

Promoting Inclusion in STEM for Young Children with Disabilities

November 10, 2020

Presenters: Chih-Ing Lim, Tracey West, Hsiu-Wen Yang, Jessica Amsbary, Megan Vinh









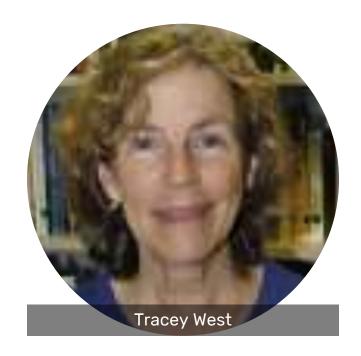




Welcome & Introductions









Meet the Team





Meet the Presenters from STEMIE

Chih-Ing Lim



Tracey West

Megan Vinh

Hsiu-Wen Yang

Jessica Amsbary

SCRIPT-NC Webinars emphasize



embedding inclusion and diversity into coursework



content that reflects evidence-based and recommended practices



opportunities to build both knowledge acquisition and knowledge application



resources that are **readily** available and free





Logistics



Remember to mute your audio



SCRIPT-NC



Webinar Handouts

https://scriptnc.fpg.unc.edu/scriptnc-webinar-early-stem-learning







SCRIPT-NC Webinar: STEM learning for each and every child Presented by staff from the STEM Innovation for Inclusion in Early Education November 10, 2020 References and Resources

General activities/assignments

1-1-

Resources

- SCRIPT-NC Website Resource search Annotated collection of free, downloadable resources is searchable by topic, resource type, type of diversity, etc. (Note: you may select "STEM" to filter the STEM-related resources): https://scriptnc.fpg.unc.edu/resource-search
- 2. **Personas** are short snapshots of individual children, which provide information about the configuration of the child's family, offer insights about the child's likes or interests, and share information about the child as a learner. There are three sets of personas available: infant/ toddler, preschool, and K-Grade 3. The children reflect different learning needs: children who are dual language learners, have identified disabilities, live in challenging conditions, have experienced trauma, and are racially/ethnically/culturally diverse: https://scriptnc.fpg.unc.edu/shifting-blackboards

From STEMIE:

- 3. STEMIE Mythbuster series: https://stem4ec.ning.com/blog/Mythbuster
- STEMIEFest Media Cubbies includes some great resources related to STEM developed by some of our amazing partners: https://stemie.fpg.unc.edu/stemiefest Resources that you might be interested in include:
 - a. Joan Ganz Cooney Center's STEMIEFest Media Cubbic includes blog posts and reports that advocate for, and make recommendations for early STEM learning for young children: https://stemie.fpg.unc.edu/stemiefest/the-joan-ganz-cooney-center-at-sesame-workshop
 - b. Early EduAlliance and Cultivate Learning at the U of Washingon shared several resources on how educators can incorporate STEM in their daily plans and how to modify activities to increase children's engagement and learning: https://stemie.fpg.unc.edu/stemiefest/early-edu-alliance
 - c. National Center for Early Childhood Teaching and Learning: https://stemie.fpg.unc.edu/stemiefest/ncecdt/





Webinar Objectives

1

2

3

Participants will learn about the work of STEMIE

Participants will be able to understand why it is important for young children with and without disabilities to engage in STEM learning

Participants will be able to apply how to embed STEM learning into different courses.



Myths

- STEM is only for older students or gifted children, and it is too difficult for young children or children with disabilities to understand.
- Language and Literacy skills are more important than STEM knowledge and skills
- STEM learning is too expensive
- Children don't need adult guidance in play (or learning)



Agenda

- Overview of STEM Innovation for Inclusion in Early Education center (STEMIE): Who we are, why this work is important, what we do
- Examples of embedding STEM content into different college courses and inservice PD opportunities
- What's next for you from STEMIE:
 - New STEMIE resources
 - How you can continue to engage with our work so that we can support you!



