

NEWS YOU CAN USE

News for Head Start, Early Head Start, & Migrant/Seasonal Programs

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■ EARLY SCIENCE LEARNING FOR INFANTS AND TODDLERS

Have you ever heard people say, “Science for infants and toddlers? That can’t be right!” Or, “I don’t know how to do that?” Or even “Science is for older children”? Science learning may seem to be the stuff of high school and college students, but it all begins with infants and toddlers!

■ What Is Science?

Science is not just a body of knowledge—it’s “a way of thinking and acting . . . a way of trying to discover the nature of things.”¹ Science learning at any age involves curiosity, exploration, and discovery. These come naturally to most infants and toddlers. Adults can help young children find answers to their questions and discover more about things that interest them. Do you do some of that already? If so, you’re helping them learn science!



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■ The Scientific Process

Fifteen-month-old Jasper is exploring a basket of different kinds of balls that his home visitor brought with her. Jasper finds a large, rubber bouncy ball. He hands it to his mother, Adria, and says “Ball.” Adria says, “Yes, it’s a rubber ball. Drop it and see what happens.” Jasper drops the ball, and it bounces back up to his waist. He laughs in delight. Adria laughs too and says, “It bounced. You like that!” Then he finds a plastic ball and says, “Ball!” When he drops this ball, it just lands on the floor and rolls. He looks at his mom with wide open eyes. Adria smiles and says, “Uh, it didn’t bounce. You look surprised! Here, try this one,” and hands him a larger bouncy ball. He drops it and it bounces back up to his knees. Jasper spends some time going through the basket of balls, dropping each one (and sometimes throwing one to the ground) to see if it bounces.

Science has two parts: *process* and knowledge.² The scientific *process* (also known as the scientific method) is a series of steps. These steps do not have to happen in a certain order or just once. Sometimes they can happen at the same time. In this vignette, Jasper uses the same process that adult scientists use! As you read the steps, think about how Jasper and his mom explored the balls and the way he naturally followed the process:



1. Observing	Leads to forming questions or identifying a problem; often, questions lead to more observations.	Here's a ball. Does it do anything?
2. Developing one or more hypotheses (or "best guess")	Making educated guesses about answers to questions or solutions to problems; predicting what will happen. Adults (and older children with adult support) may first gather as much information as possible related to their initial question(s) before developing hypotheses or predictions.	I drop the ball. It bounces All balls bounce!
3. Investigating/experimenting	Testing hypotheses and predictions	I drop a different ball It doesn't bounce!
4. Analyzing results/drawing conclusions	How close do the results fit the hypotheses and predictions?	One ball bounces, one ball doesn't bounce. Maybe all balls don't bounce.
5. Communicating	Letting others know the results or findings; discussing the results with others	When the second ball doesn't bounce, I look at mom with a surprised look on my face.

An important part of the scientific process is modifying and repeating. This can mean changing the hypotheses and doing the same experiment. It can also mean keeping the same hypotheses and doing a different experiment! Modifying and repeating can happen at any time while a child explores. In the vignette, Jasper tries dropping (or throwing) each ball to find the ones that bounce after he "communicates" the results of dropping the plastic ball. Over time, and with lots of experiences like this, Jasper will learn more about balls, including why some bounce and why some don't! So, knowing about the scientific process helps adults recognize when young children naturally follow these steps.



This knowledge also helps adults support the scientific process by providing children with appropriate materials, experiences, and interactions.

■ Science Knowledge

Heath (infant teacher) sits on a blanket with Clara (twenty-six months old) under a tree on the center's outdoor play space. Clara lies quietly on her back, looking up toward the tree branches where a shiny silver chime is hanging. Heath says, "Clara, I see you looking up at the chimes. Do you think we'll hear them make a sound today?" Just then, a gentle wind blows and the chimes tinkle. Clara says excitedly, "I hear them just now!" Heath laughs and says, "I guess the answer is 'yes'! Did you feel the wind? It blew and moved the chime, and the chime made a tinkling sound!"



Where can science learning happen? Everywhere and anywhere; it doesn't have to stay at the science table! In this everyday experience of being outside and noticing chimes, Heath helps Clara wonder about (hypothesize) whether the chimes will make a noise or not and connect blowing wind (something that cannot be seen) with the effect it can have on a solid object (causing the chimes to make a tinkling noise). As Clara has more experiences seeing and hearing the wind's effects on objects such as chimes, trees, streamers, and hair, she will begin to learn more about wind, such as what it is and what happens when it blows. She will also learn to connect the wind blowing with the sounds that some objects make and to predict what sounds she might hear before the wind blows.

If the scientific *process* is the "how" of science exploration, science knowledge is the "what." There are many ways to organize science knowledge. Here is one.³

- Physical science: exploring the properties of objects and materials, such as shape, color, texture, weight, temperature (e.g., hot, cold), solid, or liquid; how objects move, work, and change; what objects and materials are made of; sound and light
- Natural science: exploring the natural world of living things, including plants and animals; and exploring things related to the earth (e.g., dirt, rocks, sand, wind, weather, sun)
- Social science: exploring people—who they are (e.g., relationships between people), what they do, and where they live

■ How Might Staff and Families Support Early Science Learning for Infants and Toddlers?

Cristina, a family child care provider, has noticed the way that infants and toddlers naturally explore and behave like scientists. She watches five-month-old Liam explore large plastic snap beads with his mouth. He is learning about their properties! She notices that thirteen-month-old Hanna has discovered—through trial and error—that the couch is an excellent structure for pulling herself up,





while large cardboard boxes are not as stable. Twenty-one-month-old Xander seems driven to discover what he can and cannot fit his finger into. Cristina believes that the children she cares for are curious and capable. They will discover more about the world around them than she could ever hope to “teach.” She knows that her nurturing relationship and safe home together create an inviting environment for learning.



