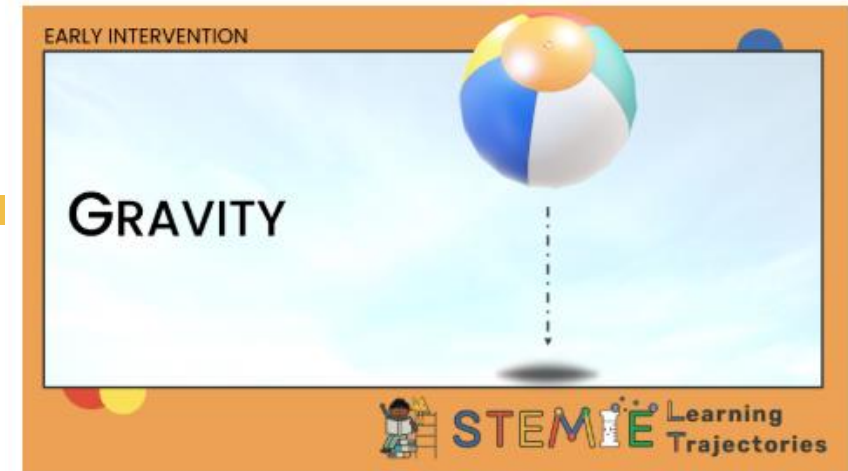
Activities

El Cards

One page STEM activity cards for EI providers
(spontaneous/the “use” vs. “create”
Explore El Cards for various routines

Investigations

Outline activities that align with a particular
STEM learning trajectory (LT, planned, “create”)
Explore LT Resources: Foundational
Investigations



[LT] 2 - Indoor Play with Forces and Motion

STEMIE
INNOVATION FOR INCLUSION IN EARLY EDUCATION

Introduction

Child(ren) will learn about forces and motion through exploration of object movement and push and pull activities.


photo credit: Tatiana Syrikova from Pexels

See specific adaptations for this investigation

See learning trajectories information

Environmental Adaptations

Materials Adaptations

Instructional Adaptations

Learning Trajectories

Remember to notice children's thinking!

STORYBOOK CONVERSATIONS WITH YOUR YOUNG CHILD

BLACK INNOVATORS

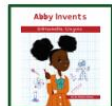
Every child is different, and these are only suggested age ranges and books. Do what works best for encouraging the child's independent exploration of STEM concepts.



A Computer Called Katherine
Suzanne Slade
Preschoolers
Math, STEM innovator
Also available in Spanish



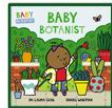
Abby Invents Foldibot
Dr. Arlyne Simon
Preschoolers
Engineering
Black author & characters



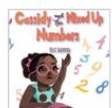
Abby Invents Unbreakable Crayons
Dr. Arlyne Simon
Preschoolers
Engineering
Black author & character



Ada Twist, Scientist
Andrea Beaty
Kindergarteners
STEM
Black character
Also available in Spanish



Baby Botanist
Dr. Laura Gehl
Toddlers
Science
Black character



Cassidy and the Mixed Up Numbers
Deid Shepperd
Preschoolers
Math
Black author, Black disability character



STORYBOOK CONVERSATIONS WITH YOUR YOUNG CHILD

CURATED STEM BOOKLIST

Every child is different, and these are only suggested age ranges and books. Do what works best for encouraging the child's independent exploration of STEM concepts.

BABIES & TODDLERS (0 - 2+ YEARS)



Architecture for Babies
Jonathan Litton
Engineering



Baby Code!
Sandra Horning
Technology (CT)



Baby Loves Gravity!
Ruth Spiro
Science
Black character
Also available in Spanish



Baby Loves Structural Engineering!
Ruth Spiro
Engineering



Bear in a Square
Stella Blackstone
Math
Also available in Spanish & French



Bear Shadow
Frank Asch
Science



Circle! Sphere!
Grace Lin
Math
Asian author
Also available in Spanish



Counting Kisses
Karen Katz
Math
Also available in Spanish



Crash! Boom! A Math Tale
Robie H. Harris
Math



Hello, World! Weather
Jill McDonald
Science

STEME

STORYBOOK CONVERSATIONS WITH YOUR YOUNG CHILD

DISABILITY IN STEM

Every child is different, and these are only suggested age ranges and books. Do what works best for encouraging the child's independent exploration of STEM concepts.



Little People Big Dreams
Vagera



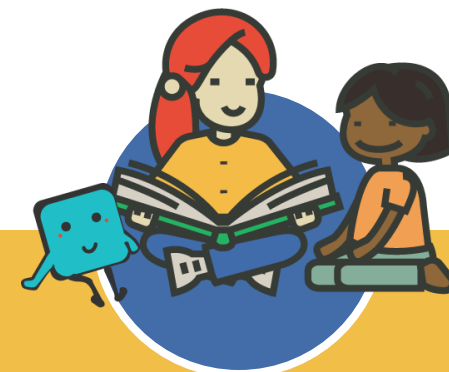
Stay Curious!
Kathleen Krull & Paul Brewer
Preschoolers
STEM innovator
Also available in Spanish & Chinese



The Girl Who Thought in Pictures
Julia Finley Mosca & Daniel Rieley
Kindergarteners
Science & Engineering, STEM innovator



Up Where the Stars Are
Ryan Jacobson
Preschoolers
Science
Disability character



Curated Booklists



Open captions are embedded in the video.



App Store



Google Play



My STEM Adventure App



stemie.fpg.unc.edu



stemie@unc.edu



stemielearningtrajectories.fpg.unc.edu



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