STEM Jam: How to?

Option 1: Type the link into your

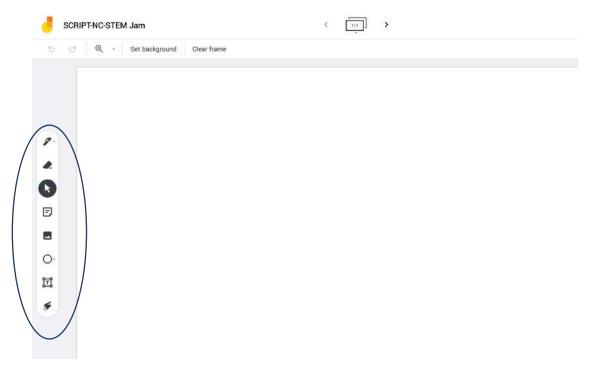
browser: https://tinyurl.com/stem-

<u>jam</u>

Option 2: If you already have the Jamboard app on your phone, scan the QR code to get on Jamboard



Once in, begin adding comments, ideas and thoughts throughout the presentation





Quick Polls Via Zoom

- Comfort addressing early STEM content
- Incorporates STEM learning into coursework and practica/TA and inservice PD? What courses/PD opportunities (in chatbox)?
- Heard of STEMIE?



Who is STEMIE?

UNC FPG Child Development Institute

Megan Vinh Chih-Ing Lim **Tracey West** Ann Sam Adam Holland **Christine Harradine** Kellen Reid **Victoria Waters Wendy Morgan** Julie Chin Jessica Amsbary Hsiu-Wen Yang **Andrea Ross Lindsay Holland** Lisa Levin **Peggy Hensley Amy Crume** Daniel Van Ark

Marsico Institute, University of Denver

Doug Clements Crystal Day-Hess Shannon Stark-Guss Becky Chance





Public Health Management

Pip Campbell



UNC School of Education

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Consultants

Christine Cunningham, Penn State
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Charlene Czerniak, University of Toledo
Cindy Hoisington, EDC
Daryl Greenfield, University of Miami
Yvette Mere-Cook, Boise State University
Susan Sandall, University of Washington

OSEP Project Officer

Tracie Dickson



Chabely Figuereo, Poojha Palle, Hyejung Hwang, Maryanne Peters Onyekachukwue, Rakeb Asres (2020/2021 Work-study students)



Center Outcome





Young children with disabilities participate and benefit from high quality STEM teaching and learning.



Why This Work is Important.















What We Do

















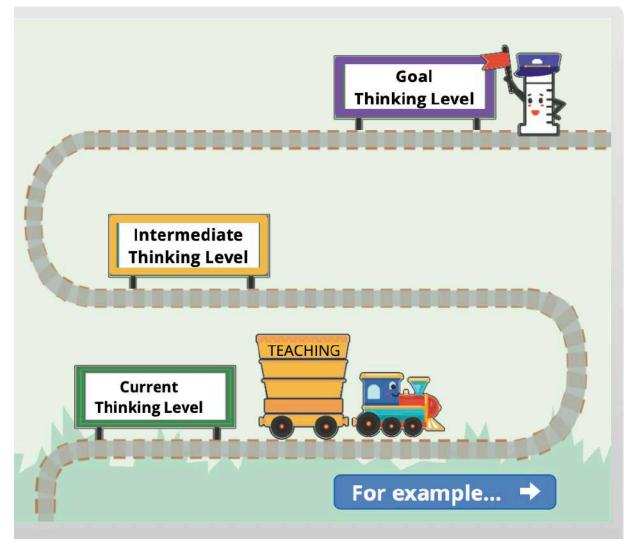


Learning trajectories

Goal: Where do you want your kids to go?

Developmental Progression: Where is the child now?

Instructional
Strategies/Teaching:
What can practitioners and
caregivers do?





