Newsletter 68 **Science, Technology, Engineering & Math** **2016**

What if there was a ONE-step solution to increasing STEM (Science, Technology, Engineering and Math) learning in your early childhood environment? What if by adapting just ONE practice you could promote higher-level thinking, support the advancement of social skills, improve a child's language development and support engagement and focus in the activities you design for the children?

In the world of STEM learning, phrases like "Scientific Inquiry," "theory," "hypothesis," "data-collection," "analysis," and "critical thinking" can sometimes leave early care providers wondering how these ideas can be considered developmentally appropriate in their classrooms. How is the exploration of physics appropriate for a 3-year-old? Why would mathematical concepts be of interest to a toddler?

Fortunately, at the heart of STEM learning there is no need for memorizing STEM terms, designing complex experiments and looking for ways to engage young children in activities that feel inappropriate for their developmental stages. To teach STEM in an early childhood environment, you don't have to know all the ANSWERS, you simply need to know how to ASK THE RIGHT QUESTIONS.

That's it! ONE change that impacts ALL learning. Give fewer answers and ask more *intentional* questions.

Here are a few examples:

- To encourage reasoning skills and analysis: "Why do we need to wear a coat outside today if we didn't need one yesterday?"
- Acknowledge and support observations made, and help them evaluate their conclusions: "Would you rather live in that nest we saw in the tree or the spider-web in the grass?" "Why?"
- Encourage children to think about their thinking: "How did you figure that out?"
- Look for ways to link or align ideas across multiple activities: "Remember when we explored the colors, shapes and sizes of rocks yesterday? Maybe today we can guess which ones are the lightest and heaviest."
- Help children dig deeper into basic concepts: Instead of asking IF, ask WHY. "Why doesn't this shape (color/texture/picture) belong with the others?"
- Help children connect learning to their everyday lives: "Let's make a graph to show how each of us gets to school each day. Bring your picture up and put it next to the bus, the car, the boat, the bicycle, or the walking feet."
- Encourage creativity and imagination. Acknowledge and appreciate "out-of-the-box thinking" and support and explore the ideas that might seem "impossible." "Let's try to think of all the ways we could get from our classroom to the playground. Which way do you think is fastest? Which one is silliest? If you could use ANY method, which one would you use?"

Want to know more? Use the resources in this issue to help you develop, support, or enhance the STEM learning in your classroom and let us know if we can help find more for you!

Marvelous Explorations through Science and Stories (MESS)

The MESS teaching guides from the Head Start Early Childhood Learning & Knowledge Center (ECLKC) can help early childhood teachers develop confidence in introducing scientific discovery and concepts to young children.

- My Body My Senses Teacher's Guide
- Investigating Water Teacher's Guide
- Our Natural World Teacher's Guide
- Physical Science Teacher's Guide
- Kitchen Science Teacher's Guide
- Animals 1: Fur, Fins, Feathers and More Teacher's Guide
- Animals 2: Insects and Spiders Teacher's Guide
- Plant Life Teacher's Guide

Science: It's a Girl Thing!

An early childhood science program designed for caregivers and children to do together. Each of the ten activities in ***Science: It's a Girl Thing!*** create physical science experiences that use inexpensive materials commonly found in most homes. Designed around children's natural play activities, the hands-on, minds-on experiments involve things like pouring, sorting, categorizing, measuring, and constructing, which provide a strong foundation for understanding more complex concepts later on.

Each activity is laid out like a recipe card and indicates the specific skills the activity develops, how much time to allow, what materials are needed, step-by-step activity instructions, how to expand the activity for different ages, and modifications for children with disabilities.

- Creating a Mystery Bottle
- Bubble Science
- Making and Using Sieves
- Making and Tossing Beanbags
- Ramps, Force, and Motion
- Building with Wonderful Junk
- Discovering How it Works
- Looking at How Liquids Move
- Oobleck: Solid or Liquid?

STEM
books to borrow from CCIC

1. ***Teaching STEM in the early years: activities for integrating science, technology, engineering, and mathematics.*** Sallly Moomaw. St. Paul, MN: Redleaf Press, 2013. 227 p.
The foundation for science, technology, engineering, and mathematics education begins in the early years. This book provides activities and learning center ideas that seamlessly integrate STEM throughout your early childhood classroom for children ages 3-7.

2. ***Exploring math & science in preschool.*** Washington, DC: National Association for the Education of Young Children, 2015. 102 p.
Adapted from the NAEYC magazine *Teaching Young Children* (TYC), this book offers learning center ideas, engaging activities, practical suggestions, children's book recommendations, and ideas that support the development and learning of every preschooler.

