Let's Talk: Early Science Development

Excerpt: Life Science Workshop

ALBERT SHANKER INSTITUTE

Early Science Development

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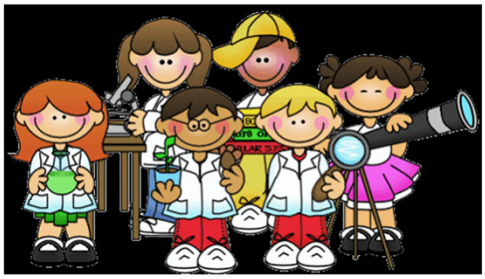
"Scientific knowledge is cumulative: To learn new things, you must build on what you already know. So, it's important that your child starts learning early…"



– U.S. Department of Education

Basic science concepts and process skills start to develop as early as infancy. Young children are naturally curious about their world; early science experiences can capitalize on this natural inclination (Trundle, 2009). Adults often notice that children investigate their world and regularly ask questions to gain a better understanding of how their world works. As children explore and make new discoveries - new questions emerge and young children grow in the cycle of scientific inquiry and in their knowledge of scientific concepts.

Early Science Development: Overview

Key Concepts	You Will Learn
■ Foundations in Science Development ■ Scientific Inquiry ■ Science Vocabulary ■ Developing a Science Area ■ Curriculum Integration	☑ Ways to build solid *foundations* in: physical science, life science, and earth science ■ Ideas to promote *scientific inquiry* in young children ■ Activities that build *science vocabulary* ■ Ways to develop a preschool *science area* ■ How to enhance concepts in science through *curriculum integration*

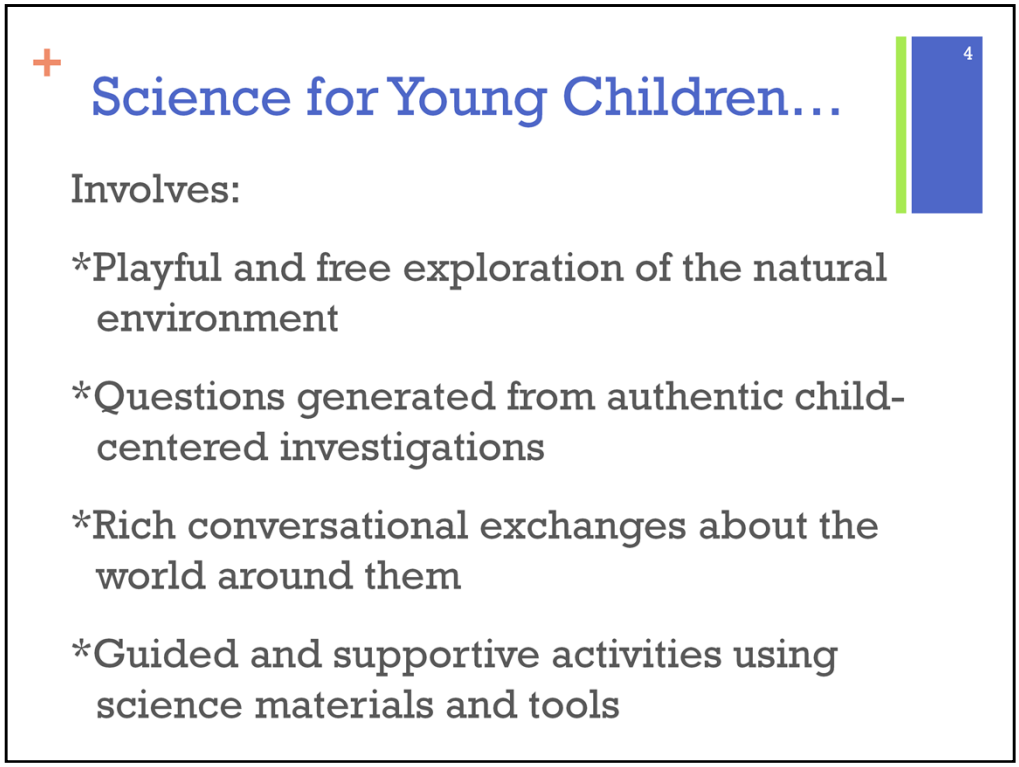
+ Early Science Development: Provide Opportunities

Early science development involves :