Inclusion in Learning Trajectories

Environment, activities, and

routines

For example, room set-up, equipment, how an activity is done, length of time)



Materials

For example, modifications to toys, materials, AT devices)



Instruction

For example, adding information, reducing steps



STEP 03

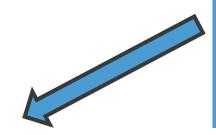
STEP

Embedding inclusion into learning trajectories



Goal

Developmental Progression



Instructional Tasks:

Adult practices used to individualize STEM activities within the daily routine and environment

Environment, activities, and routines

STEP



Materials

For example, modifications to toys, materials, AT devices)



Instruction

For example, adding information, reducing steps

For example, room set-up, equipment, how an activity is done, length of time)

STEP

02

03

STEP



STEM can be incorporated into different courses!

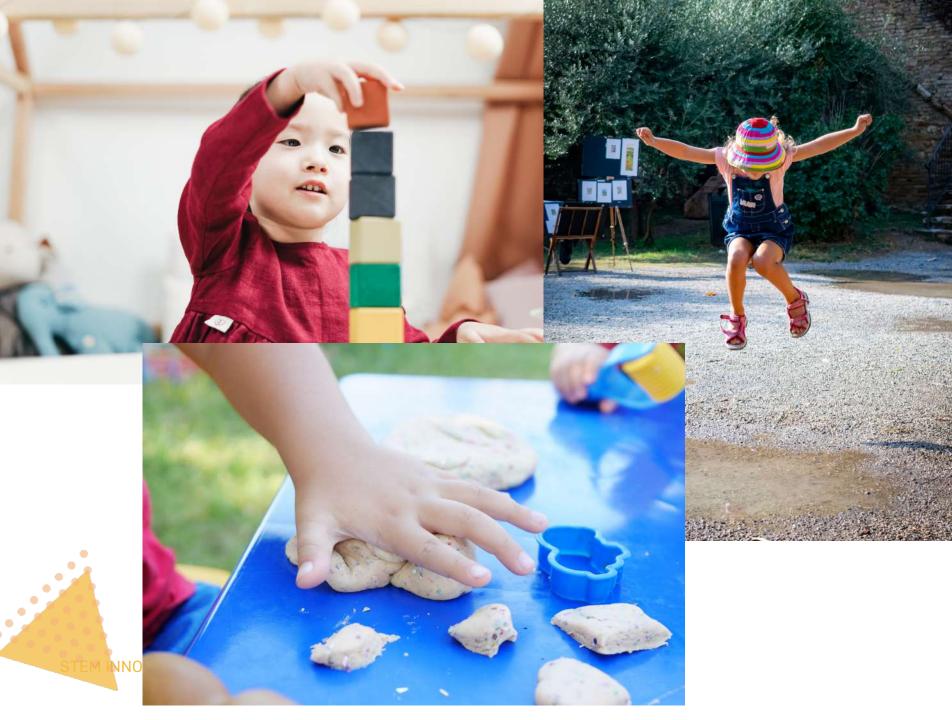


Child Development course





How do children



STEM learning is appropriate for young children!

High quality STEM experiences:

Provide a context for implementing best practices for teaching and learning

Draw upon children's curiosity about how their world works

Encourage children to be engaged and motivated to learn

Involve a "hands-on/minds-on, goal- directed collaborative approach"

Promote higher-order thinking skills

Promote learning across multiple domains

Source: Greenfield, D. (2017)





What is your role in STEM learning?