3. ***Blocks and beyond: strengthening early math and science skills through spatial learning.*** Baltimore, MD: Brookes, 2010. 200 p.
Focusing on math, science, art, literature, and social studies, this book includes insights and activities to promote the spatial development of children in preschool through grade 3.

4. ***The Block book. 3rd ed.*** Washington, DC: National Association for the Education of Young Children, 1996. 162 p.
Blocks contribute richly to creativity, dramatic play, social studies, science, math, and cooperative exploration of patterns, geometry, ordering and much more.

5. ***Science and technology.*** Ann S. Epstein. Ypsilanti, MI: HighScope Press, 2012. 102p.
Volume 8 of the highly regarded *HighScope Curriculum*.

SCIENCE
books to borrow from CCIC

6. ***Learning with nature: embedding outdoor practice.*** Claire Warden. Thousand Oaks, CA: SAGE, 2015. 95 p.
Learning outside the classroom is a key part of early years and primary practice and is on the rise in settings across the world. This book focuses on outstanding outdoor practice and how children can learn and develop in natural environments.

7. ***Starting with science: strategies for introducing young children to inquiry.*** Marcia Talhelm Edson. Portland, ME: Stenhouse Publishers, 2013. 149 p.
Young children arrive at school with unrestrained curiosity and wonder about the world. A fact-based, hands-on activity approach to teaching science however, is not enough to help them deepen their scientific thinking or discoveries.

8. ***Incredible edible science: recipes for developing science and literacy skills.*** Liz Plaster. St. Paul, MN: Redleaf Press, 2010. 243 p.
160+ hands-on, food-based activities let children ages 3-8 investigate concepts in math, language, and literacy – and then eat their work.

9. ***Picture science: using digital photography to teach young children.*** Carla Neumann-Hinds. St. Paul, MN: Redleaf Press, 2007. 100 p.
Digital photography makes each step in the scientific process concrete and fun for children 3-5.

10. ***Small wonders: nature education for young children.*** Linda Garrett. Woodstock, VT: Vermont Institute of Natural Science, 2005. 314 p.
Hands-on, age-appropriate experiments and explorations use the imagination and natural curiosity of children 3-5 to introduce them to the natural world in a special way.

11. ***ScienceArts: discovering science through art experiences.*** MaryAnn F. Kohl. Bellingham, MN: Redleaf Press, 1997.
Hands-on experiments combine the curiosity of science with the beauty of art for children 3-10.

12. ***Exploring water with young children.*** Ingrid Chalufour. St. Paul, MN: Redleaf Press, 2005.
This curriculum helps children ages 3-5 learn the skills of questioning, investigating, discussing, and formulating ideas and theories as they explore water and its properties.

13. ***Discovering nature with young children.*** Ingrid Chalufour. St. Paul, MN: Redleaf Press, 2003.
From indoor terrarium and planting projects to outdoor animal searches and habitat discussions, this curriculum helps children 3-5 develop scientific reasoning processes as well as math, language, and literacy skills.

14. ***Even more fizzle bubble pop & wow!: simple science experiments for young children. Rev. ed.*** Lisa Murphy. San Diego, CA: Learning Through Adventure, 2003.
80 simple science experiments for children ages 3-12 from the Ooey Gooey Lady.

15. ***Worms, shadows, and whirlpools: science in the early childhood classroom.*** Karen Worth. Portsmouth, NH: Heinemann, 2003. 168 p.
Even the littlest learners are powerful thinkers and theory makers. Children ages 3-5 benefit greatly from having real-life, inquiry-based science experiences like these to think about.

16. ***More than magnets: exploring the wonders of science in preschool and kindergarten.*** Sally Moomaw. St. Paul, MN: Redleaf Press, 1997.
100+ hands-on learning experiences encourage children 3-6 to explore, hypothesize, and observe.

TECHNOLOGY
books to borrow from CCIC

17. *Technology and digital media in the early years: tools for teaching and learning.* Chip Donohue. New York: Routledge, 2015. 265 p.

A thought-provoking guide to effective, developmentally appropriate, and intentional use of technology with young children. Pedagogical principles, classroom practices, and teaching strategies are presented in a practical, straightforward way. Offers best practices based on the NAEYC/FRC Position Statement on Technology and Interactive Media and the Fred Rogers Center Framework for Quality in Children's Digital Media. A companion website provides additional resources and links to further illustrate principles and best practices for teaching and learning in the digital age. Written for early childhood teacher educators, professional development providers, and early childhood educators in pre-service, in-service, and continuing education settings.

18. *Teaching in the digital age: smart tools for age 3 to grade 3.* Brian Puerling. St. Paul, MN: Redleaf Press, 2012. 245 p.