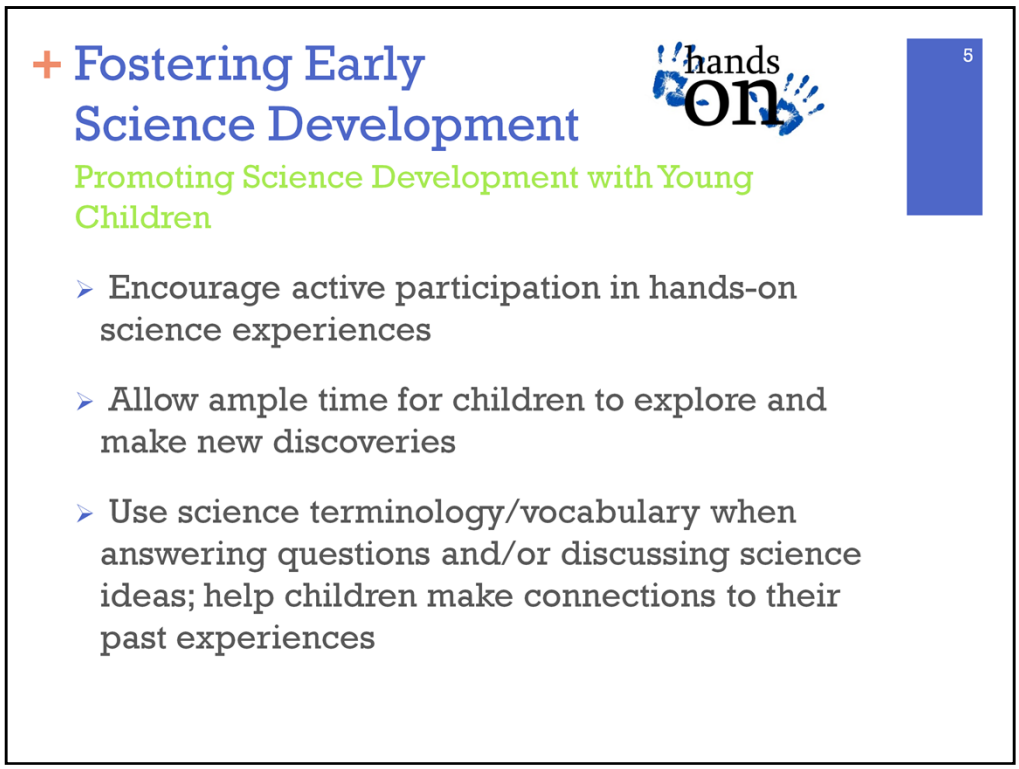
Providing a variety of opportunities for young children to explore concepts in science relating to scientific processes, physical science, life science, and earth science.

Think About:

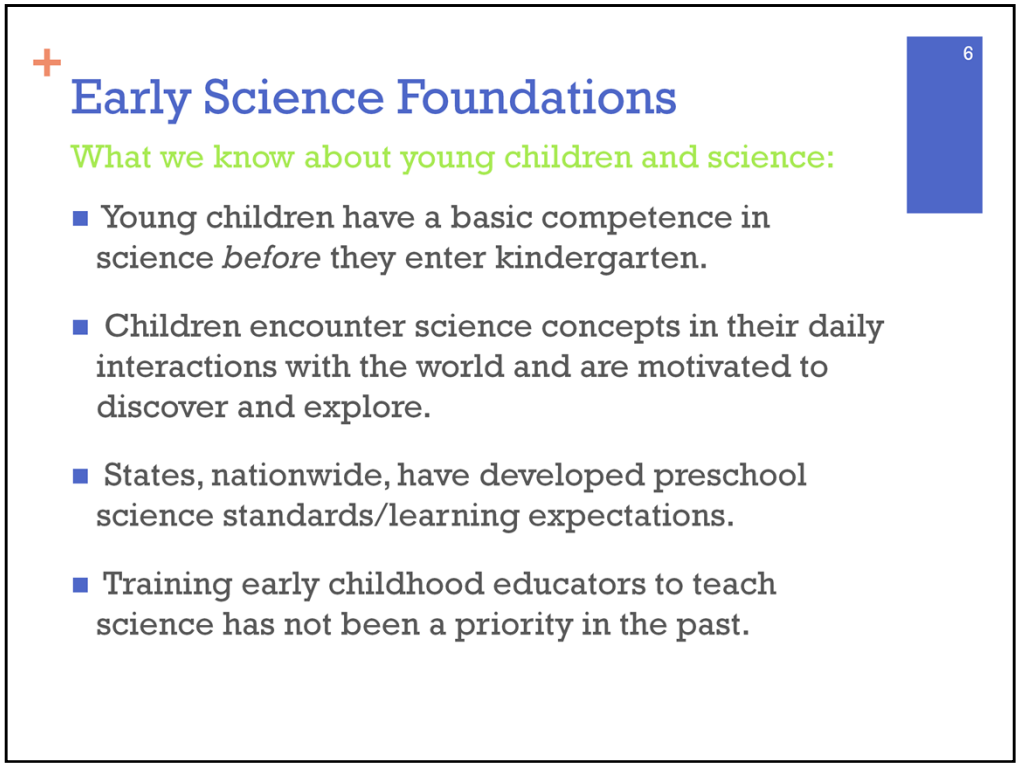
What type of opportunities promote early science development?



