The Cat in the Hat Knows a Lot About That!™

EXPLORER'S GUIDE

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Doing Science with Young Children

1. **Science for young children begins with wondering and questioning.** Children are invited to express their innate curiosity about the living things, objects and materials, and events in the world around them. They are encouraged to wonder, predict, and generate their own ideas.

2. **Science for young children invites all children to participate.** ALL children, including girls and boys, children from different cultures or ethnic backgrounds, children with disabilities, and children with varying interests, abilities, and learning styles have opportunities to engage in doing and learning science. For example, a child with vision impairment is invited to explore using his senses of hearing and touch.

3. **Science for young children focuses on direct experience.** Children have many opportunities to directly observe and explore the living things, objects and materials, and events in the world around them. For example, as they learn about animals, children observe the birds, worms, snails, and insects in their own backyards and playgrounds.

4. **Science for young children is an active process.** Children participate actively in science inquiry—the process of finding out. They have space, time, and encouragement to ask questions, make observations, try things out, develop and test their ideas, collect information, and think about what happened.

5. **Science for young children includes many varied experiences about an idea.** Children have lots of opportunities to observe and investigate a particular idea so as to gradually develop their science understanding. For example, while learning about the life cycle of plants, children plant seeds, observe and measure plant growth, and compare the growth of different plants. They also look at plants around their neighborhood and visit a local plant store or nursery.

6. **Science for young children includes many opportunities for them to communicate what they are doing, noticing, and finding out.** Children are invited to think and talk about their explorations and ideas with others. They have materials available to represent their ideas through drawing, painting, and/or making 3-D models.

Science Inquiry

Science is about **how** people find out new knowledge as much as it is about **what** people find out. When scientists investigate new questions or ideas, they engage in the lively process of science inquiry. They plan and carry out investigations to test their predictions and, depending on what they find out, they may keep, revise, or toss out their old ideas. Very often, their discoveries lead to new questions and further investigation. This means that supporting your child's ability to think and act like a scientist is much more than telling her information or giving her science facts. It's also more than demonstrating or showing her interesting things.

Supporting your child's science learning means engaging her fully, actively, and directly in science inquiry.

You can take advantage of daily opportunities to engage children in the process of science inquiry. You can invite them to learn, use, and practice the following inquiry skills in the context of their explorations. Remember that inquiry is an active process and that children probably won't use all the skills in one exploration.

Raising Questions

Young children's science explorations often begin with questions. They have questions about the world and how it works, but often don't have the language ability to articulate them. You can help by observing your child as she encounters new objects, materials, or events and asking questions that invite inquiry like "Are you wondering about what that insect is doing?" You can also model curiosity by asking questions like "I wonder how this flower is different from that one?"

Making Predictions

Just as children generate questions about the world, they also generate predictions about what will happen based on their previous experiences. Starting with predictions is a great way to get your child motivated or interested in an investigation. You can encourage him to make predictions by asking questions like "What kinds of creatures do you think we will find in the garden?" or "What do you think would happen if we brought your snowball inside?" Remember that your child must have some previous experiences on which to base predictions. Otherwise, he can only guess.

Planning and Carrying Out Investigations

Although children raise questions and make predictions all the time, they really benefit from adult support in planning and carrying out investigations. You can help your child do this, and keep her fully engaged in inquiry, by asking questions like "How do you think we could find out?" and "What do you think would happen if . . . ?" You can also help by keeping the plans for investigation clear and concrete, so she can actively participate in each phase. For example, she could make a plan to find out what conditions seeds need to sprout by planting bean seeds in small pots, placing the pots in different locations inside and outside, and checking on them daily to observe any growth.

Making Observations by Using All the Senses

Children often use their whole bodies to explore the materials and objects in their world. You can encourage your child to use all his senses to find things out by suggesting that he listen, smell, and touch as you go about your daily routines. For example, draw his attention to interesting sounds and smells outdoors, and encourage him to try to identify the sources. Whenever possible and appropriate, encourage your child to hold, manipulate, and feel objects and materials, and invite him to describe characteristics of items based on touch. You also can help him learn to use tools like magnifying glasses to extend his observations.

Collecting and Recording Data

It's important to help children remember what they found out so they can talk and think about it later. You can model collecting and recording data for your child by making notes or jotting down interesting things you and your child notice. You can also engage her in more organized data collection by keeping a weather chart over time, for example. Provide paper and crayons or colored pencils and encourage her to make drawings of her observations of plants and animals. She also might label her drawings or add a few words. If she hasn't started writing yet, do it with her.

Comparing and Contrasting

Once your child has had time to investigate his question firsthand, the next step is to help him think about his experiences and the information he has collected. Begin by helping him compare and contrast the objects and events he observes by asking, for example, "How are those two birds the same and/or different?" and "How is the weather different today from

what it was like yesterday?" Encourage him to sort, categorize, or sequence items or objects based on a variety of characteristics. For example, you could invite him to organize by size a collection of rocks from your backyard or park: What size is the most common? Where did the biggest ones come from? the smallest?

Identifying Patterns and Relationships

Identifying patterns and relationships is a first step in helping children make generalizations about the world and how it works. It is one way they develop their own ideas and theories. You can help your child do this by drawing her attention to relationships between things or events that occur over time, and encouraging her to think about cause and effect.
For example, you can ask "What are some things about the weather in summer that are different from the weather in winter?" Invite her to notice cause and effect in the natural environment by asking questions like "I wonder why there are so many birds in this area compared to our yard?"