Describes technology for teachers and teaching. Uses color illustrations and QR codes that link to video clips to show the many ways technology can enhance complete curriculum and assessment in the classroom. The book's strategies reflect *Technology in Early Childhood Programs*, the joint position statement of the National Association for the Education of Young Children and the Fred Rogers Center.

19. *Blocks to robots: learning with technology in the early childhood classroom.* Marina Umaschi Bers. New York: Teachers College Press, 2008. 154 p.

A robotic manipulative is any construction kit (such as LEGO Mindstorms) for children involving 1) construction in the physical world and 2) programming that construction in the computer so it can become interactive and respond to stimulus in the world. Children use robotics to develop the skills and ways of thinking needed to be able to create their own personally meaningful projects and solve problems using technology.

ENGINEERING
books to borrow from CCIC

20. *Ramps & pathways: a constructivist approach to physics with young children.* Rheta DeVries. Washington, DC: National Association for the Education of Young Children, 2011. 103 p.

Provides an introduction to constructivist physics with classroom examples illustrating how children construct knowledge. Shows how to promote children's scientific reasoning by engaging them in active experimentation.

21. *Building structures with young children.* Ingrid Chalufour. St. Paul, MN: Redleaf Press, 2004.

This curriculum helps children ages 3-5 develop science inquiry skills and an understanding of physical science as they design and build block structures.

22. *Gizmos & gadgets: creating science contraptions that work (& knowing why).* Jill Frankel Hauser. Charlotte, VT: Williamson Publishing, 2015. 141 p.

Provides instructions for making 75 contraptions that demonstrate friction, gravity, energy, motion, and other principles of physics. Explains for children 7-14 how to think like an inventor.

MATHEMATICS
books to borrow from CCIC

23. *Exploring mathematics through play in the early childhood classroom.* Amy Noelle Parks. New York: Teachers College Press, 2015. 148 p

This book shows how children infuse mathematics into their play while playing their way into mathematics. It also explains how to do play-based teaching and why it is so effective.

24. *Mathematizing: an emergent math curriculum approach for young children.* Allen C. Rosales. St. Paul: Redleaf Press, 2015. 141 p.

This guide to building children's math and inquiry skills outlines a "mathematizing" approach in which children ages 3-6 develop their understanding of math concepts in real-life, everyday contexts. Includes practical lessons, case studies, and a glossary.

25. *Big ideas of early mathematics: what teachers of young children need to know.* The Early Math Collaborative, Erickson Institute. Boston: Pearson, 2014. 196 p.

Use this book to explore and understand the Big Ideas that underlie early math content, and learn how to make these foundational ideas clear to children 3-6.

26. *Mathematics.* Polly Neill. Ypsilanti, MI:, HighScope Press, 2014. 159 p.

Volume 6 of the highly regarded *HighScope Curriculum*.

27. *Meaningful math in preschool: making math count throughout the day.* Polly Neill. Ypsilanti, MI:, HighScope Press, 2014. 159 p.

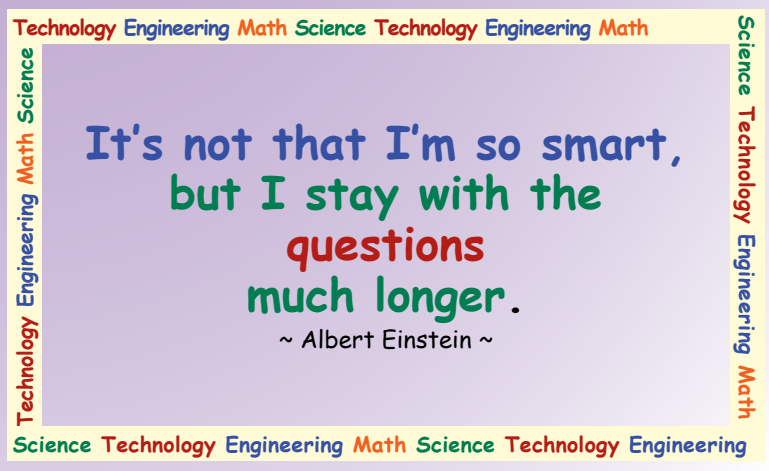
How to provide a learning environment that is rich with opportunities for preschool children to explore, discover, and expand on various math concepts.

28. *More than counting: standards-based math activities for young thinkers in preschool and kindergarten.* Sally Moomaw. St. Paul, MN:, Redleaf Press, 2011. 353 p.

124 math activities and games provide children 3-6 with learning opportunities that reflect early learning standards - on quantification, arithmetic, algebra, geometry, measurement, and data analysis and probability - from the National Council of Teachers of Mathematics (NCTM).

29. *The young child and mathematics. 2nd ed.* Juanita V. Copley. Washington, DC:, National Association for the Education of Young Children, 2010. 170 p.

