

Handout for Early Childhood Investigations Webinar  
“Supporting Young Children’s Creative Thinking Using Problems They Care About:  
Engineering Design In ECE,”  
by Peggy Ashbrook, Carrie Lynne Draper, MEd, and Beth Van Meeteren, PhD  
June 5, 2019

The archived version of this webinar can be found at: <https://www.earlychildhoodwebinars.com>

Young children participate in engineering design and science inquiry from their earliest years as they seek to understand and change their environment. Helping children learn to use materials and their surroundings to build and solve problems is part of early childhood education.

Children’s engineering may involve seeking to build a stable tower, using a stick as a tool, or planning a process to take turns.

The goal of [this webinar](#) is to help you provide opportunities for children in your program to develop engineering habits of mind: ask questions about a situation they want to change, make observations to understand how one part of a solution affects the others, identify problems and seek solutions, and collaborate with others. Using developmentally appropriate practice, you will learn how to guide children to approach problems with a positive attitude that recognizes failure and trying again as part of a learning process.

Join webinar to:

- Learn the building blocks of Engineering Habits of Mind: systems thinking, creativity, try and try again optimism, and collaboration.
- Discuss ways to nurture engineering habits of the mind and provide time for ‘the process,’ moving away from ‘product’ type engineering.
- View what engineering looks like in early childhood settings—examples of young children’s spontaneous engineering design to solve problems important to them.
- Explore how engineering activities develop communication skills and have real-world context for learning science and mathematics concepts.

**Resources: Research, Books, Journal, Online Forum and websites—An incomplete and partial list**

**ABOUT STEM (Science, Technology, Engineering, and Math)**

Engineering in Early Learning Environments: Module 5, STEM for Early Learners, by Beth Van Meeteren. PDG AEM. <https://pdg.grads360.org/#program/stem-in-early-childhood>

“From Stumble to STEM: One Schools Journey to Explore STEM with its Youngest Students” by Carrie Lynne Draper and Susan Wood. January/February 2017. <https://www.childcareexchange.com/article/from-stumble-to-stem-one-schools-journey-to-explore-stem-with-its-youngest-students/5023361/>

Handout for Early Childhood Investigations Webinar  
“Supporting Young Children’s Creative Thinking Using Problems They Care About:  
Engineering Design In ECE,”  
by Peggy Ashbrook, Carrie Lynne Draper, MEd, and Beth Van Meeteren, PhD  
June 5, 2019

“Gimme an ‘E,’ Seven strategies for supporting the “E” in young children’s STEM learning by Cynthia Hoisington and Jeff Winokur. 2015. *Science and Children* 53(1): 44-51. [https://www.nsta.org/publications/browse\\_journals.aspx?action=issue&thetype=all&id=102032](https://www.nsta.org/publications/browse_journals.aspx?action=issue&thetype=all&id=102032)  
*The Roots of STEM Success* by Helen Shwe Hadani and Elizabeth Rood. 2018. Center for Childhood Creativity. <https://centerforchildhoodcreativity.org/roots-stem-success/>  
Science in Early Learning Environments: Module 3. STEM for Early Learners, by Peggy Ashbrook. PDG AEM. <https://pdg.grads360.org/#program/stem-in-early-childhood>  
The TinkerLab Blog by “maker mom” Rachelle Doorley. <https://tinkerlab.com>

### **POSITION STATEMENTS**

The National Association for the Education of Young Children (NAEYC) position statements. <http://www.naeyc.org/positionstatements>

The National Science Teachers Association’s (NSTA) position statement on Early Childhood Science Education—endorsed by the NAEYC. (2014). <http://www.nsta.org/about/positions/earlychildhood.aspx>

### **EARLY CHILDHOOD SCIENCE COMMUNITIES OPEN TO ALL.**

NAEYC Early Childhood Science Interest Forum (ECSIF) on the NAEYC social media site ‘Hello’: Read posts and join NAEYC Interest Forums, <http://hello.naeyc.org/home> . The ECSIF is also on Facebook and Pinterest: <https://www.facebook.com/pages/Early-Childhood-Science-Interest-Forum-naeyc/140431919391071> , <https://www.pinterest.com/ecsif/> , Twitter @ECSIF and the NSTA Learning Center Early Childhood Forum, <http://learningcenter.nsta.org/default.aspx>

### **ABOUT THE NATURE OF SCIENCE**

Understanding Science 101, “fun, accessible, and free resource...accurately communicates what science is and how it really works.” [http://undsci.berkeley.edu/article/intro\\_01](http://undsci.berkeley.edu/article/intro_01)

### **ABOUT EARLY CHILDHOOD SCIENCE EDUCATION**

*Early Childhood Research and Practice*, Collected Papers from the SEED (STEM in Early Education and Development) Conference, 2010. <http://ecrp.uiuc.edu/beyond/seed/index.html>  
Lab Out Loud, Karen Worth Episode 108 – Science in Early Childhood Education, February 23, 2014. <http://laboutloud.com/2014/02/episode-108-science-in-early-childhood-education/>  
Education Development Center, Inc. Foundations of Science Literacy. <http://foundationsofscienceliteracy.edc.org>

