

An Inclusive Approach to Playful Early STEM Learning

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Early Childhood Inclusion Institute



Disclosures & Acknowledgements

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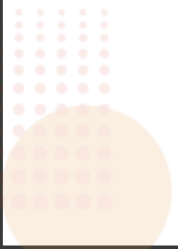


Participants will:

- Describe and identify strategies to foster inclusive and playful STEM learning opportunities for all young children
- Learn about free open-access learning trajectories and resources for planning and implementing inclusive STEM experiences in their classrooms



Handouts and Materials from Today's Presentation



Find the STEM in Your Environment

Find one loose part or object around you. Take a moment to explore and observe the object.

- What do you see, smell, feel, taste (if food)?
- Complete the sentence: "I wonder..."
- How can this be used as a STEM experience for young children?



"Came upon this on a neighborhood walk"



Do you see yourself in STEM?



Children's attitudes about STEM and about themselves as STEM learners are formed early

Early Childhood STEM Working Group, 2017



“Every child deserves to experience the wonder of science and the satisfaction of engineering.”

– National Academy of Sciences, Engineering, and Medicine, 2022

Dignity and Disability



Children with disabilities do not need to be repaired or fixed. Just like all children, they need support to succeed.

All children are entitled to developmentally appropriate materials and exemplary classroom practices that honor each child's strengths and areas of development.

There are no one-size-fits-all practices for children and we must work to understand the strengths and needs of each child and family.

**What Support(s) Did You
Bring to Help You Engage
and Participate Today?**



Presume Competence!

UNC
FRANK PORTER
GRAHAM CHILD
DEVELOPMENT
INSTITUTE

UNIVERSITY of
DENVER
MORGRIEGE COLLEGE OF EDUCATION

STEMiE Fest
INNOVATION FOR INCLUSION IN EARLY EDUCATION

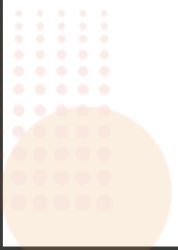
Marsico Institute
FOR EARLY LEARNING

IDEAs
that Work
Office of Special Education Programs
U.S. Department of Education




a child with a
very solid self-esteem.

**Start with
the child**



All About Me Planning Form



ALL ABOUT ME!

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.

My name is _____

I am _____ **years old.**

I speak _____

I live with _____


My personality is _____

My top 5 favorite things:	My top 5 favorite activities:	I am really good at:
1.	1.	1.
2.	2.	2.
3.	3.	3.
4.	4.	4.
5.	5.	5.

I sometimes need help with:	My goals are:

Adapted from: Campbell, P. H., Milbourne, S. A., & Silverman, C. (2001). Strengths-Based Child Portfolios: A Professional Development Activity to Alter Perspectives of Children with Special Needs. *Topics in Early Childhood Special Education, 21*(3), 152-161. <https://doi.org/10.1177/027112140102100303>

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Learning Trajectories



Goal

- **Where are you trying to go?**



Developmental progression

- **Where are children now and what are next levels?**



Instruction/ Teaching

- **How can you get there?**

Create Barrier-Free STEM Opportunities

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

Examples of Material Adaptations

(from *A Guide to
Adaptations*)



magnets or Velcro
wrist bands to pick
up materials

Image Credit: BRIDGES Activities, 2021



cups with handles

Image Credit: Creative Commons



grip tape and/or
tubes to thicken
handles

Image Credit: Creative Commons



deep bowls/plates
for easier scooping

Image Credit: Creative Commons



page fluffers to
space apart pages
of a book for easier
turning

Image Credit: Paths to Literacy, 2018



stabilizers, like
Velcro or rubber
shelf liners, for
activities, puzzles,
and games

Image Credit: Creative Commons



alternative
materials (e.g., soft,
squeezable) to
support grasping

Image Credit: Creative Commons



low-tech materials
(e.g., Velcro on
blocks, tabs,
padded handles for
toys, tools, and
utensils)