Based on standards and guidelines from NCTM and NAEYC, this book uses classroom vignettes, activity ideas, and strategies to show how teachers can readily and enjoyably make math an integral part of their classrooms all day, every day. **Accompanied by the DVD *Mathematics in Action: Teaching and Learning*** to be played on a computer with a DVD drive.



STEM DVDs to borrow from CCIC

The Young Scientist Series

30. *DISCOVERING NATURE WITH YOUNG CHILDREN: TRAINER'S VIDEO.* 37 min DVD

Includes trainer's guide (218 p.) + curriculum book (157 p.) St. Paul, MN: Redleaf Press, 2003.

This inquiry-based science curriculum builds on children's natural curiosity about the living world around them. The trainer's guide has materials for six basic workshops and seven advanced workshops to introduce preschool teachers to the curriculum, show them how to prepare themselves and their classrooms, how to guide children through both open and focused science explorations, and how to observe, assess, and document children's learning. To aid discussion, the video presents eight vignettes showing teachers using the curriculum at different stages in their development as science teachers.

31. *EXPLORING WATER WITH YOUNG CHILDREN: TRAINER'S VIDEO.* 37 min DVD

Includes trainer's guide (219 p.) + curriculum book (108 p.) St. Paul, MN: Redleaf Press, 2003.

This preschool science curriculum supports children's development of inquiry skills and scientific dispositions at the water table as they explore concepts related to water's flow, appearance, and effect on objects. The trainer's guide has materials for six basic workshops and eight advanced workshops to introduce preschool teachers to the curriculum. To aid discussion, the video presents seven vignettes showing teachers using the curriculum at different stages in their development as science teachers.

32. *BUILDING STRUCTURES WITH YOUNG CHILDREN: TRAINER'S VIDEO.* 37 min DVD

Includes trainer's guide (219 p.) + curriculum book (129 p.) St. Paul, MN: Redleaf Press, 2004.

This preschool science curriculum guides children's explorations to help deepen their understanding of the physical science present in building block structures, including concepts such as gravity, stability, and balance. The trainer's guide has materials for six basic workshops and eight advanced workshops to introduce preschool teachers to the curriculum. To aid discussion, the video presents eight vignettes showing teachers using the curriculum at different stages in their development as science teachers.

33. *BLOCK PLAY: CONSTRUCTING REALITIES.* 20 min DVD

Washington, DC: NAEYC, 1993.

As we watch children happily construct and reconstruct block creations, we see that they are also constructing knowledge and developing skills they need to grow and negotiate their way through more complex learning experiences.

34. *LISA MURPHY PRESENTS OOEY GOOEY SQUISHY PLOP!* 52 min DVD-ROM

Rochester, NY: Ooey Gooey Inc, 2012.

In this one of a kind workshop Lisa Murphy, the Ooey Gooey Lady, demonstrates six tables of hands-on art, science, and sensory play activities as well as the "wolf words" that support their use in your classroom. Includes self-test and handout.

35. *FOUNDATIONS: THE VALUE OF BLOCK PLAY.* 30 min DVD

Rifton, NY: Community Playthings, 2010.

Educators discuss the benefits of using wooden unit block play with young children.

May be viewed online at http://www.communityplaythings.com/resources/videos/foundations

36. *BUILDING MATHEMATICAL COMPETENCIES IN EARLY CHILDHOOD.* 36 min DVD

San Luis Obispo, CA: Davidson Films, 2012.

The WHYs, WHATs, and HOWs of including rich, developmentally appropriate mathematics experiences for young children in pre-kindergarten classrooms.

STEM DVDs to borrow (continued)

37. *NATURE IN EARLY CHILDHOOD EDUCATION: DESIGNING CURRICULUM TO MEET STANDARDS WITH EVIDENCE-BASED PRACTICES.*

96 min DVD + CD-ROM Cincinnati., OH: Arlitt Instructional Media, 2013.

DVD includes three programs showing theoretical concepts in action. Guides on accompanying CD-ROM allow training to be facilitated or independent..

- **Romancing nature with young children** (44 min.) shows how teachers use nature and the environment to help children learn across a wide array of disciplines.
- **Designing nature spaces** (36 min.) shows the key features of two playscapes, or natural playgrounds, and demonstrates how teachers integrate nature into all learning.
- **Environmental education for young children** (16 min.) shows how teachers help children learn to love nature and gain higher levels of thinking about the environment, science, and their place in the world.

38. *SCIENCE IN EARLY CHILDHOOD EDUCATION: DESIGNING CURRICULUM TO MEET STANDARDS WITH EVIDENCE-BASED PRACTICES.*

83 min DVD + CD-ROM Cincinnati., OH: Arlitt Instructional Media, 2008.

