



EARLY STEM

IS NOT JUST CHILD'S PLAY!



IDAHO
STEM
ACTION CENTER



INTRODUCTION

This handout is a companion to the three videos created in collaboration with the Idaho STEM Action Center and the Boise State University College of Education: [Addressing Teacher Anxiety in Introducing STEM to Young Children](#); [STEM as an Approach to Early Childhood Learning](#); and [STEM Professional Development for Early Education Teachers](#). Beginning in infancy, young children learn about the world around them through exploration, experimentation, and problem solving. Their access and opportunity to explore their interests and develop critical thinking skills depend on the adults around them¹. Young children need their teachers to nurture their sense of wonder and intentionally plan the materials they present, the questions they ask, and the way that they set up the classroom environment. Therefore, for early childhood educators and administrators looking to integrate STEM within the daily routines and play of young children, they should make efforts to:

- Address teacher STEM anxiety
- Offer sustained education efforts by forming a professional learning community
- Provide instructional coaching models for teachers to reflect on their attitudes and practices

STEM ANXIETY

Research suggests that young children's opportunities to engage in STEM is affected by the attitudes and fears of the adults around them^{4,5,6}. Early childhood educators report hesitancy in engaging in STEM with young children because they believe that: (1) They do not have the content knowledge to introduce STEM concepts⁴; (2) they view technology from the perspective of digital tools such as computers, tablets, and loud electronic toys; and (3) they feel that introducing STEM would take away from a classroom's sense of community.

As an early childhood administrator, it is important to know that STEM anxiety is real and that teachers need supportive learning environments to address these perceptions. Professional development can help to address the hesitancy of introducing STEM within the daily routines, exploration, and play of infants, toddlers, and preschoolers.



PROFESSIONAL LEARNING COMMUNITIES

One-day workshops can provide a starting point for engaging early childhood educators in the topic of STEM. However, our research discovered that a more sustained education effort by establishing a professional learning community among all the teachers of the center was more effective in addressing STEM anxiety, expanding on young children's interests and supporting their inquiry, and adopting a maker mindset. Early childhood administrators looking to establish a professional learning community around the integration of early childhood STEM education could start by:

- Allotting time during each staff meeting to the discussion of early childhood STEM
- Providing time for teachers to share what they are doing in the classroom and to exchange ideas
- Encouraging teachers to meet within smaller groups to discuss how to implement STEM in developmentally appropriate ways during daily routines, outdoor activities, and specific investigations driven by children's interests
- Offering time off for teachers to work toward continuing education credits through webinars or learning conferences that address early childhood STEM education
- Allowing teachers time to explore and play with new materials that they may want to introduce within their classrooms

INSTRUCTIONAL COACHING SESSIONS

Our teachers described instructional coaching as an essential component to their professional development in integrating early childhood STEM education within their classrooms. Teachers reported that they learned to see themselves as researchers and learned to value their role as facilitators rather than directors of children's explorations. Instructional coaching sessions can be supported by including the following within the discussions:

- Explore ways that teachers can expand children's interests and explorations through critically examining the materials introduced, the questions asked, and the set up of the environment
- Ask teachers to share their self reflections and experiences
- Create short-term and long-term objectives based on the needs and professional goals of the teachers
- Introduce new materials or learning resources that could expand a teacher's content knowledge
- Invite content experts to join instructional coaching sessions



ADDITIONAL RESOURCES FOR ADMINISTRATORS AND TEACHERS

Your engagement and support of professional development in Early Childhood STEM Education, is part of a larger ecosystem where experts, researchers, and practitioners share ideas. Here are a few additional resources to further your efforts to provide access, opportunity, and equity in STEM for all learners.

[Myths and Misconceptions in Early STEM Learning](#) (STEMIE, 2020)

[Supporting Early STEM with Infants, Toddlers, and their Families](#) (Zero to Three, 2021)

[STEM Sprouts Teaching Guide](#) (Children's Museum of Boston, 2021)

[Online STEM Resources](#) (Discovery Museum of Idaho, 2021)

1: 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.

2: Daly, L. & Beloglovsky, M. (2018). *Loose Parts 3: Inspiring Culturally Sustainable Environments*. Redleaf Press: St.Paul, Minnesota.

3: Chen, J.Q., Hynes-Berry, M., Abel, B., Sims, C., & Ginet, L. (2017). Nurturing mathematical thinkers from birth: The why, what, and how. *Zero to Three*.

4: Yildirim, B. (2021). Preschool STEM Activities: Preschool Teachers' Preparation and Views. *Early Childhood Education Journal*, 49(2), 149–162.

<https://doi-org.libproxy.boisestate.edu/10.1007/s10643-020-01056-2>

5: Chen, Y.-L., Huang, L.-F., & Wu, P.-C. (2021). Preservice Preschool Teachers' Self-efficacy in and Need for STEM Education Professional Development: STEM Pedagogical Belief as a Mediator. *Early Childhood Education Journal*, 49(2), 137–147. <https://doi-org.libproxy.boisestate.edu/10.1007/s10643-020-01055-3>

6: GEIST, E. (2015). Math Anxiety and the "Math Gap": How Attitudes toward Mathematics Disadvantages Students as Early as Preschool. *Education*, 135(3), 328–336.