

## STEAM PRESENTER NOTES

This guide walks you through presenting the STEAM in-service suite. This in-service suite includes PowerPoint slides and supporting materials. The main PowerPoint presentation and optional slides were developed for all professional audiences (teachers, home visitors, family child care providers). Additionally, separate PowerPoint slides were developed for use with home visitors. Learning activities, tip sheets, and activity sheets are labeled for their intended audiences.

### MATERIALS NEEDED

- Projector and audio equipment
- Flip chart or similar large paper and markers for writing participant ideas

### BEFORE YOU BEGIN

- This presentation describes how children naturally engage in inquiry, reasoning, and problem solving every day. It provides strategies that support children’s STEAM skills and thinking.
  - In the presentation, you will describe the STEAM components and how they share a common approach and focus. Then discuss ways to foster STEAM skills by providing engaging environments, nurturing, responsive, effective interactions, and learning experiences/activities.
  - The presentation includes video clips that illustrate teachers fostering STEAM skills and thinking and children engaged in STEAM thinking as they play. Although most of the videos are teacher examples, home visitors can watch the strategies and use them for their own professional development and to encourage families to replicate.
  - Optional learning activities offer participants opportunities to understand how adults and children naturally use STEAM every day and to practice thinking about strategies to support STEAM skills and thinking.
- Adaptation boxes are labeled throughout the presentation to individualize this training for your specific training group.

### LIST OF AVAILABLE CONTENT

#### HANDOUTS

- STEAM Stretches Across ELOF Domains
- Learning Activity for Home Visitors: STEAM is All Around
- Activities for Families: STEAM is All Around
- Tips for Home Visitors: Speak the Language of STEAM
- Tips for Education Staff: Speak the Language of STEAM
- Tip for Families: Speak the Language of STEAM
- Tips for Families: It’s OK to be Curious
- Activities for Families: Explore the Outdoors
- Helpful Resources
- Tools for Supervisors: Reflection and Feedback
- Tools for Supervisors: Group Setting Observations

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#### OPTIONAL SLIDES

- Optional Slide 1: HSPPS Supports STEAM
- Optional Slide 2: The Inquiry Cycle
- Optional Slide 3: Create A Culture of Inquiry
- Optional Slide 4: Being an Expert Vs. Exploring Together
- Optional Slide 5: Learning Activity: Turn A Question Into An Experiment
- Optional Slide 6: Learning Activity: Inquiry In Action: Blubber Experiment

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#### OPTIONAL HANDOUTS

- Head Start Program Performance Standards Support STEAM
- Tips for Education Staff: Inquiry Cycle
- Tips for Home Visitors: Inquiry Cycle
- Tips for Families: Inquiry Cycle
- Tips for Education Staff: Culture of Inquiry
- Tips for Home Visitors: Culture of Inquiry
- Tips for Families: Culture of Inquiry

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#### OPTIONAL SLIDES FOR HOME-BASED CARE (HOME VISITORS) ONLY

- HV Optional Slide 1: Title Slide
- HV Optional Slide 2: HSPPS Supports STEAM
- HV Optional Slide 3: HSPPS Supports STEAM
- HV Optional Slide 4: Center-Based and Family Child Care Practices
- HV Optional Slide 5: Home Visit Practices
- HV Optional Slide 6: What's Different for a Home Visitor?
- HV Optional Slide 7: Theory of Change for Home-Based
- HV Optional Slide 8: Support Parents in Learning About STEAM
- HV Optional Slide 9: Learning Activity: STEAM is All Around
- HV Optional Slide 10: Home Visitors Can Support Families in Building STEAM
- HV Optional Slide 11: Show Parents How to Speak the Language of STEAM
- HV Optional Slide 12: Learning Activity/Experiences

