



INFANTS DO STEM

THROUGH WONDER, CURIOSITY, INQUIRY, DISCOVERY



INTRODUCTION

This handout is a companion to the two videos [Early STEM Infants](#) and [Families are Important to Early STEM Education](#), created in collaboration with the Idaho STEM Action Center and the Boise State University College of Education. Babies burst into the world with all the wonder they need for a lifetime of joyful learning. According to author Ainsley Arment, “Wonder spurs curiosity. Curiosity drives inquiry. And inquiry always leads to discovery.”¹ This drive to make meaning of the world is best done with the support of engaged adults - family members, teachers, and caregivers.² Early childhood educators can create a nurturing environment of STEM learning for infants by:

- Recognizing that babies’ sense of wonder leads to discovery
- Engaging in the Four L’s
- Allowing babies to experience the world through their seven senses^{3; 5}

RECOGNIZE THAT BABIES’ SENSE OF WONDER LEADS TO DISCOVERY

Infants actively observe and explore their environments, make hypotheses, and test out theories. However, they need engaged adults around them to infuse STEM learning within daily care and routines. The following components can help early childhood educators and parents provide STEM opportunities to their infants⁶:

- Embed STEM learning during naturally occurring times of the day. For instance, during bathtime a baby can pour and fill, experiment with cause and effect (what happens to the water when I splash my hands in the tub), and discover properties of objects such as sinking and floating.
- Choose materials to support the infant’s exploration. For example, rather than using plastic cups, try measuring cups that babies can pick up with one hand.
- Ask open-ended questions to expand on their critical thinking skills (“I wonder what will happen if you use the washcloth to clean the boat?”)⁶



1: Arment, A. (2019). *The Call of the Wild and Free: Reclaiming Wonder in Your Child’s Education*. HarperCollins. Page 307.
 2: McClure, E.R., Guernsey, L., Clements, D.H., Bales, S., Nichols, J., Kendall-Taylor, N., & Levine M.H. (2017) *STEM starts early: Grounding science, technology, engineering, and math education in early childhood*. New York: The Joan Ganz Cooney Center at Sesame Workshop.
 3: Mailloux, Z. & Smith Roley, S. (2013). Sensory integration development and early signs of difficulties. *Pathways.org*. Retrieved from <https://pathways.org/topics-of-development/sensory/>
 4: Center on the Developing Child, Harvard University (2021). Retrieved from: <https://developingchild.harvard.edu/science/key-concepts/serve-and-return/>
 5: Grzadzinski, R., Donovan, K., Truong, K. et al. Sensory Reactivity at 1 and 2 Years Old is Associated with ASD Severity During the Preschool Years. *J Autism Dev Disord* 50, 3895–3904 (2020). <https://doi.org/10.1007/s10803-020-04432-4>
 6: Campbell, P. & Harradine, C. (2021). Adaptations to routines and activities make STEM happen for infants and toddlers. 2021 STEMIE Professional Development Webinar Series. Retrieved from <https://stemie.fpg.unc.edu/sites/stemie.fpg.unc.edu/files/STEMIE-PD-Series-Adaptations-March2021.pdf>

ENGAGE IN THE FOUR L'S

To continue and expand on babies' explorations, the process of engaging in the Four L's invites educators to look, listen, let the child lead, and learn together.

1. Look
 - Write time into the daily or weekly schedule to be wholly present with the children. Partner with fellow teachers so that they can take care of custodial care duties such as diapering and wiping noses while you fix your attention solely on the children and their interactions with one another.
 - Observe the children with no preconceived expectations. What do you see? What are they experiencing? What makes them respond? What causes discomfort? What captures their attention? Which toys do they prefer?
2. Listen
 - Their babbles and cries reveal what babies are thinking and experiencing. What are they saying?
3. Let the child lead
 - Follow the babies' play as they pursue their "wonderings" and interests.
4. Learn together
 - Adults don't have to have all the answers; children are already in the process of creating knowledge in the wonder-curiosity-inquiry-discovery cycle. Based on what is gathered from practicing the previous three L's, you will gain ideas of how to intentionally join children's play, careful not to take over and ensuring the play is free from choking hazards. Caregivers attuned to young children's needs and cues join in back-and-forth learning opportunities to take turns with them in a "serve and return" style.⁴

ALLOW BABIES TO EXPERIENCE THE WORLD THROUGH THEIR SEVEN SENSES

Educators can bring alive infants' explorations by intentionally offering items with a variety of sensory properties. This allows children to discover their world through their seven senses.^{3,5}

- Input from the world
 - Hearing: Point out sounds in nature (i.e. the crackle of fall leaves); introduce novel sounds such as chimes; provide everyday materials in safe ways for infants to create different sounds.
 - Smell: Create smell jars with contrasting aromas such as cinnamon, lavender, or lemon.
 - Taste: Allow babies to explore different tastes such as mashed bananas and mashed butternut squash, encouraging them to bring these foods up to their mouths.
 - Sight: Place contrasting shapes and objects in front of the child.
 - Touch: Put out a cookie sheet of water in front of the child to splash. Have the baby lie on the grass on their tummy.
- Input from their own bodies
 - Vestibular (movement): Provide gentle rocking in different planes - side to side, forward and backward, always supporting the baby's neck and head.
 - Proprioception (body position): Provide tummy time or position the baby on their side facing an infant mirror or an object slightly out of their reach.



ADDITIONAL RESOURCES TO EXPLORE

[Sensory - Did You Know There Are Seven Senses?](#) (Pathways.org, n.d.)

[Mealtime Explorations for Infants](#) (STEMIE, 2021)

[STEM PD Series: Adaptations to Everyday Routines and Activities Make STEM Happen for Infants and Toddlers](#) (STEMIE, 2021)

[Adaptations \(unc.edu\)](#) (STEMIE, 2021)

[Covid-19 Resources for Families: Supporting Children's STEM Learning During Routines And Activities](#) (STEMIE, 2020)

[Build New Routines](#) (AFIRM, University of North Carolina)

[Finding Math in Everyday Routines](#) (Clements, D.H. & Sarama, 2017/2019. Learning and Teaching with Learning Trajectories [LT]²)

[Math At Home](#) (Clements, D.H. & Sarama, 2017/2019. Learning and Teaching with Learning Trajectories [LT]²)

[Learning Trajectories in Early Math](#) (Clements, D.H. & Sarama, 2017/2019. Learning and Teaching with Learning Trajectories [LT]²)

[Household Items Handout-rev.pub](#) (Clements, D.H. & Sarama, 2017/2019. Learning and Teaching with Learning Trajectories [LT]²)