Children's role

- Piaget: Development occurs internally through children's active engagement with the world around them
- Vygotsky: "Zone of proximal development"

Adult's role

- Provide child with stimulating environment to explore
- Adults scaffold children into a "zone of proximal development"



1. Review Strategies to Support Young Children With and Without Disabilities in STEM

- (i) Review the microlesson on learning trajectories: https://stemie.fpg.unc.edu/our-work/learning-trajectories
- (ii) Review additional information about Ms. Amy's class and Shawntell:

Ms. Amy's class is a group of children from diverse backgrounds with varied interests. Many of the children are currently interested in Duplos and splashing about at the water table. Almost all the children love storytime. Shawntell enjoys playing with her brother, Ty at home, and the other children in the class. She can count up to five and knows the words related to quantity such as 'more, less, big, small'. She loves baby dolls and enjoys putting her baby dolls in the houses that her brother, Ty builds. She also enjoys splashing at the water table with other children, and at home, she enjoys taking baths, and 'helping' with washing up dishes. She does not speak in sentences and uses a communication board/visual cues to communicate and is working on turning pages in a board book and grasping objects.

- (i) Register for a free account https://learningtrajectories.org. Once you are in, select 'Explore Learning Trajectories'. If desired, you may select Alignment tool (on left side of screen, in green) to review the trajectories by age.
- Use the learning trajectories to identify Shawntell's current thinking level on counting and measurement (volume).
 Compare that to what some of Shawntell's 3-year old peers may be at.



Language and literacy course



How does reading storybooks support children's STEM development?



STEM-related books

- Small group discussion and share back
 - Do you have a favorite children's book that is STEM related?
 - Why is it a favorite?
 - What STEM topics/concepts are included in the book? For example:
 - The Very Hungry Caterpillar: number, counting, size

Curated STEMIE Book List

STORYBOOK CONVERSATIONS WITH YOUR YOUNG CHILD

Recommended Books



SCIENCE:

These award-winning books embrace every day science ideas accurately and have lots of engaging illustrations and photos to talk about with your young children. You may want to explore other books by the authors listed here – their other titles are often just as good!

The ages are only SUGGESTED guidelines! For example, many books in the "babies and toddlers" category may be loved by older children. If you need to adapt the reading process to match the needs of your child, please see STEMIE's adaptations resource: https://stemie.fpg.unc.edu/dialogicreading-general-adaptations.

Click on the images of the book covers to visit videos of an adult reading aloud each book. Check your local library for digital book lending or this free online digital library: https://archive.org/. You could also mute the audio from the read-aloud video if you prefer to read the book to your child yourself and do not have a copy.

BABIES AND TODDLERS:



The Snowy Day
by Ezra Jack Keats



Mr. Brown Can Moo! Can You? Dr. Seuss's Book of Wonderful Noises by Dr. Seuss



Hello World! Solar System by Jill McDonald



Moo Baa La La La by Sandra Boynton





FRANK PORTER GRAHAM
CHILD DEVELOPMENT INSTITUTE





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OUTREACH- LANGUAGE IS CRITICAL

Storybook Conversations Series

Curated STEMIE book lists

Storybook Reading bookmarks

- On-line book availability
- Video links to adults reading the books
- Bookmarks with suggested prompts

Suggestions for adaptations to the reading process



WHAT ADULTS CAN DO?

STORYBOOK CONVERSATIONS WITH YOUR YOUNG CHILD

Dialogic Reading Guide



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

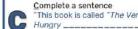
Use this reading time as an opportunity for building concepts through conversations! Your child can help you tell part of the story. You can use digital books on screen or with regular paper or board books. This is called dialogic reading. It is easy! And we have some tips to help you do it! What Works Clearinghouse Intervention: DialogicReading

https://ies.ed.gov/ncee/wwc/Docs/InterventionReports/WWC_Dialogic_Reading_020807.pdf

The Very Caterpil is a book written by Eric Carle



Prompt Examples:





"What happens to the caterpillar at the end of the





WH questions "Why do you think the caterpillar needed so much food?" "What is the caterpillar going to eat next?"

Distancing questions "How would you feel if you ate what the caterpillar ate?"

STEP ONE

You and your child select a book. Look for a book that appeals to your child and has lots of detailed pictures to give you things to talk about. Encourage your child to turn the pages or operate the screen. Let's use The Very Hungry Caterpillar by Eric Carle as an example.

For tips on picking appropriate books, see this

If you don't have a paper copy of the book, click here to view a digital version.