## PRESENTATION OUTLINE

SLIDE	HANDOUTS NEEDED	HOME VISITOR POWERPOINT ADAPTATION	HOME VISITOR HANDOUTS	OPTIONAL SLIDES	OPTIONAL HANDOUTS
1. STEAM Introduction		<ul style="list-style-type: none"> <li>Insert HV Optional Slide 1 if participants are all home visitors</li> </ul>			
2. STEAM Stretches Across ELOF Domains					
3. TEAM Stretches Across ELOF Domains	<ul style="list-style-type: none"> <li>STEAM Stretches across ELOF Domains</li> </ul>	<ul style="list-style-type: none"> <li>HV Optional Slide 2-3 if participants are from HS/EHS</li> </ul>		<ul style="list-style-type: none"> <li>Optional Slide 1</li> </ul>	<ul style="list-style-type: none"> <li>HSPPS Supports STEAM</li> </ul>
4. House Framework for Effective Teaching Practices					
5. House Framework for Effective Teaching Practices- Foundation					
6. Objectives		<ul style="list-style-type: none"> <li>Insert HV Optional Slides 4-7 after Objectives</li> </ul>			
7. What is STEAM?					
8. STEAM is for Everyone		<ul style="list-style-type: none"> <li>Insert HV Optional Slide 8</li> </ul>			
9. STEAM is All Around		<ul style="list-style-type: none"> <li>Replace current slide with HV Optional Slide 9</li> <li>Insert HV Optional Slide 10</li> </ul>	<ul style="list-style-type: none"> <li>Learning Activity for Home Visitors: STEAM is All Around (HV)</li> <li>Learning Activity for Families: STEAM is All Around (F)</li> </ul>		<ul style="list-style-type: none"> <li>Learning Activity for Families: STEAM is All Around (F)</li> </ul>
10. A Common Approach and Focus					
11. A Common Approach and Focus					
12. STEAM Mindset					
13. STEAM Knowledge					
14. Language of STEAM					
15. Speak the Language of STEAM	<ul style="list-style-type: none"> <li>Speak the Language of STEAM (ES)</li> <li>Speak the Language of STEAM (F)</li> </ul>	<ul style="list-style-type: none"> <li>Insert HV Optional Slide 11</li> </ul>	<ul style="list-style-type: none"> <li>Speak the language of STEAM (HV)</li> <li>Speak the Language of STEAM (F)</li> </ul>		

SLIDE	HANDOUTS NEEDED	HOME VISITOR POWERPOINT ADAPTATION	HOME VISITOR HANDOUTS	OPTIONAL SLIDES	OPTIONAL HANDOUTS
16. STEAM-related Skills				<ul style="list-style-type: none"> <li>Optional Slide 2</li> </ul>	<ul style="list-style-type: none"> <li>Inquiry Cycle (ES, HV, F)</li> </ul>
17. How We Can Support STEAM Learning					
18. Engaging Environments					
19. Nurturing, Responsive, & Effective Interactions	<ul style="list-style-type: none"> <li>It's OK to be Curious (F)</li> </ul>			<ul style="list-style-type: none"> <li>Optional Slide 3</li> <li>Optional Slide 4</li> </ul>	<ul style="list-style-type: none"> <li>Culture of Inquiry (ES, HV, F)</li> </ul>
20. Learning Experiences/ Activities		<ul style="list-style-type: none"> <li>Insert HV Optional Slide 12</li> </ul>			
21. Learning Activity: STEAM in Everyday Experiences & Activities	<ul style="list-style-type: none"> <li>Explore the Outdoors (F)</li> </ul>			<ul style="list-style-type: none"> <li>Optional Slide 5</li> <li>Optional Slide 6</li> </ul>	
22. Review	<ul style="list-style-type: none"> <li>Helpful Resources</li> <li>Reflection and Feedback</li> <li>Group Setting Observations</li> </ul>				

ES: Indicates tips/activity sheet for education staff

HV: Indicates tips/activity sheet for home visitors

F: Indicates tips/activity sheet for families



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## SLIDE 1:

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### INTRODUCTIONS:

Begin the training by giving participants background information on yourself.

Provide an opportunity for participants to introduce themselves.

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### INTRODUCE THE TOPIC:

STEAM stands for science, technology, engineering, art, and math.

Begin with an activity to get participants thinking about how they naturally use STEAM throughout the day.

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### **DISCUSSION:** HAVE PARTICIPANTS SHARE WHAT STEAM SKILLS THEY USED THAT MORNING.

This will give you an idea of what they think of when they hear the STEAM acronym.


Offer examples such as cooking breakfast, making coffee, parking your car, paying for lunch, checking the weather, etc.

\*Emphasize: You naturally use STEAM every day!


## ADAPTATION FOR HOME VISITORS:

- Insert HV Optional Slide 1

## STEAM Stretches Across the ELOF Domains



		CENTRAL DOMAINS				
		APPROACHES TO LEARNING	SOCIAL AND EMOTIONAL DEVELOPMENT	LANGUAGE AND LITERACY	COGNITION	PERCEPTUAL, MOTOR, AND PHYSICAL DEVELOPMENT
▲ INFANT/TODDLER DOMAINS	Approaches to Learning	Social and Emotional Development	Language and Communication	Cognition	Perceptual, Motor, and Physical Development	
● PRESCHOOLER DOMAINS	Approaches to Learning	Social and Emotional Development	Language and Communication Literacy	Mathematics Development Scientific Reasoning	Perceptual, Motor, and Physical Development	



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### SLIDE 2:

The Head Start Early Learning Outcomes Framework (ELOF) helps teachers, family child care providers, and home visitors understand child development and what children should know and be able to do. The ELOF guides the implementation of effective program and teaching practices that promote strong outcomes for all children, including children with disabilities or suspected delays and children who are dual language learners or children who are learning a tribal language.

STEAM is about children developing skills in multiple ELOF domains, including Approaches to Learning and Cognition. Children are born primed to explore STEAM ideas as they learn about the world. STEAM skills include using active exploration, understanding causal relationships, reasoning, and problem solving.