Developing Ideas

Developing ideas is a critical ability and in order to do this regularly, children need to feel confident that what is valued is not whether or not they are "correct." One of the most important concepts to promote is that science ideas are based on evidence from observations and explorations. You can help your child understand this idea by encouraging him to make observations and then asking "What do you think about that?" You can also express an authentic interest in his ideas by asking "Why do you think so?" or "Why don't you think so?"

Communicating and Collaborating

Listening to the ideas of others, defending her own ideas, and working together are important science inquiry skills that your child can learn as she works with other children and adults. You can help her express her ideas by encouraging her to talk about, show, demonstrate, or draw what she means. Take it further by joining in her investigations and sharing your own observations and ideas, and by modeling a willingness to listen to those of others. Ask her a question like "What do you think about that?"

Respecting the Environment

Science explorations provide a wonderful context for helping children develop respect and concern for the outdoor environment and the living things that inhabit it.

As your child gets outside and observes birds finding food, examines flowers and the creatures that use them, and finds nuts hidden by squirrels, she is introduced to the idea that all living creatures depend on their environments to meet their needs for food, water, and shelter. This will help her begin to understand that the earth, as home to all kinds of living things, including humans, needs to be cherished and protected.

When you and your child are outside, encourage her to treat the environment and all the living things in the natural world with care and respect. Help her understand that if we disturb the outdoors too much, living things may not survive. When you are exploring, teach your child to observe and learn from animals and plants in their natural environment. If you do take a leaf or branch home to examine further or to use in a project, just take a small one.

Top Ten Tips for Engaging Young Children in Science

1. **Nurture your child's sense of wonder and excitement about the natural world.** Most likely, you already know that your child is naturally curious about the world and everything in it! Join her in asking questions about interesting things and wondering about the answers. "I wonder why worms come out of the ground when it rains? I wonder why puddles disappear when the sun comes out?"

2. **Engage your child in active science observation and exploration.** You are the best model your child could have for learning to act and think like a scientist. Have you noticed that your child is fascinated by small bugs? The next time you see one, stop and check it out. Encourage your child to look closely at the bug, and notice what it looks like and what it's doing. Ask questions or make comments that invite further exploration like "How could we find out where that bug lives?" or "I wonder if there are any bugs like that in our yard."

3. **Find time for science exploration in everyday activities.** Take advantage of daily opportunities to support your child's observation and exploration around your home and neighborhood. For example if you have house plants, invite your child to help water them while you talk with him about what plants need as well as different leaf textures and shapes. When you're at the supermarket, stop at the produce section. Look for all the leafy vegetables. Find the ones that grow underground like carrots and potatoes. Look at apples and talk with him about all the different kinds.

4. **Give your child simple tools to support science exploration.** Some basic household items can enrich your child's science experiences by helping her explore and observe more closely. Give her some old spoons for digging or a shoe box for collecting rocks or other items she finds on a walk. Buy an inexpensive plastic magnifier, so she can look more closely at what she collects.

5. **Talk with your child about science observations, explorations, and ideas.** The conversations you have with your child are critical in helping him make connections, and see patterns. Asking questions that begin with "Did you notice . . . ?" "How is that the same/different from . . . ?" and "What do you think would happen if . . . ?" will encourage him to think like a scientist. Encourage him to share his observations, explorations, and ideas with friends and other family members.

6. **Encourage your child to visually represent her science observations and ideas.** Visual representations can help your child talk about and share her science experiences. Have your child show you what she observes by acting it out or drawing it. For example, she could move her body to demonstrate how a bird walks and flies or she could make a picture of a bird that visits your backyard bird feeder. Some children enjoy creating a small notebook to record their explorations. You or your child can also take photos of the things she is doing and noticing and add them to the notebook.

7. **Take advantage of family experiences to support your child's science learning.** The relationships and experiences you share as a family provide unique opportunities for helping your child notice how living things grow and change over time. As pets like puppies and kittens grow into adult cats and dogs, and little sisters and brothers grow into toddlers, draw your child's attention to changes in their appearance and the new skills they are learning. Share baby pictures with your child and talk with him about how he is growing and changing too!

8. **Get your whole family involved in your child's science explorations.** The interests that family members share can enrich your child's science explorations. Encourage everyone to take part. For example, older brothers and sisters may enjoy helping your child identify the leaves he collects or sharing books about trees; an aunt or uncle may invite him to help seed a vegetable garden; and grandparents may have stories to tell about their own experiences collecting and using plants.

9. **Go on science adventures.** Simple or more planned family events can provide opportunities to observe and explore the natural world. For example, take a walk through a local park or arboretum and help your child make a small collection of fallen leaves, nuts, or fruit to look at, touch, and describe. You can also head out for a more exotic adventure like taking a rowboat ride at a local pond, feeding ducks, going to a science museum or aquarium, or going out at night to look up at the stars.

10. **Have fun exploring science with your child!** Take a tip from the Cat in the Hat and remember to keep the fun in science. Encourage your child to use words, create rhymes, and sing songs about what she is doing, noticing, and learning in science. Join your child in viewing *The Cat in the Hat Knows a Lot About That!*™ programs and use the parents resources to engage your child in fun ways to learn science.