

# Science

Accomplished early childhood teachers appreciate the ways that young children think about science. Teachers understand key elements in science and select science content that strengthens the cognitive capacities of learners. Teachers know that young children's dispositions toward science form at an early age, and they build skillfully on children's curiosity and wonder to help them organize and report their meaningful discoveries. They provide consistent opportunities for children to examine, explore, compare, classify, describe, and ask questions about their environment. They support children's growth in the ability to formulate and follow up on questions, and as children progress, teachers help them explore their world more systematically. Teachers understand the nature of scientific inquiry and the ways in which the scientific community works to test theories and build knowledge over time. Accomplished teachers use inquiry approaches to provide opportunities for children to learn scientific skills, such as predicting, observing, gathering information, inferring, generalizing, and analyzing data, to acquire the skills needed for inquiry and to create their own hypotheses.

Accomplished early childhood teachers are familiar with the major concepts of earth science (space, physical features, geological formations, forces of nature, and environmental science), physical science (motion and energy), and life science (plants and animals). Teachers are adept at teaching the unifying concepts and themes of science, such as systems, energy, and change, and they realize the significance of process standards to support those ideas.

Accomplished early childhood teachers help young children see the relevance of science. For example, when teaching life science, teachers might engage younger children in understanding the body through activities involving their senses and through stories, songs, and motions. Teachers might involve older children in earth science with a study of animal habitats or an investigation of the features of the natural environment outside the school. In physical science, teachers might begin simple investigations of the properties of water by having children observe an ice cube and tell what occurs when it is exposed to heat. The children might further explore water's states of matter by heating the water to see it evaporate or freezing it so that it will turn into a solid cube. In environmental science, the accomplished teacher might have children plant a garden or develop and observe a compost pile to learn how to recycle waste into useful fertilizer that helps save our Earth. Accomplished teachers understand that such hands-on activities help children make connections to the world around them.

Accomplished early childhood teachers know that young children typically have roughly formed notions about science. Teachers value the thinking processes behind children's naïve conceptions and design developmentally appropriate learning experiences to help children uncover explanations that are closer to scientific reality.

For example, teachers might guide younger children to discover the reason an item sinks is not because it is too big or, with older children, because it is too heavy. Teachers understand the complexity of concepts in science, and they take care to address the scientific process to help children understand those concepts. Teachers know what level of scientific terminology is challenging yet attainable for children of a given age. Teachers design learning experiences that help children uncover for themselves the counterintuitive nature of many scientific principles. Accomplished teachers understand that deep discussions can transform a class of children into a community of future scientists.

Accomplished early childhood teachers know that children need to know scientific facts as well as to practice scientific inquiry, and they create a program that balances both elements. They help young children become aware of the scientific nature of their questions, pursue multiple paths to investigate a problem, and raise new questions. Teachers also allow children to take control of investigations and extend them if they wish. Rather than having children simply execute prefabricated experiments, accomplished teachers use probing questions to steer children toward discoveries.

Accomplished early childhood teachers understand ways of using inquiry to engage children in hands-on science that supports the learning of scientific concepts and processes. They know that engaging children in science is foundational for developing children's ability to ask questions, conduct investigations, collect data, and seek answers. Teachers provide sufficient time to instill in children a deep understanding of essential scientific concepts rather than simply providing children with a superficial acquaintance with isolated facts. They help children develop acute observational skills and support children's emergent reasoning and problem solving about what they experience through their senses. In addition, they incorporate ongoing exploration, investigation, and inquiry in science as a consistent part of their curriculum. Teachers systematically plan instructional activities, some of which focus solely on science and some of which integrate science with other subject areas. Teachers are also adept at using teachable moments to steer children toward new knowledge. Accomplished teachers constantly research new knowledge bases and use technology and best practices to enhance children's learning in science. Accomplished teachers ensure that all children have an equal opportunity to engage in science as a means to understand better and enjoy the natural world.