## STEAM Stretches Across the ELOF Domains





- Cognition (Infant/Toddler)
  - Exploration and Discovery
  - Memory
  - Reasoning and Problem-Solving
- Cognition (Preschooler)
  - Mathematics Development
  - Scientific Reasoning
- Approaches to Learning
- Social and Emotional Development
- Language and Communication
- Perceptual Motor and Physical Development



### SLIDE 3:

For infants/toddlers

- Science knowledge, skills, and concepts that we know are attainable for young children are primarily found in the **Cognition** domain under the subdomains: Exploration and Discovery, Memory, and Reasoning and Problem-Solving.

For preschoolers

- The central domain **Cognition** is comprised of two more specific domains— Scientific Reasoning and Mathematics Development. Mathematics Development includes the subdomains Counting and Cardinality, Operations and Algebraic Thinking, Measurement and Geometry and Spatial Sense. Scientific Reasoning includes the subdomains Scientific Inquiry and Reasoning and Problem-Solving.

Other areas of development connected to STEAM learning include the central domains **Approaches to Learning, Social and Emotional Development, Language and Literacy, and Perceptual, Motor and Physical Development.**

- For example, the **Approaches to Learning** domain is about how children learn, rather than what they learn. It includes executive function skills that are crucial to STEAM exploration like initiative and curiosity, creativity, and cognitive and behavioral self-regulation.
- When children engage in positive interactions with adults and other children while exploring their environment children are using skills found in the **Social and Emotional Development** domain. And by using both language and nonverbal communication, such as eye gaze and gestures to express interest and talk about what they observe, children are using skills found in the **Language and Communication** domain.
- Children’s exploration of the tools and materials in their environment facilitates their **Physical Development**, often requiring the use of fine and gross motor skills. For example, digging for objects in the dirt requires fine or small motor movements. And when teachers take children on nature walks, gross motor skills help children walk, run, or kneel down to explore what they see!
- Teaching children in their home language is an important part of connecting STEAM skills to their family, culture, and developmental goals. You can further support children who are dual language learners or children who are learning a tribal language by describing what they are observing and providing key terms in English and their second language.

**NOTE:** *The Early Learning Outcomes Framework is widely used in Head Start and Early Head Start programs. Please refer to your state's early learning framework for this slide. If this slide is not applicable to your program, it can be replaced with information from your state's early learning framework.*

### MATERIALS NEEDED:

- Handout: STEAM Stretches Across ELOF Domains

### OPTIONAL FOR HS/EHS:

- Insert: Optional Slide 1
- Handout: Head Start Program Performance Standards Support STEAM

### ADAPTATION FOR HOME VISITORS:

- Insert HV Optional slides 2-3
- Handout: HSPPS Supports STEAM





**SLIDE 4:**

The framework for effective teaching practices is known as the House. The House represents five integral components of quality teaching and learning:

- The foundation- providing nurturing, responsive, and effective interactions and engaging environments for children
- The first pillar- choosing and implementing research-based curricula and teaching practices
- The second pillar- using screening and ongoing assessment of children’s skills
- The Roof- individualizing teaching and learning
- The Center – engaging parents and families

When connected with one another, they form a single structure—the House Framework—that surrounds the family in the center because as we implement each component of the house – in partnership with parents and families, we foster children’s learning and development.



SLIDE 5:

- STEAM is an essential part of the foundation of the house.
- The foundation includes nurturing, responsive, and effective interactions and engaging environments.
- Children naturally engage in STEAM skills such as inquiry, reasoning, and problem solving every day but need support from teachers and families to expand their STEAM skills and thinking through engaging environments and nurturing, stimulating interactions.

## Objectives



- **Identify** ways infants, toddlers, and preschoolers naturally engage in inquiry, reasoning, and problem-solving through every day routines and learning opportunities
- **Describe** how the STEAM components share a common approach and focus
- **Provide strategies** to support children’s inquiry and STEAM skills in the early education setting and at home

### SLIDE 6:

REVIEW THE OBJECTIVES FOR THE SESSION.

- **Identify** ways young children naturally engage in inquiry, reasoning, and problem solving through every day routines and learning opportunities
- **Describe** how the STEAM components share a common approach and way of thinking
- **Provide strategies** to support children’s inquiry and STEAM skills in the early education setting and at home

### ADAPTATION FOR HOME VISITORS:

- Insert HV Optional Slide 4-7 to provide a foundation for home visiting practices



SLIDE 7:

**INTRODUCE WHAT THE STEAM COMPONENTS ARE AND HOW THEY ARE CONNECTED.**

STEAM is a research-based way of thinking that involves observing, questioning, testing ideas, and creating. It is part of many early childhood curricula. As children explore their surroundings, they naturally use STEAM as a tool to understand the world. This way of thinking begins in infancy and continues throughout early childhood. It is essential to children’s school readiness and overall school success later in life.