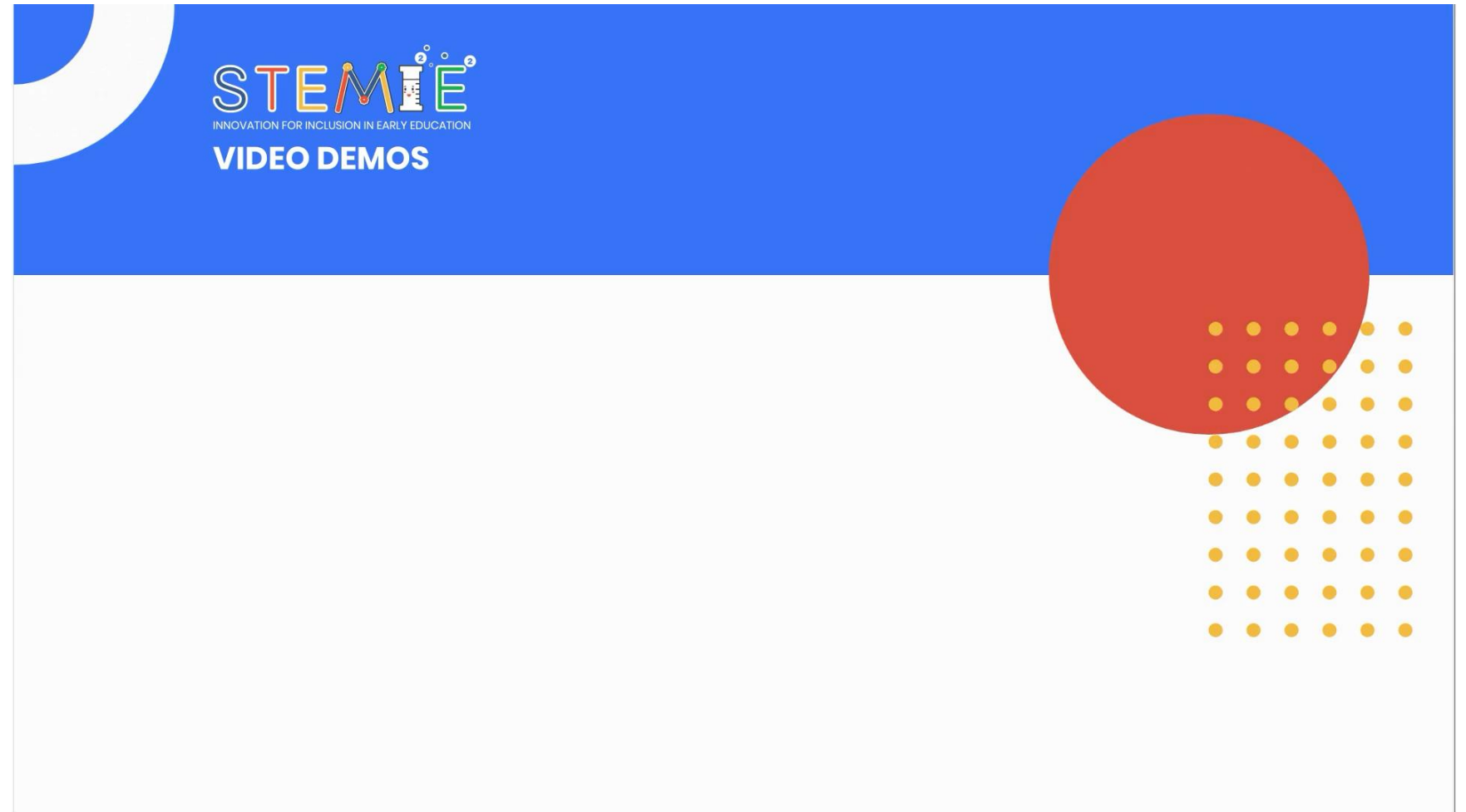
Image Credit: Paths to Literacy, 2018

Embed STEM into Everyday Routines

What you can say, "First, I'm going to lift your legs up, then I'm going to slide the clean diaper right under!"