Handout for Early Childhood Investigations Webinar  
“Supporting Young Children’s Creative Thinking Using Problems They Care About:  
Engineering Design In ECE,”  
by Peggy Ashbrook, Carrie Lynne Draper, MEd, and Beth Van Meeteren, PhD  
June 5, 2019

## **ABOUT EQUITY**

*Anti-Bias Curriculum for Young Children and Ourselves.* By L. Derman-Sparks & J. Olsen Edwards. 2010. Washington, DC: NAEYC. <https://www.naeyc.org/resources/pubs/books/anti-bias-education>

*Embrace Race*, a blog and Facebook page. <http://www.embracerace.org/>

NAEYC Diversity & Equity Education for Adults Interest Forum. <https://www.facebook.com/earlyedequity/?fref=ts>

## **National Science Teachers Association (NSTA)**

- NSTA/NAEYC Position statement on Early Childhood Science Education (endorsed by the National Association for the Education of Young Children (NAEYC):  
<https://www.nsta.org/about/positions/earlychildhood.aspx>
- NSTA, The Early Years blog  
<http://blog.nsta.org/category/earlyyears/>
- Science and Children, NSTA elementary journal including early childhood.  
<https://www.nsta.org/elementaryschool/>

## **RESEARCH**

Published by the National Academy Press and available online:

*From Neurons to Neighborhoods: The Science of Early Childhood Development* (2000). <http://www.nap.edu/catalog/9824/from-neurons-to-neighborhoods-the-science-of-early-childhood-development>

*Taking Science to School: Learning and Teaching Science in Grades K-8* (2007).  
<http://www.nap.edu/catalog/11625/taking-science-to-school-learning-and-teaching-science-in-grades>

*Ready, Set, SCIENCE!: Putting Research to Work in K-8 Science Classrooms.* (2007)  
<http://www.nap.edu/catalog/11882/ready-set-science-putting-research-to-work-in-k-8>

*A Framework for K–12 Science Education: Practices, crosscutting concepts, and core ideas.* (2012).  
<http://www.nap.edu/catalog/13165/a-framework-for-k-12-science-education-practices-crosscutting-concepts>

*STEM starts early: Grounding science, technology, engineering, and math education in early childhood.* 2017. [http://www.joanganzcooneycenter.org/wp-content/uploads/2017/01/jgcc\\_stemstartsearly\\_final.pdf](http://www.joanganzcooneycenter.org/wp-content/uploads/2017/01/jgcc_stemstartsearly_final.pdf)

Handout for Early Childhood Investigations Webinar  
“Supporting Young Children’s Creative Thinking Using Problems They Care About:  
Engineering Design In ECE,”  
by Peggy Ashbrook, Carrie Lynne Draper, MEd, and Beth Van Meeteren, PhD  
June 5, 2019

*Early STEM Matters: Providing High-Quality STEM, Experiences for All Young Learners, A Policy Report* by the Early Childhood STEM Working Group. 2017. <http://ecstem.uchicago.edu>

Published by the National Association for the Education of Young Children (NAEYC)  
*Developmentally Appropriate Practice in Early Childhood Programs Serving Children from Birth through Age 8*, NAEYC position statement. 2009. <http://www.naeyc.org/dap>  
Five Essentials to Meaningful Play by Marcia L. Nell and Walter F. Drew. *NAEYC for families* online at: <https://families.naeyc.org/learning-and-development/child-development/five-essentials-meaningful-play>

## STANDARDS

*Next Generation Science Standards for K-12 science education: For states, by states.* 2013.  
NGSS Lead States.

<http://www.nextgenscience.org/next-generation-science-standards>

The National Science Teachers Association matrix of NGSS science and engineering practices:  
<http://nstahosted.org/pdfs/ngss/MatrixOfScienceAndEngineeringPractices.pdf>

“Scientific and Engineering Practices in K–12 Classrooms Understanding A Framework for K–12 Science Education” by Roger Bybee. 2011. NSTA journals. [http://nstahosted.org/pdfs/ngss/resources/201112\\_framework-bybee.pdf](http://nstahosted.org/pdfs/ngss/resources/201112_framework-bybee.pdf)

## Next Generation Science Standards (NGSS)

<https://www.nextgenscience.org>

NGSS K-2-ETS1 Engineering Design, <https://www.nextgenscience.org/dci-arrangement/k-2-ets1-engineering-design>

APPENDIX E – Progressions Within the Next Generation Science Standards  
<https://www.nextgenscience.org/sites/default/files/resource/files/AppendixE-ProgressionswithinNGSS-061617.pdf>