Inquiry is the act of asking about or gathering information about a topic of interest. Science includes the use of inquiry skills such as observing, asking questions, exploring, making predictions, and analyzing information to understand how the world works (e.g., characteristics of living objects, non-living objects, and earth materials). Older infants and toddlers may spend time exploring the texture and shape of leaves in a sensory table or in their backyard by touching them, while preschoolers can discuss the differences and similarities between soft green leaves and brown leaves that are hard and crunchy.

**DISCUSSION/BRIEF ACTIVITY: HOLD UP A PEN OR PENCIL AND ASK IF IT’S STEAM—IT IS!**

Technology refers to any type of man-made object, not just cell phones, televisions, and computers. It’s using tools (such as pens, scissors, binoculars, pulleys, wheels, and levers) and creating and problem solving.

Engineering is using materials, designing, problem solving, and building structures and products. It helps us understand *how* and *why* things work. Infants and toddlers can explore stacking different-sized blocks. Preschoolers can design a ramp out of blocks and problem solve ways to make a ball roll down faster each time.


Art is sensory exploration. It’s more than just drawing and painting. Art also includes pretend play, music, and crafts. You might be wondering why “Art” was added to STEM to create “STEAM.” Art was added because a creative mindset is critical for STEM subjects. For example, infants and toddlers can explore various art materials such as finger paints or bang on pots and pans to create a drum. Preschoolers can observe birds outside then draw a picture of where they live or create different patterns as they hit a drum.


Math refers to numbers and operations, counting, sorting, measuring, using patterns, making comparisons, understanding geometry, and spatial sense. Even babies and toddlers learn early math concepts like geometry and spatial relationships when they explore new objects with their hands or mouth. Preschoolers show great interest in counting objects in their environments and sorting items by color, shape, or size.

**STEAM is for Everyone**

—15-Minute—  
In-Service Suites

STEAM is about *how* people explore the world, not which facts they know.




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### SLIDE 8:

STEAM is about how people explore the world—*not* which facts they know. Children can use any old item to explore STEAM, it doesn't have to be a typical “science” material like a beaker or test tube. Open-ended and every day materials such as empty jars & lids or leaves allow for boundless exploration (and can grow with the child).

And the world is your classroom— STEAM is everywhere, especially outdoors! Because STEAM is for everyone and children start using STEAM skills at such a young age, there is a great opportunity to provide STEAM learning opportunities that are culturally relevant to the children you work with. Encourage families to support STEAM learning at home and in the community.

**\*Emphasize\*** It's not about which facts you know—it's how you explore the world—together!

### ADAPTATION FOR HOME VISITORS:

- Replace this slide with HV Optional Slide 8



Video is approximately 56 seconds long

### SLIDE 9:

So what does STEAM look like in every day interactions and play? Let's watch two short video examples to find out! *Note: The videos shown here are teacher examples, however home visitors can use the strategies shown for professional development and to encourage families to replicate ideas at home.* [PLAY VIDEO](#)

### DISCUSSION: LEAD PARTICIPANTS IN A DISCUSSION ABOUT HOW EACH VIDEO SHOWED STEAM.

#### Infant video clip

- In the first clip, the children are exploring avocados.
- The infants are too young to talk, but the teacher still engaged them in STEAM! She asked them to make a prediction (“What do you think is inside the avocado?”). Even more verbal toddlers may not know many scientific ideas but can be encouraged to observe, think, and hypothesize—or guess.
- She talked about the children’s explorations. (“You are experimenting with rolling your avocado.”)
- She included math and science when she mentions the avocado’s round shape that enables it to roll.

#### Preschooler video clip

- In the second clip, the girl is building a ramp (That’s engineering!) to roll balls down (She’s exploring physics).
- When she tries to put a ball through one of the tunnels, it doesn’t fit. First, she experiments with the angle of the ramp. Then the ball fits through the first tunnel, but not the second. She thinks through the problem then removes the tunnel that isn’t big enough for the ball to fit.
- Then she experiments with dropping a ball down the ramp again.

These clips show examples of children demonstrating behaviors in the ELOF sub-domains such as curiosity, exploration, inquiry, reasoning and problem solving. For example, in the infant video clip the children are showing interest in the avocados by participating in this experience. This is supported by the ELOF Approaches to Learning subdomain Initiative and Curiosity. In the preschool video clip, when the girl discovered that the ball wouldn't fit through the second tunnel, she problem solved and removed the tunnel. This is an example of the ELOF Cognition subdomain Reasoning and Problem-Solving.

Additionally, children may understand STEAM concepts but may not have the words for the concepts. For example, it seems as if she understands the concept of the ball rolling down the ramp without knowing the words accelerate, incline, etc. but she can learn these words with support from her teacher and they will have meaning for her in the context of her exploration. These are some of the characteristics and skills that are common across the STEAM components and are some of the goals in the ELOF domains.