STEP TWO

PEER: Prompt, Evaluate, Expand, & Repeat

P: Prompt your child with questions. Use the acronym CROWD to remember ways to prompt your child. Examples on the left,

E: Evaluate your child's answers by responding to what the child said. Praise and encourage. "Yes, you're right! This book is about a hungry

caterpillar."

E: Expand your child's answers. Ask another question or help the child remember additional related details.

"Where did we see a caterpillar yesterday?" R: Repeat. Repeat or revisit the prompt you started with, encouraging your child to use any new information or words you've provided. "Can you say caterpillar?"

Recall and Distancing work best with older

STORYBOOK CONVERSATIONS WITH YOUR YOUNG CHILD

General Adaptations



SUPPORT CHILDREN WHO ARE LEARNING TO **MANIPULATE:**

PAGE TURNERS



Use things around you house, such as small pieces of felt, popsicle sticks, empty daily contact lens cups, or big paper clips to place on sides of book pages.

Learn more:

Easy Picture Adaptations

This adaptation can also...

- ø Increase children's attention and engagement
- Support alternative ways of communication
- Support children's learning

STEMPE

stemie.fpg.unc.edu

STORYBOOK CONVERSATIONS WITH YOUR YOUNG CHILD

STEM Building Activities STE/.\I



Patterns:

Take a walk around the neighborhood and talk about the patterns you see in the cars, plants, clouds, and buildings.









Make patterns out of blocks, crayons, or even snack items as you play (or eat)! Encourage your child to replicate patterns you make and then switch and let your child start the pattern.

Discuss patterns on your clothing as you're getting dressed in the morning. "Oh, I see you have on a blue and white BUTTERFLY patterned shirt this morning." Or "You're looking at the blue and white STRIPES on Daddy's pajamas."



STEMBE

MUNC FRANK PORTER GRAHAM
CHILD DEVELOPMENT INSTITUTE



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Use of Personas







- Winston is very strong in learning about dinosaurs and incorporating "his favorite" T-Rex in his learning and social environment.
- His mother is a strong advocate for literacy by which books are read to him daily. Winston has evolved in his reading by identifying objects, some words, and talking about the images he sees in the books. The concern his parents have is finding images in books that look like him.
- Winston's parents are concerned that he does not speak as clearly about other concepts outside of dinosaurs and nature.
- He is well versed in the alphabets, numbers to twenty, colors, shapes, opposites and some aspects of the earth such as differences in night and day, cold and hot.



Activity/Assignment

- Read the personas
- Select STEM-related books
- List STEM topics/concepts
- Plan dialogic reading strategies
 - Small group discussion and share back
 - Padlet/google doc/Jamboard
 - Flipgrid

Handout 6.3



Title:		
Author:	Illustrator:	
build upon children's langua	reach category for your book that you can use to ge during dialogic reading. Include the page nun te opportunity to use each prompt.	
	rates an incomplete sentence to prompt the child be (i.e. fill-in-the-blank). (Ex: Lily's purse is	
story. (Ex: What happened v	uestion designed to help children remember key when Jose went back to school? What was miss id Stephanie wear her hair?)	
describe part of the story in t	sks a question or makes a statement that require their own words beyond just a "yes" or "no" respo ling in this picture. How is Josie going to carry a	onse. (Ex: Tell
	asks a question about the story that begins with ou think shy means? What does it mean to be e	
story to those that occur in the	os children make connections between events th neir own lives. (Ex: Tell me about a time when yo feel when your friend moved away?)	
ost something, now ald you		