"The goal is to provide children with engaging science experiences that appeal to their natural curiosity while providing coherent opportunities to learn foundational science concepts and skills" (The Albert Shanker Institute, 2009).



When adults listen, support, and expand the questions and interests that young children have about their natural world a door is opened for the development of scientific knowledge and inquiry.

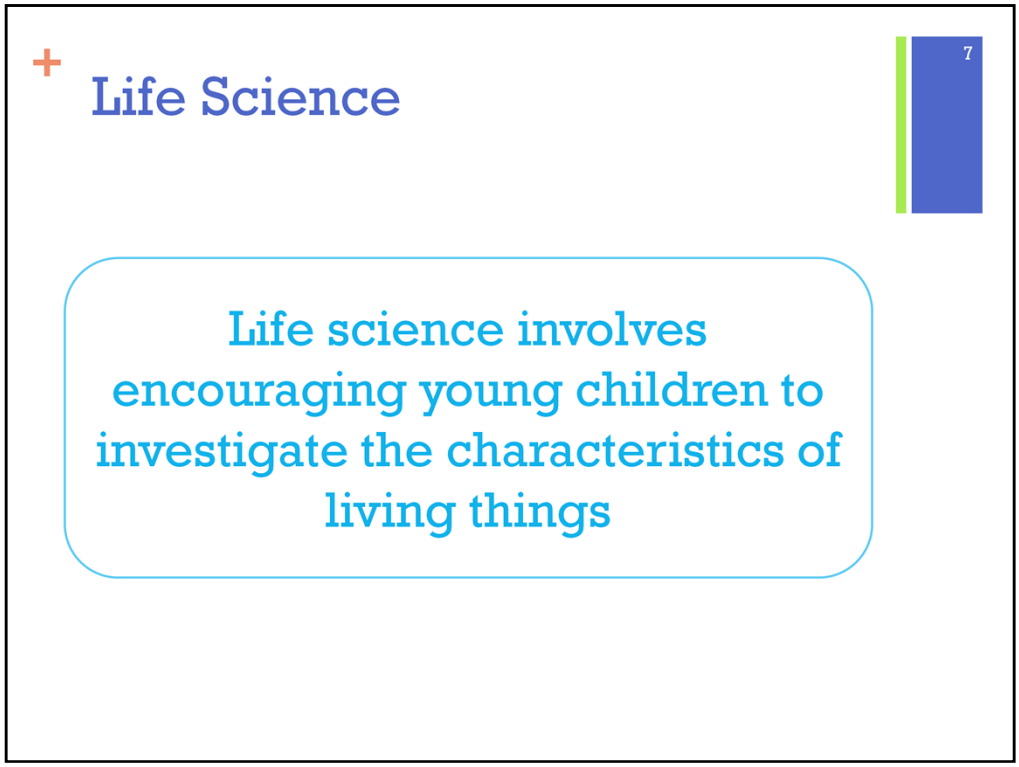


Young children have a basic competence in science *before* they enter kindergarten; there is a natural curiosity and interest in exploring concepts in science.

Children encounter science concepts in their daily interactions with the world and are motivated to discover and explore.

States, nationwide, have developed preschool science standards/learning expectations.