### OPTIONAL MATERIALS:

- Handout: Activity for Families: STEAM is All Around

### ADAPTATION FOR HOME VISITORS:

- Replace this slide with HV Optional Slide 9
- Insert HV Optional Slide 10
- Handout: Learning Activity for Home Visitors: STEAM is All Around
- Handout: Activity for Families: STEAM is All Around

--15-Minute--  
In-Service Suites

## A Common Approach and Focus



STEAM Mindset



STEAM Knowledge



Language of STEAM



STEAM-related Skills


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**SLIDE 10:**

**INTRODUCE HOW THE STEAM COMPONENTS SHARE A COMMON APPROACH AND FOCUS.**

The STEAM components share a common approach and focus—a STEAM mindset, STEAM knowledge, the language of STEAM, and STEAM-related skills. In the next few slides, we will discuss how education staff can support and focus on these approaches with children.

**NOTE:** You'll describe each in more detail on the following pages.



## STEAM Mindset

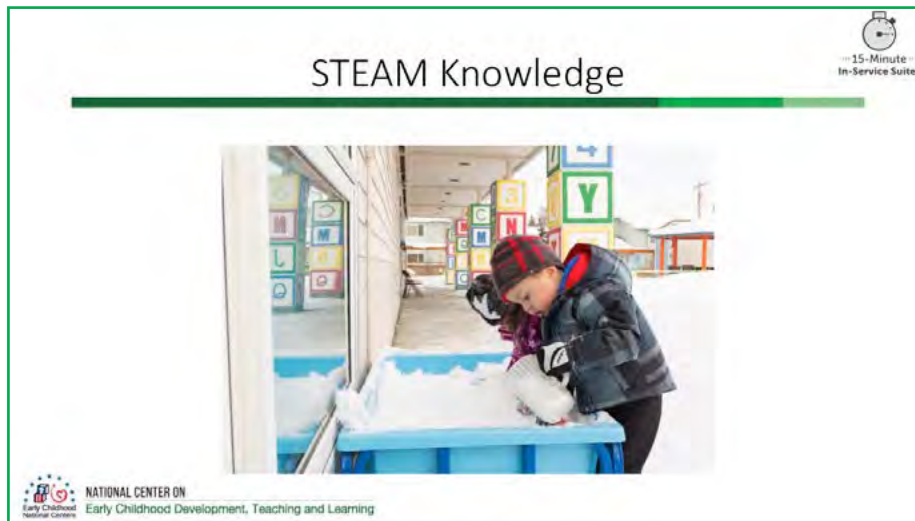


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### SLIDE 11:

A STEAM mindset includes curiosity, creativity, critical reflection, etc. From research on how children think and learn, we know that young children have a sense of wonder and natural curiosity about their world. Adults can encourage children's STEAM mindset through both free play and supportive experiences and explorations. Here are some examples:

- Children are like scientists—they learn about how the world works through experience and exploration by finding patterns in their environment and collecting “data.” For example, when I play with snow inside of the classroom where it is warm, it melts faster, then when I play with it outside where it is cold.
- Supporting STEAM skills encourages children to develop their own approaches to learning, such as the incredible curiosity that young children naturally have. For example, if an infant is crunching leaves found on the ground outside, adults can support this curiosity by bringing over more leaves (perhaps of different shapes, colors, or textures). Encourage the child's explorations by labeling what they are doing and asking questions, “When you squeeze the leaf in your hand, what do you hear?” or “Why do you think this leaf is crunchy?”



## SLIDE 12:

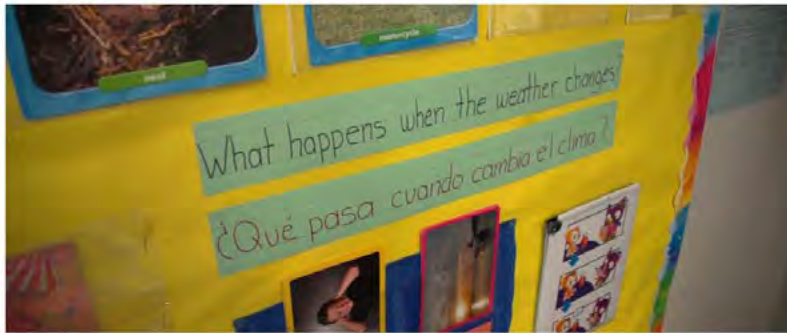
### STEAM knowledge:

- Children are born primed to explore STEAM ideas as they learn about the world.
- Ask participants to think about what older babies or toddlers might understand about physics—or the movement of objects through space and time. (Pause for a few seconds.)
  - Kind of a lot already! They might have fallen, tried to walk, dropped toys, banged a cup on the table, and recognized that objects have solidity. Their experiences and play have already taught them quite a bit.
- Children build hypotheses and eventually theories as they try to make sense of the world. (A hypothesis or prediction is like a guess or possible explanation for something. A theory is the best current explanation for something that has been tested)
  - Research shows that young children can keep track of cause-and-effect relationships and use this data to form theories about relationships that aren't always reliable (for example, pushing a button on a certain toy usually results in it making a sound, except when its battery is dead or missing)<sup>1</sup>.
- Adults can help children build on and expand their existing knowledge and interest in the natural world through both free play and supportive explorations. **NOTE:** We'll talk about supportive explorations in more detail in the strategies section.

