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# Partnering with Families to Support Children's Early Science Learning

by Cindy Hoisington

As we advance into the 21st century, there is an increasing focus on educating students in science and STEM (science, technology, engineering, and math), and early childhood teachers are being asked to think more deeply about the quantity and quality of the science experiences they provide for young children. Recent research, including reports such as *STEM Starts Early* (Joan Ganz Cooney Center, 2017), clearly describes the benefits of high-quality early STEM experiences for later learning and school achievement, and for developing children's positive attitudes toward doing and learning science (Turner & Patrick, 2008).

As a result, ECE standards across the country are being revised and updated to align with the K-12 Next Generation Science Standards (NGSS Lead States, 2013), and many now incorporate a distinct focus on concepts in life, earth, and physical science (for example: characteristics and needs of living things; properties of earth's materials; forces, motion, and stability). There is also an emphasis on inquiry and on science and engineering practices.

## Science and Engineering Practices

The practices describe eight activities that scientists and engineers use as they engage in the inquiry process. The practices emphasize the close relationship among the STEM disciplines and they include asking questions (and defining problems), developing and using models, planning

and carrying out investigations, analyzing and interpreting data, using mathematics and computational thinking, engaging in argument from evidence, constructing explanations (and designing solutions), and obtaining, evaluating, and communicating information.

This emphasis on science in the early years makes total sense. Our lives, jobs, and careers are becoming increasingly science oriented. Today's children need an education that



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will prepare them to take on technical jobs and careers and to make informed personal and civic decisions on a variety of science-related issues. Current research also indicates that young children are not only capable, but primed, for doing and learning science (NSTA, 2014). Like budding scientists, they are naturally inclined to investigate the world, seek out relationships and patterns, and construct explanations based on evidence from their own experiences.

One way to promote children's science learning is to get families in on the act. It is well-known that family engagement in schools has a powerful influence on children's attendance, motivation to learn, and literacy, math, and social skills development (Van Voorhis, et al, 2013) and ECE settings have historically prioritized family engagement. Early childhood teachers are perfectly positioned to partner with families around science, and findings from a newly-released study *What Parents Talk about when They Talk about Learning: A National Survey about Young Children and Science* (2018) (<http://www.edc.org/what-parents-talk-about-when-they-talk-about-learning-executive-summary>), can help them do just that. The report was conducted by the Education Development Center and SRI International and commissioned by the U.S. Department of Education's Ready To Learn initiative, led by the Corporation for Public Broadcasting and PBS. The study provides a window into how parents think about their children's learning and suggests how educators might partner with families in ways that are responsive to their perspectives and experiences.

Researchers conducted phone interviews with over 1,400 parents across the country who had at least one three- to six-year-old child living in the home and interviewed 65 parents through focus groups and home visits. Researchers found that nearly all families are invested in their children's education and want to work with teachers to support it. However, there is a difference in how parents view their roles in supporting literacy, social skills, and science. Many parents view science as less important for them to support at home than the other domains. When asked about learning activities they do with their children, parents were most likely to report that they read with their children, involve their children in chores, and work on math concepts with them every day. Far fewer parents report engaging in science learning activities daily. Perhaps not surprisingly, parents are also less confident about supporting children's science learning than learning in other domains. Some parents report that they are unsure about how to answer their children's science questions. Importantly, most families report that ideas for using everyday activities and materials, resources about what science their children should be learning, and ideas for engaging their children in science would help them to do more science at home.

The following are seven key ideas that emerge from the study for how teachers might develop, maintain, and strengthen partnerships with families around science.

### 1. Reflect on your own science teaching practices.

Before reaching out to families, think about how your science teaching incorporates a focus on key concepts, inquiry and practices, and developing children's positive attitudes toward science. Are the science experiences you provide anchored in concepts (*all living things have parts that help them survive in their environments*) or do they emphasize facts and information (*insects have six legs; plants have roots, stems, leaves, and flowers*)? Do all children have the time, space, and support they need to raise questions, conduct investigations, share their ideas, and explain their thinking? Are their emerging ideas (*plants are not living; heavy things always sink; shaking leaves cause the wind to blow*) acknowledged, discussed, and investigated? Or alternatively, does your science curriculum feel like a set of isolated activities that follow a pattern of making predictions, doing experiments, and arriving at correct results with little room for incorporating children's perspectives? Do you frequently find yourself looking for "fun" science activities that will ignite children's curiosity and interest? Shifting your science teaching from a more traditional approach (explaining science facts, information, and content to children) to a more

current approach (developing children's understanding of science concepts through inquiry and a focus on their observations at home, school, and in the community) can be challenging (Table 1).