Appendix F: Science and Engineering Practices in the NGSS

<https://www.nextgenscience.org/sites/default/files/resource/files/Appendix%20F%20%20Science%20and%20Engineering%20Practices%20in%20the%20ONGSS%20-%20FINAL%20060513.pdf>

The eight practices of science and engineering that the Framework identifies as essential for all students to learn and describes in detail are listed below:

1. Asking questions (for science) and defining problems (for engineering)
2. Developing and using models

Handout for Early Childhood Investigations Webinar  
“Supporting Young Children’s Creative Thinking Using Problems They Care About:  
Engineering Design In ECE,”  
by Peggy Ashbrook, Carrie Lynne Draper, MEd, and Beth Van Meeteren, PhD  
June 5, 2019

3. Planning and carrying out investigations
4. Analyzing and interpreting data
5. Using mathematics and computational thinking
6. Constructing explanations (for science) and designing solutions (for engineering)
7. Engaging in argument from evidence
8. Obtaining, evaluating, and communicating information

## **BOOKS**

*Action Art: Hands-on Active Art Adventures* by MaryAnn Kohl & B. Zaborowski. 2015. Bellingham, WA: Bright Ring Publishing.

*Science in Kindergarten* by Ingrid Chalufour and Karen Worth, Reading #56 from the CD accompanying *Developmentally Appropriate Practice in Early Childhood Programs Serving Children from Birth through Age 8, Third Edition* by Carol Copple and Sue Bredekamp, eds. 2009. Washington, D.C.: National Association for the Education of Young Children.

*Science Is Simple: Over 250 activities for preschoolers* by Peggy Ashbrook. 2003. Beltsville, MD: Gryphon House.

*Science Learning in the Early Years: Activities for preK-2* by Peggy Ashbrook. 2016. Arlington, VA: NSTA Press.

*Starting with Science* by Marcia Talhelm Edson. 2013. Stenhouse Publishers.

*STEM Learning with Young Children: Inquiry Teaching with Ramps and Pathways* by S. Counsell, L. Escalada, R. Geiken, M. Sander, J.Uhlenberg, B. Van Meeteren, S.Yoshizawa, B. Zan. 2015. New York: Teachers College Press.

*Thinking BIG, Learning BIG: Connecting Science, Math, Literacy, and Language in Early Childhood* by Marie Faust Evitt, Tim Dobbins, and Bobbi Weesen-Baer. 2009. Gryphon House.

*Tinkerlab: A Hands-On Guide for Little Inventors* by Rachele Doorley. 2014. Roost Books.

*What Is A Scientist?* by Barbara Lehn, with wonderful photos by Carol Krauss. 1998. Brookfield, CT: Millbrook Press. (Children’s book)

*Worms, Shadows, and Whirlpools* by Karen Worth and Sharon Grollman. 2003. Portsmouth, NH: Heinemann.

*The Young Scientist Series (Nature, Building, Water)* by Ingrid Chalufour and Karen Worth. 2004. Redleaf Press.

Handout for Early Childhood Investigations Webinar  
“Supporting Young Children’s Creative Thinking Using Problems They Care About:  
Engineering Design In ECE,”  
by Peggy Ashbrook, Carrie Lynne Draper, MEd, and Beth Van Meeteren, PhD  
June 5, 2019

## JOURNALS

*Science and Children*, “The Early Years” column in the National Science Teachers Association (NSTA) elementary school journal, with activities and resource suggestions. <https://www.nsta.org/elementaryschool/>

*Teaching Young Children*. National Association for the Education of Young Children’s journal designed especially for preschool educators. <https://www.naeyc.org/tyc/>

*Young Children*. NAEYC’s peer-reviewed professional journal. <http://www.naeyc.org/yc/>

## ADDITIONAL ONLINE RESOURCES

◆Annenberg, Learning Science Through Inquiry. <http://www.learner.org/workshops/inquiry/videos.html?pop=yes&pid=1452>

◆The Early Years Blog, resources and conversation on PreK-2 Science, the free, online companion to the National Science Teachers Association’s early childhood column in the elementary journal, *Science and Children*. <http://blog.nsta.org/category/earlyyears/>

◆ExchangeEveryDay newsletter, <https://www.childcareexchange.com/eed/>

◆Peep and the Big Wide World Science Curriculum, WGBH and 9 Story Entertainment in association with TV Ontario and the National Science Foundation. <http://peepandthebigwideworld.com/en/educators/>

◆Pinterest, ECSIF <https://www.pinterest.com/ecsif/>: search and choose among the many activities and crafts for work that will both honor the capabilities of your students, foster their curiosity, involve a concept important to science, and develop their understanding of the natural and human manufactured world.

◆Regents’ Center for Early Developmental Education, Director Beth Van Meeteren Ed. D. Develops research-based programs and curriculum materials that respect the unique developmental needs of young children and their families, promotes applied and interdisciplinary research in early education, disseminates information about developmentally appropriate early education to educators, parents, and the public at state, national, and international levels through workshops, conferences, and publications. <https://regentsctr.uni.edu>