Embed STEM into Everyday Routines (con'td)



Collaboration

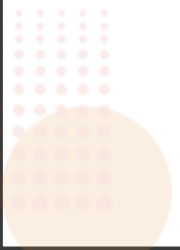
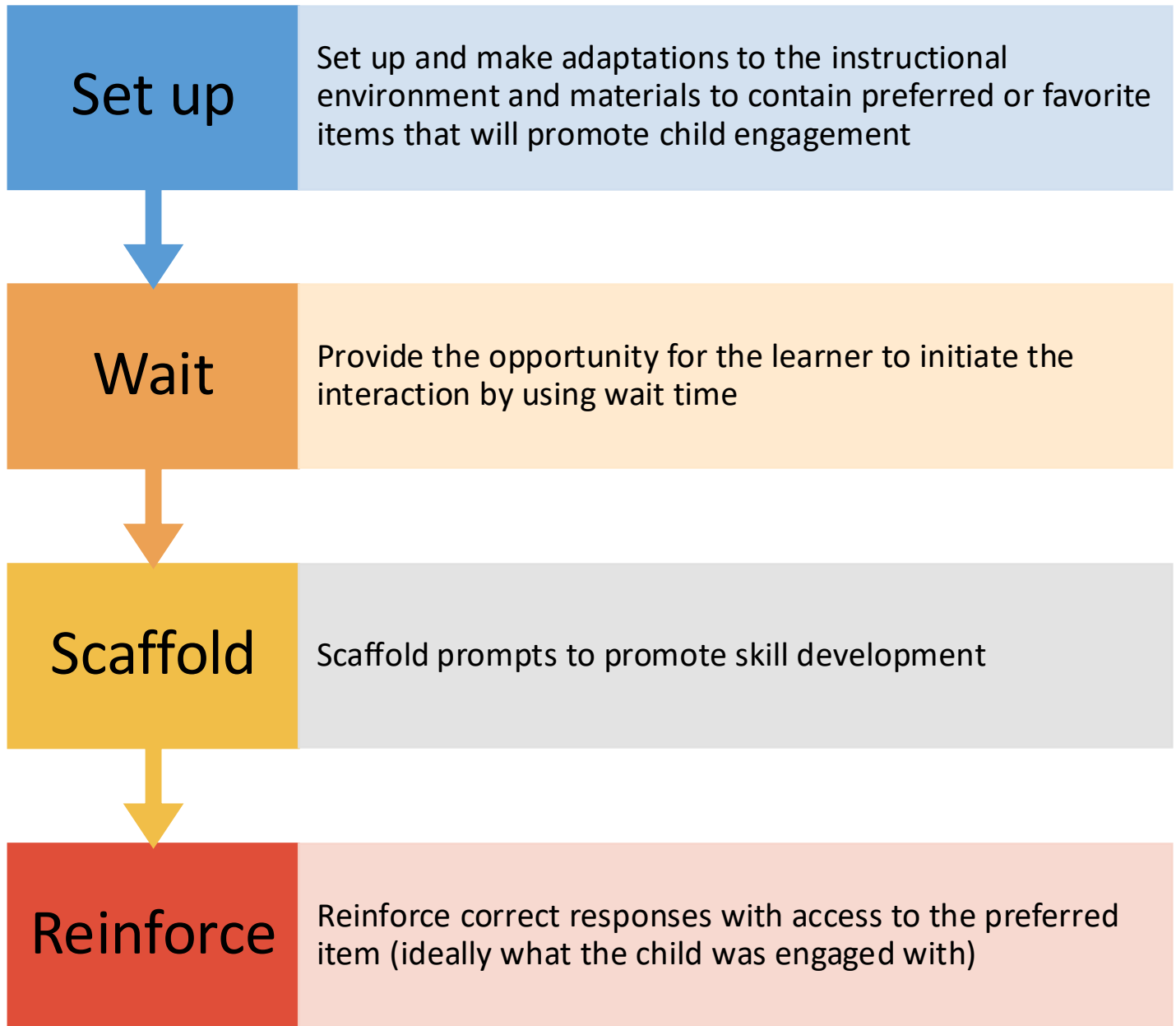