DVD includes three programs showing theoretical concepts in action. Guides on accompanying CD-ROM allow training to be facilitated or independent..

- **Children's development of scientific knowledge guides planning** (26 min.) shows how to plan and implement activities based on the ways in which children construct scientific knowledge.
- **Teacher reflection informs planning** (35 min.) shows how to extend science activities and use questions to promote children's higher-level thinking.
- **Integrating science throughout the classroom** (22 min.) shows how to integrate science throughout the early childhood classroom to create a rich, meaningful science curriculum.

39. *MATHEMATICS IN EARLY CHILDHOOD EDUCATION: DESIGNING CURRICULUM TO MEET STANDARDS WITH EVIDENCE-BASED PRACTICES.*

68 min DVD + CD-ROM Cincinnati., OH: Arlitt Instructional Media, 2008.

DVD includes three programs showing theoretical concepts in action. Guides on accompanying CD-ROM allow training to be facilitated or independent..

- **Knowledge of mathematical development guides planning** (22 min.) shows how children develop mathematical concepts and how teachers can use this knowledge to guide planning.
- **Teacher reflection informs planning** (29 min.) shows how teachers can use reflection to make modifications to the classroom environment and their own instructional strategies.
- **Planning for intentional teaching opportunities** (17 min.) shows how to integrate mathematics throughout the early childhood classroom to create intentional teaching opportunities.

40. *MATHEMATICAL THINKING: GEOMETRY, PATTERNING AND MEASUREMENT IN EARLY CHILDHOOD EDUCATION: DESIGNING CURRICULUM TO MEET STANDARDS WITH EVIDENCE-BASED PRACTICES.*

83 min DVD + CD-ROM Cincinnati., OH: Arlitt Instructional Media, 2008.

DVD includes three programs showing theoretical concepts in action. Guides on accompanying CD-ROM allow training to be facilitated or independent..

- **Geometry** (31 min.) shows how children use learning about shapes to form deeper mathematical knowledge. Explains how to help children build a working vocabulary that will continue throughout their mathematical education.
- **Patterning** (28 min.) shows how children build future math skills through early patterning experiences. Patterning across a variety of group and individual activities forms a strong foundation for more complex mathematical concepts.
- **Measurement** (24 min.) shows how measurement concepts begin to develop in infancy. Measurement of length, volume and even time supports later understanding of mathematical concepts.

Free Online Book!

Identifying and Supporting Productive STEM Programs in Out-of-School Settings

National Research Council. Washington, DC: National Academies Press, 2015.

Download free PDF or read online at:

http://www.nap.edu/catalog/21740/identifying-and-supporting-productive-stem-programs-in-out-of-school-settings?utm_source=NAP+Newsletter&utm_campaign=68dc71d6a8-NAP_mail_new_2015_11_03&utm_medium=email&utm_term=0_96101de015-68dc71d6a8-103209497&goal=0_96101de015-68dc71d6a8-103209497&mc_cid=68dc71d6a8&mc_eid=381419bfebf

Scientists investigate that which already is;

Engineers create that which has never been.

~Albert Einstein~

Articles and other online resources about STEM in the early years

41. The Project Approach and STEM: A Powerful Combination

Sylvia Chard. *Community Playthings,* February 2016

When using both the Project Approach and STEM-focused learning in your classroom, children are empowered to ask questions, investigate, problem-solve, communicate, and discover. By building on their natural curiosity instead of imposing a scripted curriculum, the children become independent thinkers and lifelong learners. The authentic learning they experience extends beyond the classroom into the world.

42. Magnets: A First Step to High Tech

Barbara Langham. *Texas Child Care Quarterly,* Spring 2016

The invisible nature of the magnetic force as well as the fun of playing with magnets can give the impression that magnetism is magic. But magnetism is science. It has observable physical effects, it's consistent and predictable, and it gives the same results in repeated testing.

43. STEM Outdoors: Exploring Energy

Joshua Sneideman. *Natural Start Alliance,* April 2016

Even for some adults, the concept of "energy" can seem like a highly complex topic that's difficult to understand, much less explain to a young child. How do you explain how electricity moves along wires, or how cell phones are capable of sending messages wirelessly? But at its most fundamental, energy is simply the ability to do work. Energy helps things move and live. Energy is all around us.

44. Tomorrow's Architects and Engineers: They're Hammering and Sawing in Today's Classrooms

Dianne Pape and Barbara Hatcher, *Texas Child Care Quarterly,* Fall 2008

Woodworking is valuable for preschool and schoolage children for many reasons. Certainly it promotes mastery of basic woodworking skills such as measuring, hammering, sawing, and finishing. It can also be therapeutic for young children. But more important, it promotes skills in all five domains of child development.