CONNECT - 2011

https://www.connectmodules.dec-sped.c

Page

STEM in the classroom: Water

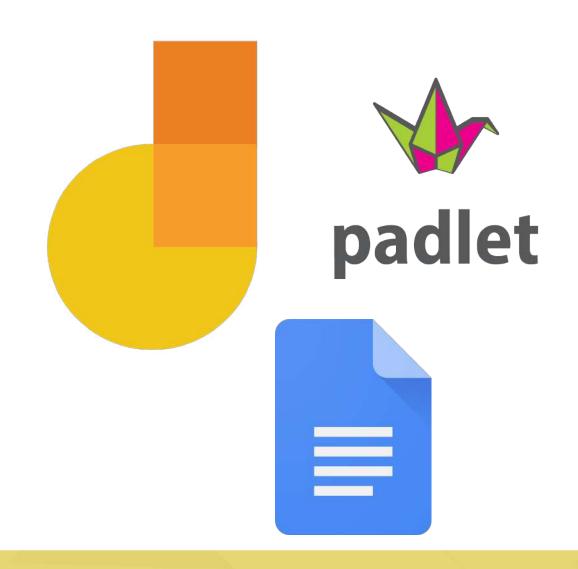
Source Credit: Recommended Practice Module





Additional STEM talk

- Google doc
- Jamboard
- Padlet





Infants and Toddlers Course



True or false: STEM is only for older students or gifted children, and it is too difficult for young children to understand

https://stem4ec.ning.com/blog/Mythbuster

STEM Opportunities Can Be Incorporated into Everyday Routines and Activities





EXPLORING NATURE

Challenge:

You have the opportunity to take a small group of toddlers for a nature walk on a beautiful sunny day.

How many math and science concepts will you be able to teach using only the naturally occurring materials you find on your walk?





STEM at home: Outdoor Exploration

Source Credit: Recommended Practice Module







Exceptional children course

Recall: Inclusion in Learning Trajectories



Environment, activities, and

routines

For example, room set-up, equipment, how an activity is done, length of time)



Materials

STEP

STEP

For example, modifications to toys, materials, AT devices)



Instruction

For example, adding information, reducing steps



Scenario to consider:

Ms. Amy is a preschool teacher in a community childcare program. She works hard at ensuring children have school readiness skills by the time they leave her program. She offers a lot of opportunity for free play but also provides some teacher-directed activities such as storybook reading. She provides free play activities such as housekeeping, blocks, and a water table. Her director wants her to incorporate STEM into the curriculum but Ms. Amy doesn't know how. She and her assistant teacher, Ms. Li have a class of twenty children, including three-year old Shawntell, a joyful and curious child who has Down syndrome. Shawntell's parents, and older brother Ty are always eager to learn how they can support her to achieve her full potential. Her older brother Ty for example loves science and building, and the family told Ms. Amy that Shawntell is always interested in what he is doing.

Shawntell attends Ms. Amy's class each day, where she receives her services. Delays have been identified in all domains of development. Her speech- language pathologist is working with Ms. Amy, and family to support Shawntell's early speech and language development.

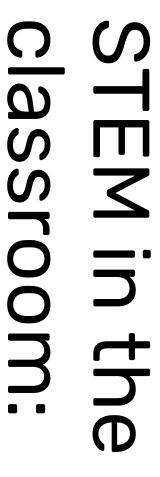


CONNECT

The Center to Mobilize Early Childhood Knowledge

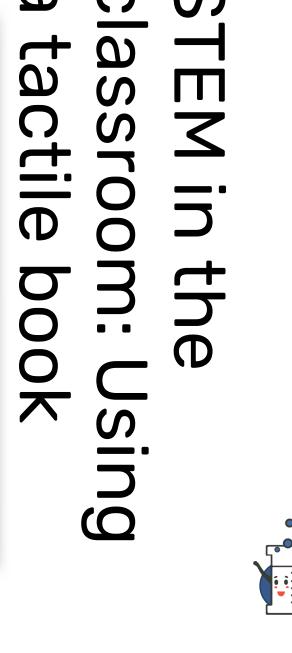


https://www.connectmodules.dec-sped.org/connectmodules/resources/videos/video-1-9/









S S



Ed. Technology course

What about Computational Thinking?



Why Computational Thinking?