CONNECT

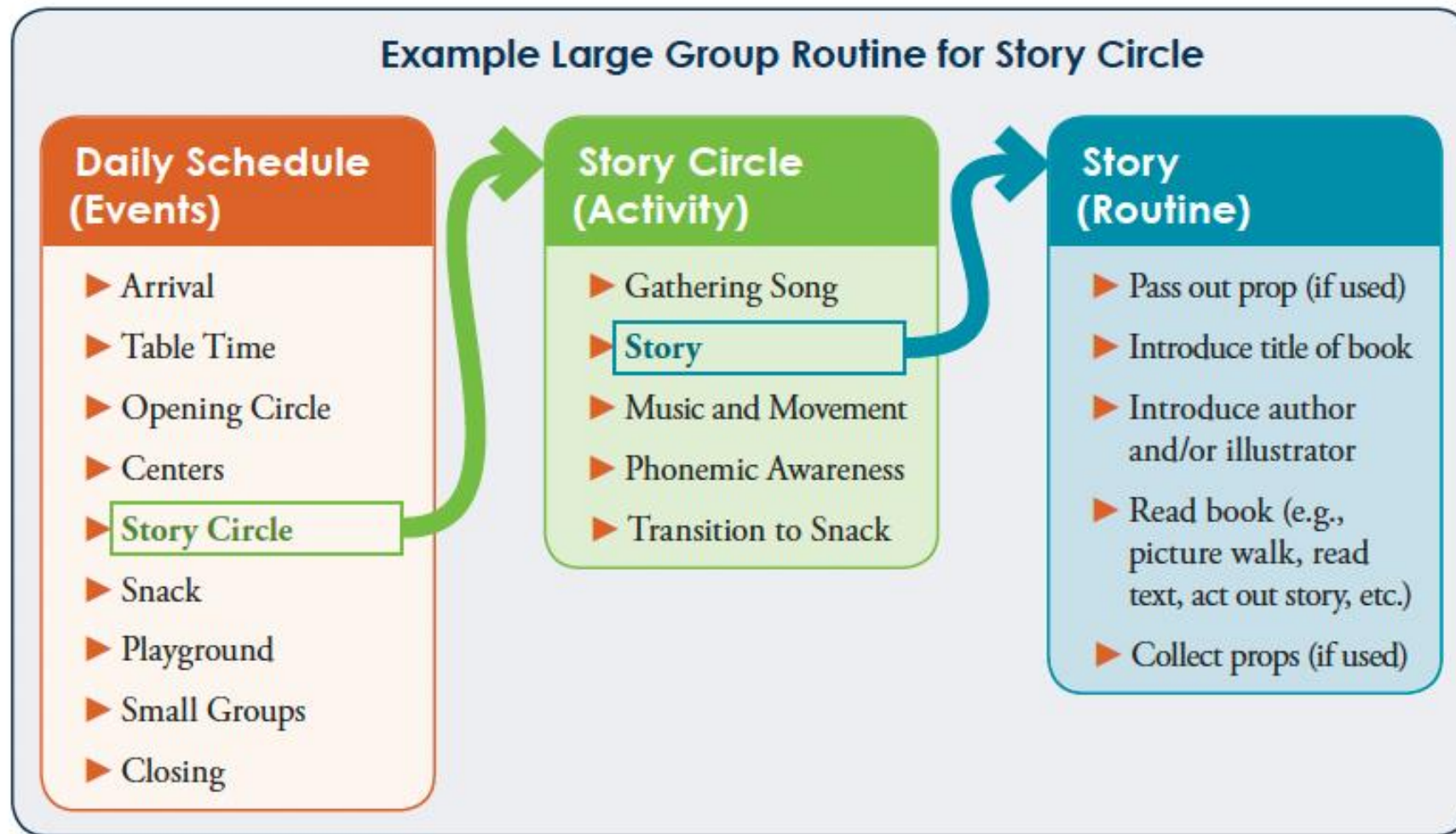
The Center to Mobilize Early Childhood Knowledge



What did we see?



Example Large Group Routine for Story Circle



How Do We Plan?

Routines within routines within routines..



Example Routines³

Routines (Schedule)	Routine within Routine	Routine within Routine with Routine (<i>biggest impact happens at this level</i>)	Embedded Learning Opportunities
Outside/Gym	Transition into Gym/Outside	<ul style="list-style-type: none"> Teacher 1 says "1,2,3,4, open up the door" Teacher 1 holds door and reminds children to go with their buddy to choose a center Teacher 2 goes to the choice board to assist as needed Teacher 1 holds the door until everyone transitions 	Counting Making a choice Social interaction
	Motor Centers	<ul style="list-style-type: none"> Choose with buddy where to play (gross motor, fine motor or sensory center) Timer is set for ~7-10 minutes When timer rings, Teacher 1 "Everyone stop, Hands on top!" Children can stay and play, or say good-bye to buddy 	Making a choice Peer interactions Individual motor/sensory goals
	Free Play	<ul style="list-style-type: none"> Adults engage with children in their zone of gym/outside Use visual choice boards as needed to help children 	Work on individual goals, social interactions (see matrix)
	Transition out of Gym/Outside	<ul style="list-style-type: none"> Transition helper will give a 2 minute notice to peers, verbally or with a visual Teacher 2 will set the timer, then give cue to stop what they are doing and look at teacher Teacher 1 will play the clean up song, both teachers assist with clean up Children stand on a shape to leave, teacher 2 starts song from choice bag 	Peer interaction- tap, say name, interact