<sup>1</sup> Waismeyer, A., Meltzoff, A. N., & Gopnik, A. (2015). Causal learning from probabilistic events in 24-month olds: an action measure. *Developmental Science*, 18, 175–182

## Language of STEAM

15 Minute  
In-Service Suites




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### SLIDE 13:


#### Language of STEAM:

- The language of STEAM is all about problem solving and the cycle of inquiry or scientific method.
- Use key vocabulary words (such as observe, predict, and compare) to encourage STEAM thinking and skills.
- Use language to describe the objects or events the child is observing and exploring. By providing words (labels) that connect the objects, concepts, and experiences, you are helping the vocabulary and concepts become meaningful to children. For example, as a child holds two different types of rocks, you could say, “Let’s compare the two rocks! This one feels smooth and this one feels bumpy.”
- You can further support children who are dual language learners by describing what the child is observing and by providing key vocabulary words in English and asking parents for the translation in their home language.

## Speak The Language Of STEAM



<ul style="list-style-type: none"> <li>• Observe, observation</li> <li>• Question</li> <li>• Predict, prediction</li> <li>• Similar, different</li> <li>• Compare, contrast</li> </ul>	<ul style="list-style-type: none"> <li>• Measure</li> <li>• Count</li> <li>• Investigate</li> <li>• Explore</li> <li>• Experiment</li> </ul>	<ul style="list-style-type: none"> <li>• Test</li> <li>• Discover</li> <li>• Record</li> <li>• Explain</li> <li>• Hypothesize, hypothesis, guess</li> </ul>
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### SLIDE 14:

How can adults support children as they observe, question, explore, and reflect?

One of the ways we can do this is with language. The way adults speak to children can encourage reflection and problem solving. By modeling and providing children with meaningful opportunities to hear and use scientific language, we are not only enhancing children's STEAM learning, but we are also teaching advanced vocabulary in a meaningful context.

When using vocabulary, physically show children what a word means. By using props or engaging in the new process while we are using the vocabulary, we help young children, including children who are dual language learners and children who are learning a tribal language, see the vocabulary in action.

### DESCRIBE IMAGES:

Left image: Preschooler observing a turtle in the class tank.

Right image: Know, Wonder, Learn (KWL) chart about turtles.

### DISCUSSION: HOW CAN YOU INCORPORATE STEAM LANGUAGE INTO THE KWL ACTIVITY? HOW CAN YOU SUPPORT FAMILIES IN USING THE KWL AT HOME?

#### MATERIALS NEEDED:

- Handout: Tips for Education Staff: Speak the Language of STEAM
- Handout: Tips for Families: Speak the Language of STEAM

#### ADAPTATION FOR HOME VISITORS:

- Insert HV Optional Slide 11
- Handout: Tips for Home Visitors: Speak the Language of STEAM
- Handout: Tips for Families: Speak the Language of STEAM

## STEAM-related Skills







### SLIDE 15:

STEAM-related skills:

- All STEAM components use inquiry and the scientific method (observe, question, predict, experiment, discuss) as useful thinking tools to reason out problems.
- Children start thinking about these ideas early! Even young babies are making observations and testing predictions. For instance, one-year-old children learn physical rules through observation and experimentation—and when they see something that violates typical physical rules, they are more likely to explore it. For example, researchers created an experiment where infants watched a car roll off a ledge. Some babies saw what would be expected—the car rolling off the ledge and dropping to the ground. Other babies saw a seemingly impossible trick—the car rolled off the ledge and appeared to float in midair. This violates what young children already understand about gravity. When those infants were given the same car, they were more likely to test the concept of gravity by repeatedly dropping the toy that they previously saw “float” in midair<sup>2</sup>.
- Young children are using the scientific method, or inquiry cycle, to think through a problem.

**NOTE:** There is a 15-minute in-service suite called “Engaging Interactions: Using The Scientific Method” that goes into each step in more depth. <https://eclkc.ohs.acf.hhs.gov/video/using-scientific-method>

#### OPTIONAL MATERIALS:

- Insert Optional Slide 2
- Handout: Tips for Education Staff: Inquiry Cycle
- Handout: Tips for Families: Inquiry Cycle

#### OPTIONAL HOME-VISITOR MATERIALS:

- Handout: Tips for Home Visitors: Inquiry Cycle
- Handout: Tips for Families: Inquiry Cycle

2 Stahl, A. E., & Ferguson, L. (2015). Observing the unexpected enhances infants’ learning and exploration. *Science*, 348, 91-94

## How We Can Support STEAM Learning


  
 15 Minute In-Service Suites



Engaging Environments



Nurturing, Responsive, & Effective Interactions



Learning Experiences / Activities


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### SLIDE 16:

Up to this point, we've learned about what STEAM is, how it supports children's development in various ELOF domains, and how to support thinking and speaking STEAM.