**Table 1:** Shift in Emphasis in Science Education (adapted from Jeff Winokur and Karen Worth)

Less Emphasis on...	More Emphasis on...
Science activities	Science inquiry and investigation
Science facts and information	Children's science ideas and explanations
Science experiments that occur only in the classroom	Science experiences at home, in the classroom, and in the community
Weekly science themes/topics	Long-term science investigations
Practice of individual process skills	Integration of science practices and content
Science table, nature displays, pets, and decorative plants	Science throughout the classroom; plants for study, animal visitors, terraria, children's work
Experience charts	Science notebooks, documentation panels, children's work and drawings
Science talk as show and tell and sharing	Science talk as evidence-based discussion and debate
Books as the sole source of information	Books and media as resources to supplement and extend children's experiences

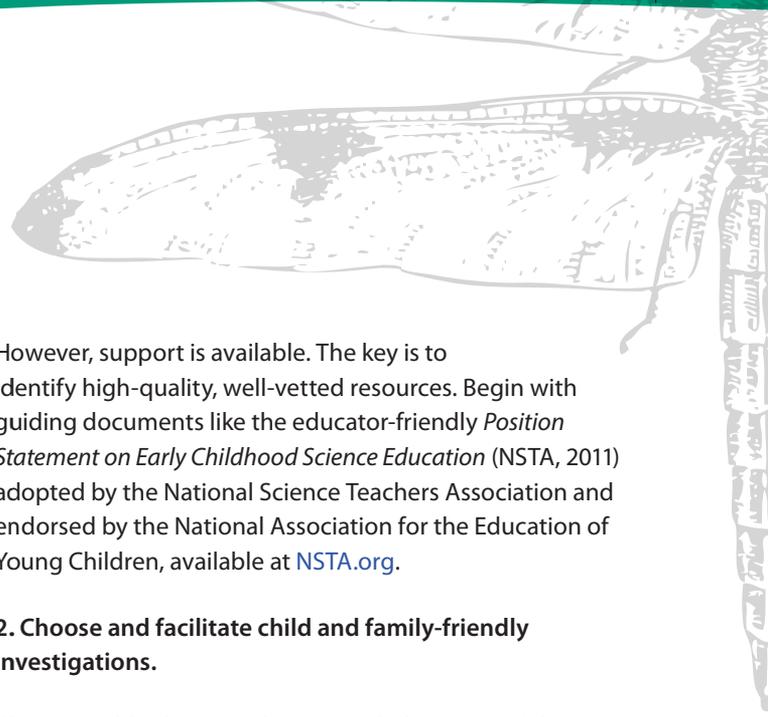
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However, support is available. The key is to identify high-quality, well-vetted resources. Begin with guiding documents like the educator-friendly *Position Statement on Early Childhood Science Education* (NSTA, 2011) adopted by the National Science Teachers Association and endorsed by the National Association for the Education of Young Children, available at [NSTA.org](http://NSTA.org).

## 2. Choose and facilitate child and family-friendly investigations.

Choose and facilitate explorations of *phenomena* (objects, materials, living things, and events) that connect children to key concepts, can be investigated over time at home and school, and are interesting and relevant to children and families in your geographic region. In a life science study of animals, for example, focus on the squirrels, birds, snails, worms, insects, and other small animals found in your area. That way, children can directly observe many different animals, collect data about their physical characteristics and behaviors, and begin to notice that *all animals have body parts that help them meet their needs*. Depending on whether your families live in an urban, suburban, or rural setting, incorporate children's observations of pets and farm animals (*How are pets the same/different from wild animals?*



*How do they each get their needs met? Over time, you will use books, media, and other resources to extend children's investigations to include animals in the rain forest or the arctic; you can share those resources with families as well.*

### 3. Connect children's home and school science experiences.

Once you have decided on a long-term investigation, introduce it by drawing out children's relevant prior experiences. In a physical science study of water, for example, you might ask, *What are some different ways that water can move? And where/when did you observe it moving that way?* Chart children's responses (you may be surprised at how much they already know about water) and add and refer to it frequently (*The water is going in a circle just like you said it does in your bathtub at home!*) Ask families about their children's experiences with water. (*Has your family gone swimming at the local pond or pool? Cooled off in a sprinkler? Visited the water exhibit at the science center?*) Describe the water investigation to families; what children will explore (*water flow at the water table, water drops and streams indoors and outdoors, how objects sink and float in water*); and how it relates to science (*water seeks its own level, takes the shape of its container, and flows*). Ask families to take photos of their family water experiences, help them annotate the photos,

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and create a classroom display that invites children to describe and compare water in different situations.