Thank you Rise School of Denver for sharing your example

STEMIE Websites

- STEMIE

- Overview of STEMIE, E-learning, blog posts and podcasts, archived STEMIEFest materials

- STEMIE Learning Trajectories

- Using LTs to create and guide inclusive early learning opportunities in S.T.E – links to LT²

- LT₂

- Using LTs to create and guide inclusive early learning opportunities in Math. (requires free account)





Open captions are embedded in the video.



App Store



Google Play



My STEM Adventure App

Go on an “adventure” and create your own adventure book with My STEM Adventure App



First, we found things that were bigger than me
—like this big dog.



And then we found a big box.

STEMIE

FAMILY HOTLINE

PODCAST SERIES



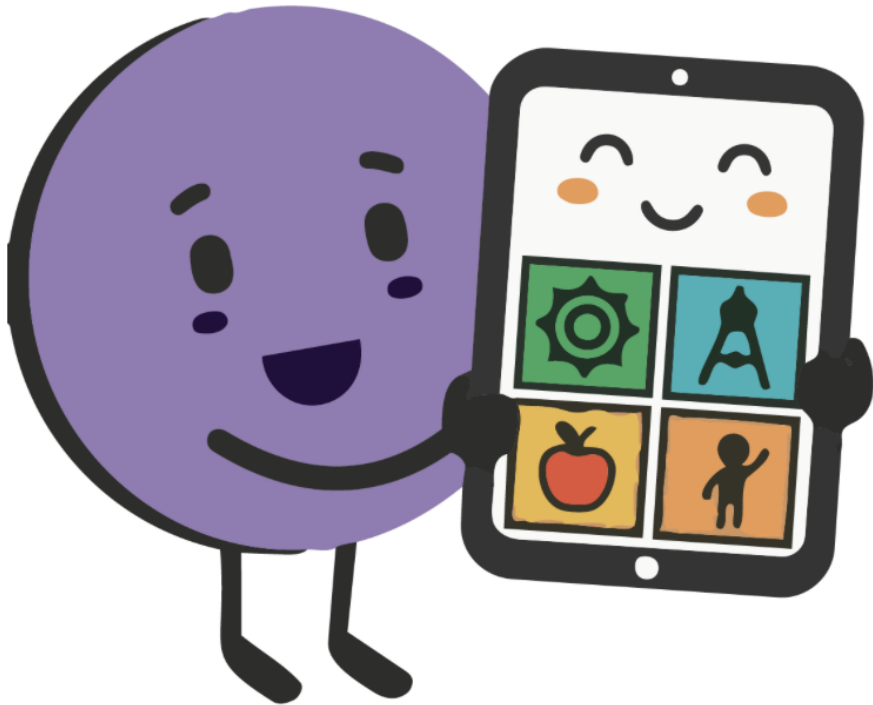
@STEMIEFPG

Building Families' Capacity Through Podcast

<https://stemie.fpg.unc.edu/news-items/family-hotline-podcast-series/>

Visual Supports

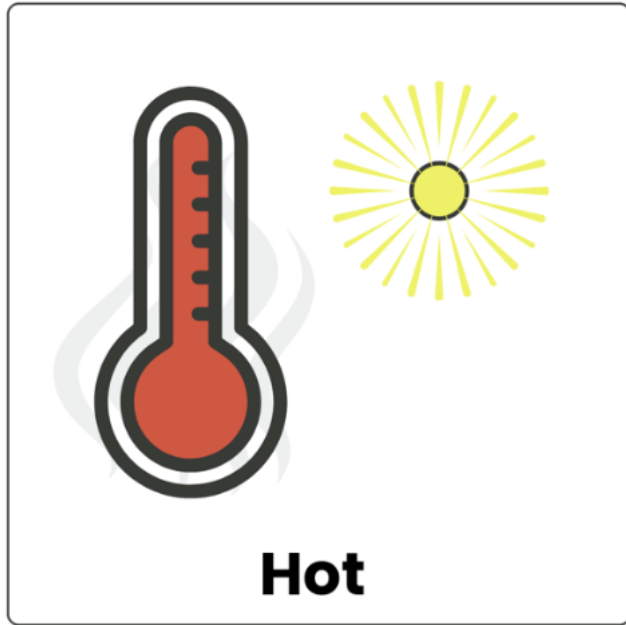
Visual supports help young children understand ideas, build routines, and communicate more effectively by making information exploring early STEM concepts to supporting daily activities, visual cues promote independence and engagement. This collection provides guidance to help families and educators use visual supports in ways that strengthen learning and support all young children.