45. Hands-On Science for Young Children

Tanya Eggers, *Early Childhood News,* 2007

Do you know a child who is not completely full of questions? As educators and parents, it's easy to tune out the barrage of inquiries—but wait—could we be missing valuable teaching moments full of motivated learners? The resounding answer is, YES! What may be a never-ending supply of trivial questions may, in fact, be a complex science investigation.

46. Problem Solving: Engineering Experiences in Early Childhood

Betty Zan & Beth Van Meerteren, *Community Playthings,* July 2015

Perhaps the most significant domain strengthened here is "Approaches to Learning". This phrase refers to how a child responds to new learning situations, and includes curiosity, engagement, initiative, persistence, problem solving, creativity, and inventiveness. These qualities are essential for later learning and affect academic success across all content domains.

47. Creating a Culture of Scientific Inquiry among Educators in an Early Childhood Context

Alison Maher, and Ellen Hall. *Exchange Magazine,* May/June 2016

The process of documentation offers educators an opportunity to make connections between classroom experiences and theories of learning, motivation, and child development. Plans for future learning experiences are then developed based on new understandings. In this way, the process of scientific inquiry includes ongoing observation, reflection, and action, and is a process that unfolds throughout the year, resulting in a curriculum that is contextual, relevant, and challenging for both children and adults.

48. Bridging the Gap: Integrating Technology and Environmental Education

J. Willis, B. Weiser, and D. Kirkwood, *Natural Start Alliance,* February 2015

Children come from diverse backgrounds, particularly in terms of their access to nature and technology. It's our job as teachers to help level the playing field and provide all students an equal chance to succeed. By integrating the two seemingly opposed areas of nature and technology, we can create an opportunity for young children to become both environmentally and technologically literate. In this article, we explore how technology tools can be used to encourage preschoolers to engage in activities that will help them appreciate nature and explore environmental issues.

49. The Power of the Woodworking Bench

Judith Pack, *Community Playthings,* February 2015

With the emphasis on STEM in early childhood classrooms, the woodworking bench provides preschool and primary school children a means to become makers, tinkerers and engineers. If we are serious about helping children master science concepts, then we need to provide children with real experiences, not artificial substitutes. If we want children to be confident about pursuing interests in STEM, then we need to give them materials that are open ended to foster the use of their imaginations and creativity. If we respect children's modes and ways of learning and thinking, then we need to give them opportunities to experience meaning and joy in the work and play that they do.

Experiment. Fail. Learn. Repeat.

50. Developmentally Appropriate STEM: It's STREAM! (Science, Technology, Relationships, Engineering, Arts and Math)

D.J. Gartrell, *Exchange Magazine,* May/June 2016

Developmentally appropriate STEM is holistic. For the child, scientific problem-solving, artistic creative expression, and building and using meaningful structures all take similar self-affirming, brain-building exploratory processes. Interaction with others about these experiences is natural, and positive interaction, especially with adults, is vital. Some early childhood educators consider STEM to be better thought of as STREAM: science, technology, relationships, engineering, arts, and mathematics.

51. Physics in Preschool? Teaching STEM with Ramps and Pathways

Betty Zan. *Community Playthings,* November 2014

Young children are budding physical scientists. They are intensely curious about the world and want to figure out how it works. They are also budding engineers. They invent, design, and solve problems. Most of all, they love to be active and make something interesting happen. While experimenting with ramps children become intently engaged with science (the physics involved in creating a stable structure and moving objects in various ways), technology (using a structure that will allow them to move marbles in interesting ways), engineering (designing their structures to achieve the results they want), and mathematics (reasoning about number, space, shapes, and patterns).

52. Trainers Talk: Tackling Teacher's Science "Anxiety"

Polly Neill. *HighScope Resource,* Winter 2010-2011

For children to acquire anything beyond random bits and pieces of information in any area, they require adults around them who are familiar with the content and able to scaffold their learning. If science is going to claim equal time with mathematics and language and literacy, teachers will have to turn with excitement toward the light, dirt, ramps, structures, ants, shadows, and other delights that characterize early childhood science.

More articles and online resources about STEM in the early years

53. "I Hate Math!" What We Want Children NOT to Learn.

Alyse C. Hachey. *Texas Child Care Quarterly,* Fall 2009

Young children do not naturally perceive their world as separate subject areas like math, reading, and science. Nor is math limited to formulaic expression. Instead, mathematical patterns occur in the songs children sing, the books they read, and their charting of the weather. Geometry and spatial sense are found in the art children create, the movement games they play, the puzzles they do, and the models they build. Number is found in the chants children say, the sports they play, and the scenes they act out.