- Technology use increasing
- CT foundational skills prepare learners for life
- Links to success in academics
- Problem solving critical skill

Committee on STEM Education, 2018



What is Computational Thinking?

"a set of processes that defines a problem, breaks it down into components, and develops models to solve the problem, then evaluates the result, iterates changes, and does it again" (Committee on STEM Education, 2018)

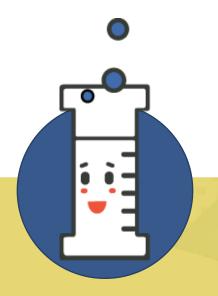
- Sequencing
- Repetition/looping
- Abstractions/conditionals
- Decomposition
- Debugging

Clements et al. (In preparation)



Daily activities

- Cooking
- Reading
- Building
- Maps
- Dressing
- Transitions



Ice Cream Cone Algorithm



Alaina



Alaina is a 4-year-old girl who lives with her mom, dad, and little brother. Alaina was born with bilateral, sensorineural, severe-profound hearing loss. This means she is deaf in both ears. At the age of 10 months, Alaina received cochlear implants which enable her to hear. Alaina and her parents were enrolled in their state's Early Intervention program from the time she was born to the age of three. Now Alaina receives early childhood special education services in an inclusive classroom with her peers. Her inclusion is supported through services she and her teacher receive from a Teacher of the Deaf/Hard of Hearing (TOD) and a Speech-Language Pathologist (SLP).

Alaina loves to play and is very social with her peers. She plays with all the children in her classes but also has special friends who she prefers. Her interests include play-doh, baby dolls, playing chase games outside, and anything pink! Alaina

is interested in books and has the attention to listen to long stories but sometimes has a hard time remembering all the details.

Often, because Alaina is very socially competent, it can be difficult to notice when Alaina is struggling in the daily classroom routines. She is able to follow other children's lead when she doesn't hear the directions or can't understand what is being said. Sometimes Alaina struggles to follow step by step instructions. Alaina's expressive language is very good but she sometimes is missing the beginnings or ends of words – especially softer sounds. In addition, it is difficult for Alaina to learn new words quickly.

Child Activity Matrix

Child: Teacher:	mom	Date:	
Child: reacher:	<u>mom</u>	Date:	

Learning Goals

- Child will recognize and create patterns and explain how a symbol can stand for something else
- 2. Child will put steps together in the correct order to carry out a task

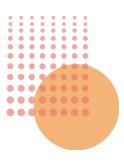
Daily Schedule	Learning Activities Addressing Goal #1	Learning Activities Addressing Goal #2
Playtime	 Designate blocks or familiar objects to stand for simple movements, sounds, or actions. Develop "codebook" or simple means to remember designations Put together blocks or objects to carry out a sequence 	 Discuss simple first then activities in play Talk about the order of things as you play Encourage child to explain steps of common play activities or pretend play scenarios
Meal and snack time	Talk about differences and similarities in foods and snacks Create patterns and sequences with foods such as fruit loops Make choices about what to eat in what order	 Explain how to follow steps to "cook" something Ask the child to help develop step-by-step cooking activities to make a favorite food (i.e. sandwich, bowl of cereal with milk, ice cream cone) Follow "recipes" with measurements and mixing steps together
Outings & transitions	 While out in the community, point the child to recognize patterns Ask child if they can find any sequences or patterns Talk about simple symbols and signs in the environment 	 Explain steps needed in order to transition to leaving the house for an outing Facilitate creation of first-then activities involved in outings and transitions

Adapted from: Sandall, S. R., & Swartz, I. S. (2008). Building blocks for teaching preschoolers with special needs. Baltimore: Brookes.

Video Example

(Insert Toni's Video here)







Let's Reframe It!