Visual Cue Library

An online collection of images designed to support communication during playful STEM learning experiences. You can browse, search for visual cues related to STEM concepts and topics or daily routine activities.

[Visual Cue Library](#)



[More Details](#)



+ Add to My Visual Cues

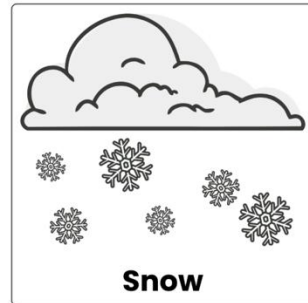
How to Talk About This Term with Young Children

For States of Matter: Encourage children to notice how objects change when heated. What happens to water when boiled? What happens to ice when the temperature warms up and the sun comes out?

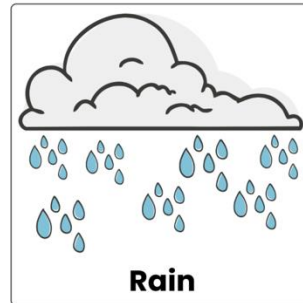
For Weather: Hot weather is when the air temperature is very high. "The weather is so hot today. I'm going to wear shorts and a t-shirt to stay cool."

For Daily Routines: Talk about the temperature of foods or water during daily activities.

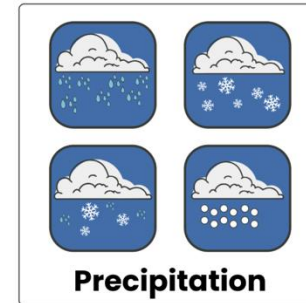
Create your own set of cue cards



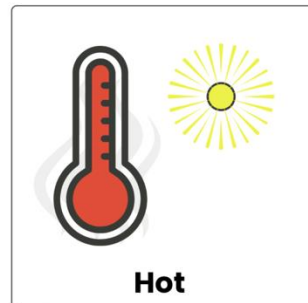
- Remove from My Visual Cues



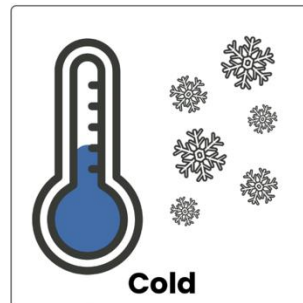
- Remove from My Visual Cues



- Remove from My Visual Cues



- Remove from My Visual Cues



- Remove from My Visual Cues



- Remove from My Visual Cues

Storybook Conversations

STORYBOOK CONVERSATIONS WITH YOUR YOUNG CHILD

Bookmark with Prompts



The Hike is a book written and illustrated by Alison Farrell.



The Hike is a book about three curious and intrepid young explorers enjoying a hike in the woods. They take notes on what they see, look for tracks, collect leaves and twigs, and even get a little bit lost. How will they find their way back?

Do not forget to PEER! Use additional Prompts if needed, Evaluate and Expand your child's answers, and Repeat the prompts.

If you do not have a paper copy of this book, go to <https://www.youtube.com/watch?v=eyrsjFAc1pU> to watch a YouTube video of someone reading the book. If you prefer to read it to your child yourself, just mute the audio.

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. Or find it in a library near you: <https://www.worldcat.org/title/hike/oclc/1158903128>

Look at STEMIE's tips for making adaptations to the storybook reading process https://stemie.fpg.unc.edu/sites/stemie.fpg.unc.edu/files/Dialogic%20Reading_General%20Adaptations.pdf



If you print this page, you can download or view online by scanning the QR code.

Every child is different, and these are only suggested age ranges and activities. Do what works best for your child. Print this page and cut around the edges.