In the upcoming section, we will make the connection back to the House Framework and discuss ways to support STEAM learning by providing the foundation of learning through

- engaging environments,
- nurturing, responsive, & effective interactions, and
- learning experiences/activities.

## Engaging Environments



Provide open-ended materials

Use a variety of materials

Pay attention to children's interests

Engage the senses

Consider children's developmental levels

Arrange materials so they are accessible








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### SLIDE 17:

Developing an engaging environment requires using our observations about what children say and do to learn about their interests and current abilities.

Create an engaging physical environment that is stimulating, interesting, and encourages experimentation.

In selecting and arranging materials, remember that children actively explore, investigate, and observe. They will *not* be taking in knowledge in a passive way.

- *Provide open-ended materials.* Materials that can be used in different ways and allow for creativity, investigation, and problem solving, such as cardboard and tubes, clay, or ramps.
  - Work with families to ensure their home learning environments are safe for exploration.
  - Work with families to ensure that the classroom environments reflect their cultural backgrounds and languages. Ask them to bring in familiar materials.
- *Use a variety of materials.*
  - Select materials related to children's interests.
  - Engage the senses with materials of different textures, smells, tastes, sounds, and sights.
- *Consider the developmental level of the little scientists with whom you are working.* For example, older preschoolers can verbally share what they think might happen or help record findings using sticky notes or drawings, whereas toddlers may respond by pointing to one of two options.
- *Materials must be accessible to all children.*
  - Place in a safe location so children may have independent access.
  - Tools should be of the proper size and constructed of appropriate materials for young learners.
  - When appropriate, adapt materials to ensure that children with special needs can participate as independently as possible. Some possible modifications include placing the materials in an optimal position, stabilizing materials, providing adaptations to make tools easier to grasp, and making materials larger or brighter.

## Nurturing, Responsive, & Effective Interactions



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Early Childhood Development, Teaching and Learning

### SLIDE 18:

Warm, nurturing, and effective interactions lay the foundation for children's discovery and create opportunities for them to share their findings.

Create an engaging social environment. Interactions with peers and adults facilitate the development of STEAM knowledge, while developing children's social, language, and communication skills. It's a collaborative inquiry process—teachers, parents, and children become scientists together. In this way, STEAM supports development in multiple ELOF domains.

Discuss the following four specific ways to promote nurturing, responsive, and effective interactions:

1. **Use scaffolds** (Scaffolding means offering the right support and structuring the environment to take a child's knowledge to the next level.) Support exploration and discovery during play. Scaffolds can be physical (such as breaking a task into smaller steps) or verbal (such as prompting children to describe what they are observing). Scaffolding can help children engage in more complex thinking and problem solving.
2. **Introduce basic inquiry skills** to help children think about STEAM during every day play and activities. This helps children become critical thinkers and problem solvers. Talk with children and ask questions to guide their observations: "Why do you think this flower hasn't bloomed yet?" **Emphasize: Model curiosity and a questioning mind.**
3. **Speak STEAM** by incorporating problem solving and STEAM-rich language in all types of activities. Use words such as observe, investigate, compare, and predict. Listen to children's observations and scaffold when appropriate. The use of language extends and enriches scientific experiences and reinforces the growth of STEAM content knowledge.
4. Invite children to **communicate**. Use modeling and open-ended questions to encourage children to describe their observations, develop questions, make predictions, notice similarities and differences, explain what happened during their explorations, etc.
  - Infants and toddlers can respond with eye gaze, gestures, and some vocalizations.
  - Older toddlers and preschoolers are still learning language but are better able to respond verbally as they put words and experiences together.
  - **NOTE:** Important for all children, including children who are dual language learners.



Many of these strategies are used throughout the day in literacy and social and emotional contexts. For example, when you ask a question “Why do you think the boy in the book feels that way?” This strategy is the same for STEAM interactions, when we ask children questions to foster inquiry skills and use STEAM language to strengthen children’s vocabulary.

### MATERIALS NEEDED:

- Handout: Tips for Families: It’s OK to be Curious

### OPTIONAL MATERIALS:

- Insert Optional Slide 3
- Insert Optional Slide 4
- Handout: Tips for Education Staff: Culture of Inquiry
- Handout: Tips for Home Visitors: Culture of Inquiry
- Handout: Tips for Families: Culture of Inquiry

## Learning Experiences/Activities



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Video is approximately 1 minute long.

### SLIDE 19:

An important way to support STEAM learning and skills is through the experiences and activities you plan in the early education setting and encourage families to do at home.