### 4. Pull families into classroom science explorations.

Invite a family member who has experience with the concepts being explored to visit the classroom. For example, when you are investigating properties of objects and materials (*color, size, shape, weight, texture, hardness*), invite family members who are designers, builders, painters, cooks, tailors, or artists to visit the classroom. They can join in children's investigations (*building with wood and foam blocks, mixing and using paints, doing a food preparation activity*) and/or bring objects, materials, or tools they use in their work to share and talk about with children. Get families involved by asking them to collect materials for multiple studies (*cardboard tubes and containers for building experiences; clean tin cans and string for exploring sound; and wax paper, foil, and cloth for water drops investigations*). Talk with them about what children will do with the materials, how these investigations connect to science, and how families can recreate or extend them at home.

### 5. Clearly communicate the benefits of science inquiry and learning.

The best way to explain the benefits of science to families is to show them. Create and talk with families about documentation of children's explorations (*photos, your observations, children's drawings, quotes*). For example, in a study of shadows, take photos of children observing and tracing shadows outdoors, using flashlights and small toys to investigate shadows indoors, and creating shadow plays. Incorporate children's quotes (*My shadow has a ponytail like me but no eyes and no mouth! and When I turn the dinosaur around its shadow moves too!*) and the concepts they are experiencing (*light is blocked by some objects and goes through or is reflected by others*). Communicate the relevance of science to children's lives by displaying and discussing images of men and women who reflect the ethnic diversity of your families, using science and technology in familiar jobs and careers. Emphasize that science is about communication, collaboration, and creativity, as well as critical thinking and problem-solving. Help children create and share classroom books with their families that emphasize literacy and social skills development (*How We Worked Together to Build a Five-foot Tower; How We Take Care of Our Classroom Pets; Our Best Goop Recipes*). Share science-related fiction and nonfiction books with families and communicate about how science supports language development, especially for their dual-language-learning children.

## 6. Educate families about the best ways to support their children's inquiry.

As all parents and teachers know, young children ask lots of questions! These questions range from those that are easy to answer, such as *Why can't I have a cookie now?* and *Why do I have to wear a raincoat?* to more scientific questions like *Why is the sky blue?* and *Where do butterflies go when it rains?* Reassure parents that it is okay not to know the answers to their children's questions, and that you often do not either! The important thing is to encourage their children to keep asking questions (*What a great question! I wonder how we could find out?*). Better yet, when they can, suggest they turn their children's questions into investigations (*How do you think we could figure it out? Maybe we could...*) Let families know that, when it comes to science, the most powerful thing they can do is observe and listen to their children, provide them with interesting things to investigate, join in their play and exploration, and ask them to share what they are doing, noticing, and thinking.

## 7. Give parents resources to support science learning at home.

Send home tip sheets with activity ideas related to the topic being investigated at school that can be integrated with families' everyday experiences (*exploring sinking and floating in the tub, doing a taste test at mealtime, observing birds while outdoors, making a map of your own home*). Include sentence starters (such as *I wonder...*, *I notice...*, and *I think...*) with space for children and families to draw or write about their exploration. Invite families of your dual-language learners to facilitate these conversations in their home language and encourage all families to return tip sheets to school so you can share and talk about them with children. Provide resources on children's science learning and activities designed for families such as Resources for Early Learning (for parents) (<http://resourcesforearlylearning.org/parents/>) and PEEP and the Big Wide World (for parents in English and Spanish) (<http://peepandthebigwideworld.com/en/parents/>).

Engaging with parents and families is a critical aspect of your role as an early childhood educator. That does not mean it is always easy, especially when it comes to science. All parents are unique, with their own priorities, goals, personalities, and past science education experiences, which may have been positive or negative. But remember that all families want to work with you to support their child's learning and are looking to you for support with science. Providing that support will not only enrich your science teaching; more

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importantly, it will provide long-term benefits to your 21st century students.

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