Ages 4+ years	Science
The Hike By Alison Farrell	
C	Complete a sentence Wren, El, and Hattie go on a _____ (hike). Recall
R	How many friends went on the hike? (3) Open-ended questions
O	How are the creek, river, and waterfall different? The same? WH questions
W	What does the steller jay say? (shook shook) Distancing questions
D	What do you like to bring along on a hike? What do you like to collect?
STEM Words & Ideas to Explore	
<ul style="list-style-type: none"> • Earth Science-Properties (Liquid, Solid) • Nature Science (Animals, Plants, and the Environment) • Classify, Sort, Observe, Record 	
 stemie.fpg.unc.edu	

STORYBOOK CONVERSATIONS WITH YOUR YOUNG CHILD

Visual Cues:

The Hike

by Alison Farrell



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

HOW TO:

Step 1: Print and cut out the images. You can also create your own visual cues (empty squares included).

Step 2: As you read, use tape or Velcro to attach the pictures to the corresponding pages in the book.



Climb



Stick



Help



Snail



Chipmunk



Blue jay

STORYBOOK CONVERSATIONS WITH YOUR YOUNG CHILD

Adaptations:

The Hike

by Alison Farrell



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

SUPPORT CHILDREN WITH VISUAL IMPAIRMENT/DEAF-BLINDNESS/MULTIPLE DISABILITIES:

STORY BOX

- Selecting corresponding items from the story and put them in a box. Items might include leaves, pine boughs, snail shells, pinecones, small rocks, etc.



Image credit: Puhut

This adaptation can also...

- Increase children's attention and engagement
- Support children with sensory challenges

STORYBOOK CONVERSATIONS WITH YOUR YOUNG CHILD

STEM Building Activities



Earth science: Properties

Take a hike of your own and complete a nature scavenger hunt!

Ask:

<https://stemie.fpg.unc.edu/sites/stemie.fpg.unc.edu/files/Outdoor%20-%20Preschoolers.pdf>

- "What happens if we add water to the soil/dirt?"
- "How can we place a big rock on top of a small rock without it tipping over?"
- "How are rocks and mud different? Similar? What about leaves and pine needles? Puddles and creeks?"



A cairn is a mode of pathfinding that hikers use when above the tree line, using stacks of rocks for hikers to follow trails.

Try the following investigations with rocks:


- Look for a variety of smooth, rough, round, pointy, large, and small rocks to balance with and make a cairn (tower of rocks used to help hikers find the trail above the tree line)
- Explore the purpose and history of rock cairns while hiking with the following link: <https://www.nps.gov/articles/rockcairns.htm>
- Look out for others' cairns as a wayfinding tool the next time you are on a hike!





Storybook Bookmark Examples

Ages 0-2 **Science**


Mouse Paint
By Ellen Stoll Walsh

 **Point to pictures**

 **Be Expressive**


Model correct answers
 **"What color is that mouse? Blue!"**

W **"What color is the mouse making?"**

Do not rush
 **Wait for a response after comment or question**

STEM Words & Ideas to Explore

- Colors
- Mixing and Recipes


INNOVATION FOR INCLUSION IN EARLY EDUCATION
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Ages 4-8 **Math**

Ten Black Dots
By Donald Crews

C Complete a sentence
"Four dots can make seeds from which _____(flowers) grow?" (4 dots page)


R Recall
"How many dots can make the eyes of a fox?" (two dots page)


O Open-ended questions
"What do you think will happen if we shake the branch?" (10 dots page)

W WH questions
"What is the shape of the dot?"

D Distancing questions
"What else could you make from four black dots?"

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INNOVATION FOR INCLUSION IN EARLY EDUCATION



STEMMIE Fest

INNOVATION FOR INCLUSION IN EARLY EDUCATION

Join Us Virtually: November 9-10, 12-4 pm EST



In Summary

- Be curious
- Presume competence
- Be intentional
- Everyone needs support



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<https://www.youtube.com/@stemiiee>



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STAY CONNECTED TO STEMIE!



The content in this slide deck included work or adaptations of the work that was developed by Megan Vinh, Chih-Ing Lim, Christine Harradine, Jessica Amsbary, Hsiu-wen Yang, Doug Clements, Julie Sarama, Pip Campbell, Elica Sharifnia