Statement	Reframe
I can't teach STEM because I am really bad at math and science	
Infants and toddlers are too young to learn STEM	
Children with disabilities are not able to do STEM activities	
Literacy is entirely separate from STEM	
Computational thinking concepts are too advanced for young children	
Girls don't like STEM	

Coming up: Help us to help you

- Early childhood / early childhood special education faculty and PD providers national survey on STEM
- Future collaboration around reviewing and piloting Elearning resources



Coming soon:



Archived sessions: Short 15-minute minipresentations

Video demonstrations of practice



Find all the materials from today's webinar here

https://scriptnc.fpg.unc.edu/script-nc-webinar-early-stemlearning





https://scriptnc.fpg.unc.edu



Using Technology to Build and Sustain Relationships with Students, Children, and Families Tuesday, March 2, 2021, 2:00 – 3:30 PM EST

Many programs have shifted to hybrid or online teaching models for the foreseeable future. This presents unique opportunities for fostering relationships and building community that are different from those in the face-to-face classroom. Similarly, students need a new repertoire of tools and strategies for building meaningful connections with both children and families. This session will provide strategies for supporting three technology-assisted capabilities: 1) organizing online classes; 2) cultivating instructor-student and student-student relationships; and 3) preparing students to use technology effectively to support children and engage families. Strategies suitable for both synchronous and asynchronous environments will be shared. Presenter: Danielle Savory Seggerson (Lansing Community College, Michigan)

Register Now: https://tinyurl.com/script-tech



Explicit and Intentional: Building Emphasis on Culture, Race, and Equity into Early Childhood College Courses

Tuesday, April 20, 2021 2:00 - 3:00 PM EST

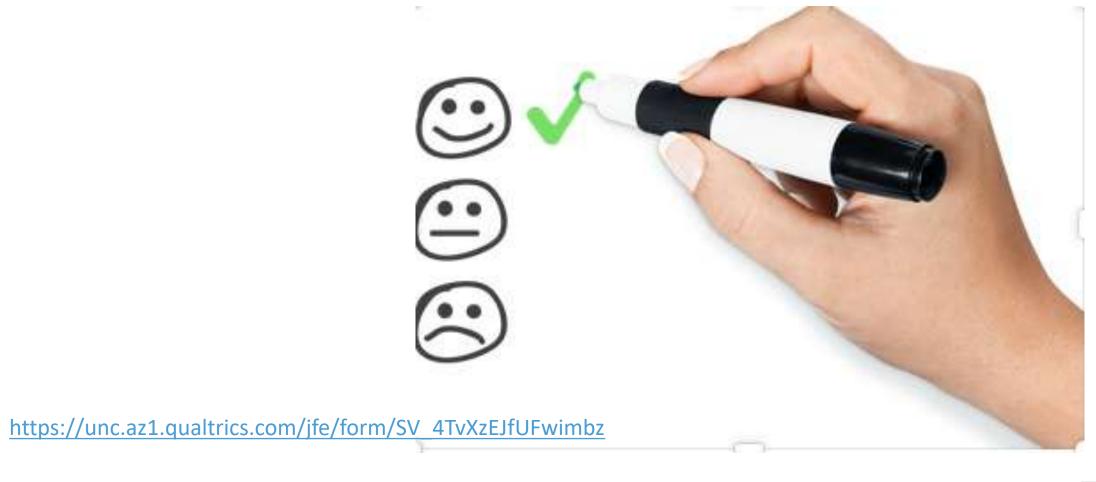
Explicit emphasis related to supporting the full and equitable potential of children who are diverse in terms of culture, race, language, ability, opportunity, and life circumstances is now called for by national publications, standards, competencies, and position statements. The challenge for early childhood instructors is how to authentically and intentionally infuse new evidence and practices in courses and field experiences. This session will highlight effective strategies for taking action to address culture, race, and equity as part of activities, experiences, and assignments.

Presenters: Cathy Collie-Robinson and Marye Vance (Durham Technical Community College, North Carolina) and the SCRIPT-NC team

Register Now: https://tinyurl.com/script-equity



Give Us Your Feedback





Questions?