54. The Child's Love of Mystery

Judith Pack. *Community Playthings,* July 2015

In early childhood we often say that the process is more important than the product, usually referring to children's art. However, it is important to recognize that process reigns supreme in most of what children do. When children are interested or intrigued by an object or an idea (a puddle, a leaf on a sock) they need to dig deep and explore. As you work with these wildly exuberant and curious children, keep in mind that mystery heightens curiosity and teachers are crucial players in creating places where children and adults can pursue these mysteries together. With observation, "good" questions, and an open and exploratory environment, wonderful things can be discovered and more questions can be pursued.

55. For Infants and Toddlers in the Digital Age, *Time* with Adults Still Matters Most.

Michael Robb. *Fred Rogers Center for Early Learning & Children's Media,* Sept. 2013.

The Rogers Center's Michael Robb takes a look at what we know from the research about infants and media and shares suggestions for how to use technology and interactive media in age-appropriate, intentional ways.

56. Exploring Simple Machines: Physics for Young Children.

Texas Child Care Quarterly, Spring 2012

"Look!" calls Rachel. "We turned the wagon over. Come and spin a wheel with us." Four children sit on the playground grass trying to make the wheels spin faster and faster. Look around: Where else do you see simple machines - the wheel on a tricycle, the slide, the platform steps, scissors at the art table, the push-pin on the parents' bulletin board or maybe a can opener on the kitchen counter?

57. How True Are Our Assumptions about Screen Time?

Lisa Guernsey. *National Association for the Edcation of Young Children.*

"Video, TV, interactive books, screen-based games: Young children today are practically bathed in this stuff as young as toddlerhood. What is the impact? As a parent who is simultaneously fascinated by and worried about the impact of electronic media on my children—and as a journalist and researcher specializing in education, technology, and social science—I have been digging for answers. Along the way I've come upon several research findings that overturn conventional wisdom. Here are five common parental assumptions that the research does not necessarily support."

58. Science Is Wonder.

Mike Huber. *Community Playthings,* August. 2015.

Science is mostly about the things we see every day but don't notice. Most of us probably couldn't explain why the sky is blue or what part of the branch leaves grow on and what parts they don't. And it's OK that we don't have the answers. What we need to do is help children ask those questions about the everyday things, and then help them figure out how to answer their questions. Science is about wonder.

The Fred Rogers Center Online STEAM videos

http://www.fredrogers.org/professional/video/steam/

- Fred Rogers' Approach to STEM
- Math Isn't Just Numbers
- Math You Can Count On
- High Tech - High Touch
- Encouraging Curiosity
- Save for a Rainy Day
- Starting With the Ordinary
- STEM Is Everywhere
- Shedding Light on Shadows
- A Wonder-ful Place
- One Small Step Closer to Nature

Early Connections: A Parent Education Toolkit for Early Childhood Providers.

https://www.commonsensemedia.org/educators/early-connections

Early Connections contains a host of easy-to-use resources so you can educate your families about media and technology. The toolkit includes handouts, family workshop outlines, recommendations and more, focused on 6 topics related to media and technology:

• Media Messages • Moving • Creative Play • Feelings and Friends • Language and Reasoning

Your Toolkit for Early Childhood STEM Education

http://archive.brookespublishing.com/content/Brookes-STEM-toolkit.pdf

This toolkit is packed with more than 30 great resources—from tip sheets and articles to webinars and video clips—designed to help you:

- deepen your knowledge about the importance of STEM
- discover what successful STEM-centered teaching practices look like
- boost your students' STEM skills with concrete examples and activities

Keep this toolkit as a handy reference to give your students the best start in STEM learning!

Let's Talk, Read and Sing About STEM!

US Dept. of Education tip sheets for families & early learning educators

http://www2.ed.gov/about/inits/ed/earlylearning/talk-read-sing/index.html

Tips for Preschool Teachers & Providers

Tips for Infant/Toddler Teachers & Providers

Tips for Families with Young Children

STEM Sprouts: Teaching Guide

http://www.bostonchildrensmuseum.org/sites/default/files/pdfs/STEMGuide.pdf

Let's Talk About STEM! Video Series!

