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

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. National Research Council (NRC) (2012). http://www.nap.edu/catalog/13165/a-framework-for-k-12-science-education-practices-crosscutting-concepts

Published by the National Association for the Education of Young Children

Developmentally Appropriate Practice in Early Childhood Programs Serving Children from Birth through Age 8, National Association for the Education of Young Children (NAEYC) position statement (2009). http://www.naeyc.org/dap

NAEYC Center for Applied Research, Using Early Childhood Research http://www.naeyc.org/research/using#main01

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

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, https://www.facebook.com/pages/Early-Childhood-Science-Interest-Forum-naeyc/140431919391071 , https://www.pinterest.com/ecsif/ , http://ecsif.blogspot.com/

For members of NAEYC: http://member-forums.naeyc.org/

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

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.org/

ABOUT EQUITY

Anti-Bias Curriculum for Young Children and Ourselves. By L. Derman-Sparks & J. Olsen Edwards. 2010. Washington, DC: NAEYC. *https://store.naeyc.org/store/anti-bias-education-young-children-and-ourselves*

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

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.

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.

JOURNALs

Science and Children, "The Early Years" column in the NSTA's elementary school journal, with activities and resource suggestions. The National Science Teachers Association (NSTA) *www.nsta.org* publishes journals for teachers at all levels, including elementary, with feature articles, book and technology reviews, and many descriptions of lesson plans.

Teaching Young Children. National Association for the Education of Young Children's a magazine designed especially for preschool educators. *https://www.naeyc.org/tyc/*

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

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 to 2 Science
The free, online companion to the National Science Teachers Association's early childhood column in the elementary journal, *Science and Children*. *http://science.nsta.org/earlyyearsblog/*

♦ExchangeEveryDay newsletter, https://www.childcareexchange.com/eed/

♦National Association for the Education of Young Children (NAEYC), Teaching Young Children (TYC), Picturing Good Practice. You Can Count on Math Handout 2: Math-Related Children's Books, Songs, and Finger Plays for Preschoolers http://www.naeyc.org/files/tyc/file/BooksSongsandFingerPlays.pdf

♦Peep and the Big Wide World Science Curriculum, WGBH and 9 Story Entertainment in association with TV Onterio & the National Science Foundation. *http://peepandthebigwideworld.com/en/educators/*

♦Pinterest: 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.

♦Ramps and Pathways pages. Regents' Center for Early Developmental Education. Center for Early Education in Science, Technology, Science and Math (CEESTEM).http://www.uni.edu/rampsandpathways/

MAGAZINES

Ladybug, The magazine for young children. A rich source of seasonal stories and poems, many of which include science concepts, as well as occasional science activities. 1-800-827-0227, http://www.cricketmag.com/LYB-LADYBUG-Magazine-for-Kids-ages-3-6

PLACES TO BUY MATERIALS

Don't buy—look in your neighbors' recycling tubs on trash day. Ask your families to save containers for you. Many items can be purchased at craft stores and party stores. Many materials are free from nature: leaves, stones, soil, sticks…

Catalogues For all sorts of science equipment including live animals:

Carolina Biological Supply Company
1-800-334-5551, www.carolina.com

Frey Scientific, 1-800-225-FREY
http://www.freyscientific.com/

Fisher Science Education, 1-800-955-1177
http://www.fisheredu.com/

Delta Education, 1-800-258-1302,
http://www.delta-education.com/

QUESTIONS TO CONSIDER IN PLANNING A SCIENCE CURRICULUM.

Dr. Beth Van Meeteren, Director of the Regents' Center for Early Developmental Education, University of Northern Iowa.

If my goal is to develop science inquiry skills and develop content knowledge:

- Why is this a relevant topic that will be worthy of the children's time?
- In what ways does this topic help children develop their ability to do science rather than only helping children pretend play as scientists?
- What is there in this activity for children to figure out?
- How well can a topic be independently investigated by young children?
- What do I need to know about this topic and be able to do to support children in their investigation?
- How will I structure the environment to support an investigation on this topic (time, tools, materials)?
- What questions or provocations can I provide to stimulate interest and curiosity in the topic (when children are not already interested)?
- How can the child continue to investigate the topic when adults are not there, or independently in their own home environment?
- How do I know I should move on to another opportunity for investigation?

Productive questions, or prompts, direct attention, support further exploration, and encourage children to think more deeply and require more than a single word answer.
Some examples:

Productive questions or prompts	**Source**
What (patterns) did you notice? I wonder why ____? What else might have caused _____? Why do you suppose _____? How was it different than ____? How can you explain ___? How will you know if ____? Do you think you could ____? How did you decide _____?	Journey North Teacher http://www.learner.org/jnorth/tm/inquiry/disc.html#a
1) Attention-Focusing Questions: "Have you seen?" or "What do you notice?" "What are they doing….?" and "How does it feel/sound/look?" 2) Measuring and Counting Questions: "How many…?", "How often…?", "How long…?", and "How much…?". 3) Comparison Questions: "How do…fit together?", "How are…different 4) Action Questions: "What happens if…?" and "What would happen if you…?" 5) Problem-Posing Questions: "Can you find a way to…?" can be asked after sufficient time for exploration. 6) Reasoning Questions: "What are some reasons to explain…" and "How would you explain…"	Productive Questions, Dr. Vickie Harry
Examples of "Essential Questions" Could you help me understand…? Could you tell me about…? Could you tell me what you were thinking? How did you decide…? It seems like you think…if… I wonder…? Tell me about that… What is the problem you are trying to solve? What might happen if…? What would you do…? Why can't I…?	HighScope curriculum http://www.highscope.org/