Infants and toddlers learn best within strong, trusting relationships with caring adults. When infants and toddlers feel safe and comfortable, they are more likely to want to explore and learn about their world. And what do they use to explore and learn?

Their senses—they watch, touch/feel, taste, smell,

and listen! Infants and toddlers also learn through play. As Cristina realizes, offering sensory play opportunities and interacting in meaningful ways with very young children are part of supporting early science learning. Here are a few more ideas to consider:

- Provide an environment of “yes”⁴ and long chunks of time for children to observe and explore their environment (indoors and outdoors)—at their pace.
- Use language! Help children make sense of their experiences by describing what they see and do. Ask open-ended questions such as, “I wonder why...?” “What do you think will happen if...?” “What else can you try?” You can even ask young infants open-ended questions! They may not answer, but you are helping to develop their scientific thinking. Commenting, describing, making comparisons between objects/materials, and asking questions are all ways to help young children learn new words and connect new information to what they already know.
- Provide mobile infants and toddlers with discovery tools such as small pails and buckets with handles; small digging tools; and safe, sturdy magnifying glasses.
- Read books with children about nature, people, and familiar objects.



■ Science and School Readiness for Infants and Toddlers

Science in the early years can lead to a lifelong love of discovery. Science learning is also related to developmental domains and school readiness. For example, the scientific process steps are closely related to attention, curiosity, information gathering, memory, persistence, and problem solving. These are characteristics that are found in the Approaches Toward Learning domain.



(See *News You Can Use: Approaches Toward Learning – Foundations of School Readiness*, [Parts 1, 2, and 3](#) for more information.) The following cognitive concepts also connect to early science learning:

- Object permanence (people and objects exist even when you can't see them);
- Cause and effect (actions make things happen);
- Spatial awareness (where bodies and objects are in space; recognizing the environment has three dimensions – that things have tops, bottoms, and sides); and
- Symbolic thinking (using objects, actions, and ideas to represent other objects, actions, and ideas)

(See *News You Can Use: Foundations of School Readiness: Cognition and General Knowledge* for more information.)

■ Conclusion

Infants and toddlers are natural scientists! They explore physical, natural, and social science anywhere and everywhere. They observe, are curious, and investigate to find out more about their world. They gather information as they solve problems. They communicate the results of their explorations through babbling, laughing, crying, physical gestures, facial expressions, and words. However, even though “science” exploration might come naturally to most infants and toddlers, they benefit from adult support. Adults build and expand on young children’s scientific interest when they interact with infants and toddlers as they engage in the scientific process. Adults also provide opportunities, materials, time, and space for exploring and discovery. This support from staff and families in the early years can lead to positive outcomes later as young children carry their interest and excitement about science and learning into preschool and beyond!



¹Rosalind Charlesworth and Karen Lind, *Math and Science for Young Children* (Clifton Park, NY: Cengage Learning, 2010), 76.

²Lauren F. Shaffer, Ellen Hall, and Mary Lynch, “Toddlers’ Scientific Explorations: Encounters with Insects,” In *Young Children* (Washington, DC: National Association for the Education of Young Children, November 2009), 18–23.

³Diane Trister Dodge, Sherrie Rudick, and Kai-leé Berke, *The Creative Curriculum for Infants, Toddlers & Twos: Volume 1-The Foundation* (Washington, DC: Teaching Strategies, 2011).

⁴Early Head Start National Resource Center, *News You Can Use: Environment as Curriculum for Infants and Toddlers* (Washington, DC: US Department of Health and Human Services/Administration for Children and Families/Office of Head Start, July 2010), http://eclkc.ohs.acf.hhs.gov/hslc/tta-system/ehsnrc/cde/learning-environments/environment_nycu.htm.

STUDY GUIDE

NEWS YOU CAN USE

for

FOUNDATIONS OF SCHOOL READINESS: EARLY SCIENCE LEARNING FOR INFANTS AND TODDLERS

SUMMARY:

This *News You Can Use* (NYCU) talks about the scientific process and building science knowledge for infants and toddlers. It also provides strategies that adults can use to support early science learning.



Key Messages:

- Infants and toddlers are natural scientists! They are curious and investigate to find out more about their world.
- The scientific process (also known as the scientific method) is a series of steps for exploring questions and discovering answers. It is the “how” of science exploration.
- Science knowledge is the “what” of science exploration. It includes learning about physical science, natural science, and social science.
- Early science learning is related to developmental domains and school readiness.
- There are many ways adults can help young children find answers to questions and discover more about things that interest them.
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Think:

- This NYCU provides some examples of how early science learning relates to two developmental domains: (1) approaches toward learning and (2) cognition and general knowledge. What are some examples of how early science learning relates to social and emotional development, language and literacy, and physical development and health?
- How do engaging in the scientific process and learning about physical, natural, and social science help infants and toddlers become ready for preschool and beyond?



Reflect:

- Reflect on your own experiences with science learning in school. Were they positive or negative? Can you say why?
- How might your personal feelings about science affect how you support early science learning for infants and toddlers?



Discuss:

- How might early science learning look the same or differently for young infants, older infants, and toddlers?
- In what ways do you already support early science learning for infants and toddlers?



Next Steps:

- Read one or more of the following NYCU editions: *Take It Inside* (January 2012); *Take It Outside* (January 2012); and *Outdoor Spaces* (March 2012). Look for a new early science learning idea to try with the infants and toddlers you work with.
- Plan ways to share what you know about the scientific process and science knowledge with families. Work with families to find ways they can support their child’s early science learning at home.