ZERO TO THREE

https://www.zerotothree.org/resources/series/let-s-talk-about-stem-video-series

Everyday Fun With Technology and Engineering

Everyday Fun with Science

Let's Talk About Math: Early Math Video Series

Checklist for Identifying Exemplary Uses of Technology & Interactive Media for Early Learning

http://fredrogers143.wpengine.com/wp-content/uploads/2015/07/Checklist-for-Identifying-Exemplary-Uses.pdf

Educators can use this checklist to help ensure developmentally appropriate practice remains central to their practices around:

- **Selection** - Intentionality, Developmental Appropriateness, Planning;
- **Use** - Physical Environment, Collaboration, Connection to Non-Digital World, Family Engagement, Digital Equity;
- **Integration** - Professional Development, Support;
- **Evaluation** - Assessment, Reflection

STEM Gems

http://naaweb.org/resources/stem-gems

STEM Gems are short discovery-based experiences. They involve little or no materials and may be easily implemented by educators who are not STEM specialists. Each STEM Gem is designed to engage young people in active experiential learning.

Cloud in a Bottle | Simple Sundials | Cartesian Diver | Indoor Lawn | How to Weigh an Elephant | Frozen Baseballs | Mini Ice Rink

Science, Technology, Engineering, & Math websites to explore

Peep and the Big Wide World: WGBH (the public television station that produces PEEP) received a grant from the National Science Foundation to develop free STEM curriculum and professional development modules for home-based providers working with 3 to 5-year olds. The resources are translated and available here:
http://peepandthebigwideworld.com/en/educators/

American Camp Association: NASA Resources for Camps
http://www.acacamps.org/resource-library/professional-development/nasa-resources-camps

Center for Early Education in STEM: Games for 3-8 yr. olds.
http://www.uni.edu/ceestem/games

Teach Preschool - STEM
http://www.teachpreschool.org/stem/

NAEYC - STEM
http://www.naeyc.org/STEM

NAEYC - Technology and Young Children
http://www.naeyc.org/content/technology-and-young-children

NASA Kid's Club
http://www.nasa.gov/audience/forkids/kidsclub/flash/index.html#.V46F2UYrLIU

Fred Rogers Center - Technology and Young Children
http://www.fredrogerscenter.org/initiatives/digital-media-learning/

Afterschool Alliance – Afterschool and STEM Learning
http://www.afterschoolalliance.org/stem.cfm

Community Playthings - STEM
http://www.communityplaythings.com/resources/articles

Everyday Learning - PBS Learning Media Videos
Videos and interactives in the *Everyday Learning* collection use original animation and images to introduce basic concepts of math, science, health, social studies, and art to students in preschool through first grade.
http://www.pbslearningmedia.org/collection/everyday-learning/?topic_id=598

Illinois Early Learning: Tip Sheets

http://naaweb.org/resources/stem-gems

IEL Tip Sheets are easy-to-read, one-page resources on a variety of topics of interest to parents and teachers of young children. Great resources can be found here by searching *any topic*, and below you'll find a small selection of what's available on STEM.

- CSI: Child Scientist Investigates!
- "What's Next?" Predictions at Story Time
- Predicting: Helping Preschoolers Look Ahead
- Time for Preschoolers: Duration
- What to do While You're Waiting
  1. Science
  2. Curious Young Scientists
  3. Math
  4. Music, Sound and Movement
  5. Language and Literacy
- Playground Physics: On a Roll
- Things Change
- The Curious Child
- Out and About with Preschoolers
  1. Everyday Sky Activities
  2. Look Around!
  3. Take a Longer Look!
  4. Build!
  5. Think About It!
- Say Yes to the Mess!
  1. Play With Rocks
  2. Water Works
  3. Snow Time
- Playground Physics: Hang in There!
- Tech Time!
  1. Computers and Preschoolers
  2. Video Games & Young Children
  3. TV, Videos and Young Children

WISCONSIN EARLY CARE & EDUCATION PROFESSIONALS

The Child Care Information Center (CCIC) is a free mail-order lending library and information service for anyone in WI working in the field of child care, afterschool, and early education. CCIC has worked since 1986 to provide quality resources to match the needs of early care and education professionals, educators, and parents.

Ready to order?

1. Which newsletter issue are you looking at & what are the item numbers?
2. When do you need them?
3. Who are you? We will need your name, center name, address, and phone number.
4. Need something not on the list? Call us and let us find it for you!

ARTICLES ARE YOURS TO KEEP! BOOKS & VIDEOS ARE LIBRARY ITEMS YOU WILL NEED TO MAIL BACK TO CCIC
DVDs keep 1 week, BOOKS you can keep for 2 weeks, and renew over the phone if item isn't reserved for others.

Let CCIC do the research so you can focus your limited and valuable time on the most important thing - the kids!

Give us a call and tell us what you'd like to know more about. CCIC will *customize a package of information for you* using the many trusted resources CCIC has available as well as suggestions on where you might find further information.

USPS: Child Care Information Center
2109 S Stoughton Rd Madison WI 53716
PHONE: 800.362.7353
608.224.5388
EMAIL: ccic@wi.gov
WEBSITE: www.ccic.wi.gov
FAX: 608.224.6178