In this video, a teacher talks about how she created an activity with pill bugs (or roly polys) after children showed interest in them outside. As you watch, think about all the ways the teacher supports STEAM learning through this activity. Please note that the video shown here is a classroom example, but home visitors can use the strategies for professional development and to encourage families to replicate at home or use during socializations. A home visiting adaptation has also been developed (see adaptation box below). **Play video.**

### DISCUSSION: ASK PARTICIPANTS TO SHARE WHAT THEY OBSERVED.

Highlight the following STEAM skills and supports:

- The teacher followed children's natural explorations and curiosity to create an activity that brought nature inside.
- The teacher asked children to make predictions (e.g., Why did it curl up in a ball?).
- The children used magnifying glasses to closely observe the pill bugs.
- The teacher planned a hands-on activity, rather than having the children watch her talk about roly polys.
- The children explored the pill bugs with their eyes and hands.
- They did an art activity based on their explorations (briefly shown in clip).
- The teacher invited children to ask more questions about the roly polys and other things they want to learn. This led to more explorations. (Note: It wasn't shown on video, but mention that they next investigated what roly polys like to eat based on children's predictions.)
- The teacher didn't always act like the expert—she made it an activity to explore together with the children.

### ADAPTATION FOR HOME VISITORS

- Insert HV Optional Slide 12



## Learning Activity: STEAM in Everyday Experiences & Activities



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### SLIDE 20:

Small group discussion about how to incorporate STEAM into 3 different learning experiences: book reading, outside activities, and finger play/music. Also have participants consider how children naturally engage in STEAM outside.

#### DISCUSSION PROMPTS FOR EACH IMAGE:

- Left image: A dad is reading “The Very Hungry Caterpillar” to his children as part of a home visit. How can this activity promote STEAM skills?
- Middle image: A child is about to go down a slide on the playground. What type of STEAM skills can children learn while playing outside?
- Right image: Teachers are leading children in finger play and songs. How can you use music and songs to foster STEAM learning?

#### DISCUSSION: LEAD PARTICIPANTS IN A DISCUSSION ABOUT HOW THE LEARNING EXPERIENCE OR ACTIVITY IN EACH OF THE PHOTOS IS FOSTERING STEAM SKILLS.

#### BOOKS

- Books provide a great springboard for STEAM discussion and activities.
- How can “The Very Hungry Caterpillar” promote STEAM skills?
  - Topics could include math (numbers, counting, size), engineering (making a cocoon), science (e.g., Why did the caterpillar have a tummy ache after eating so much? or How did the caterpillar transform into a butterfly?), and art (have children create their own caterpillar out of different materials: balloons, beads, paper plates, sponge paint, etc.).

#### OUTSIDE

- What type of STEAM skills can children learn while playing on a climbing structure?
- Examples:
  - physics (hanging from monkey bars or sliding down slides)
  - math (counting rungs on a ladder or seeing who can swing higher)
  - science (balancing on a beam or going up and down on a see-saw)

Sand play can include engineering and art (building sand structures), technology (digging with tools), science (where does the water go when you pour it on the sand?), problem solving, investigations, imagination, gravity, and cause and effect.

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#### FINGER PLAY/SONGS

- How can you use music and songs to foster STEAM learning?
- Examples:
  - counting aloud
  - pattern recognition
  - include STEAM language and ideas to expand thinking and vocabulary
- **Note:** Research shows that the brain is learning about music as children listen to it in their environment. Four-month-olds show stronger brain responses to music they've heard more often. Reference: Trainor, L. J., Lee, K., & Bosnyak, D. J. (2011). Cortical plasticity in 4-month-old infants: specific effects of experience with musical timbres. *Brain Topography*, 24 (3-4), 192-203.

#### MATERIALS NEEDED:

- Handout: Activities for Families: Explore the Outdoors

#### OPTIONAL MATERIALS:

- Insert Optional Slide 5
- Insert Optional Slide 6



## SLIDE 21:

REVIEW THE MAIN POINTS OF THE PRESENTATION

- Inquiry is a great tool for learning about the world: adults and children do it naturally!
- Children—like scientists—explore their world using observation, logic and experimentation.
- STEAM is about *how* people explore the world—*not* which facts they know. Activities should encourage exploration and curiosity rather than facts. And it doesn't matter where you are—at school or at home—all adults can explore the world with children.
- We discussed activities to foster STEAM skills and early child development goals from the ELOF and your curriculum.
- There are many ways we can support children's natural inclinations to explore, to build, and to question. Some ways to set the stage and foster STEAM learning include creating engaging environments and learning experiences/activities and providing nurturing, responsive, and effective interactions.
- Design hands-on STEAM activities based on children's questions and observing what they show interest in throughout the day.
- Work with families in both center- and home-based settings to encourage STEAM learning at home.
- STEAM is all around us, ready to be discovered by our willing young explorers!

## MATERIALS NEEDED:

- Handout: Helpful Resources
- Handout: Tools for Supervisors: Reflection and Feedback
- Handout: Tools for Supervisors: Group Setting Observations