Training early childhood educators to teach science has not been a priority in the past; educational research reveals that early childhood teachers "…spend little time engaged in either planned or spontaneous science-relevant activities and the science area is one of the least likely centers to be visited by teachers during children's free choice time" (Brenneman, Stevenson-Boyd, & Frede, 2009; Tu, 2006).



Early learning standards for preschoolers to demonstrate their understanding in the area of life science regarding plants and animals include the following standards (The Albert Shanker Institute, 2009; Neuman & Roskos, 2007):

Development of Knowledge-

- ❑ Identifying specific features of plants and animals that help them to live in different habitats
- ❑ Demonstrating an understanding that water and food are needed for plants and animals
- ❑ Understanding that living things go through life cycles (growth, change, etc.)
- ❑ Naming some basic parts of the human body as well as knowing their functions
- ❑ Recognizing differences between living and nonliving things
- ❑ Recognizing that people have unique features, but are similar in many ways
- ❑ Understanding how people need food, rest, and exercise to maintain good health

Development of Skills and Methods-

- ❑ Showing respect for all living organisms, as well as respect for themselves
- ❑ Organizing information by systematically compiling, classifying, and ordering information collected
- ❑ Participating in simple investigations which test observations, as well as discussing findings, drawing conclusions, and making generalizations
- ❑ Naming, recording, and sharing information in a variety of forms, including oral and written forms

Life Science

Favorite preschool life science topics include:

- Life cycles
- Insects
- Plants/Gardening/Seeds
- Birds
- Pets

- Healthy Foods
- My Body
- Homes/Habitats
- Ocean Animals
- Wild Animals

Importance of Life Science

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Young children often enjoy learning about the plants and animals in their natural environment.

What living plants and creatures are from your area? Start exploring with things children are familiar with, then introduce them to living things from areas quite different from their own.

Typically, more preschool teachers use life science themes in the classroom (relating to plants and animals) than themes relating to physical science or earth science. Trips to the apple orchard, pumpkin patch, pet store, or zoo are common preschool field trips.

Activity #3: Life Science: "Sciencing" - Science-Related Activities for Children

Handout #3: Life Science for Preschoolers

Research indicates that life science is the most prevalent science area brought into the preschool classroom. "Neuman (1972) used the term 'sciencing' to describe science-related activities for young children. He divided sciencing into three categories: formal sciencing, informal sciencing, and incidental sciencing" (Tu, 2006).

In this activity, participants will reflect upon their past work with their preschoolers in the life science area and list some of the ways that their children have been involved in life science activities and investigations within the classroom.

They will share their lists with a partner and categorize these life science "sciencing" classroom experiences as well as discuss how exploratory play and guided play can be brought into their life science experiences. The goal of this activity is to get participants thinking and discussing about how they currently promote science in the preschool setting in a science area (life science) that is often used with preschoolers.

Review Slide #8 if desired (Activity #3 worksheet provides the three categories as well)

Formal Sciencing: Adults plan science lessons & materials; they present activities to the children & encourage participation to make discoveries.

Informal Sciencing: Adults set up a indoor and/or outdoor science area; the adult selects the materials and makes them accessible to children who are interested; child chooses to use materials & explore them in different ways.

Incidental Sciencing: Science incident is not planned by the adult, but results from an occurrence that sparks the interest of one (or more) children; adult supports, elaborates, and expands the science incident initiated by the learner(s).

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Life Science: Plants

Opportunities with plants provide ways for children to explore and discuss how plants move differently than animals. What do plants and animals need that are the same? What are the differences between plants and animals?

Plants can often be seen in early childhood settings on window sills and table tops, but how often are classroom plants actually used for scientific exploration? Observation is an important aspect of scientific inquiry and adults can use plants to provide opportunities to develop observation skills. Questions can be generated in the classroom regarding classroom plants, such as, “How can we find out if this plant is growing?” or “Will a different location of the room change the way the plant grows?” Perhaps the children can answer their first question by measuring the classroom plants each month and chart the growth or take a digital photo of the plants during the different seasons of the year to compare growth. The children may try moving the plants to different areas of the room to discover how the plants respond; will a sunny location produce a different response from the plant compared to a darker area of the room?

Plants

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Plants are a natural part of the world we live in and children are often curious about the plants around them.

Plant science vocabulary may include: root, stem, bud, branch, flower, seed, soil, leaves, trunk, bark, and photosynthesis. What other science "plant" words would you include?

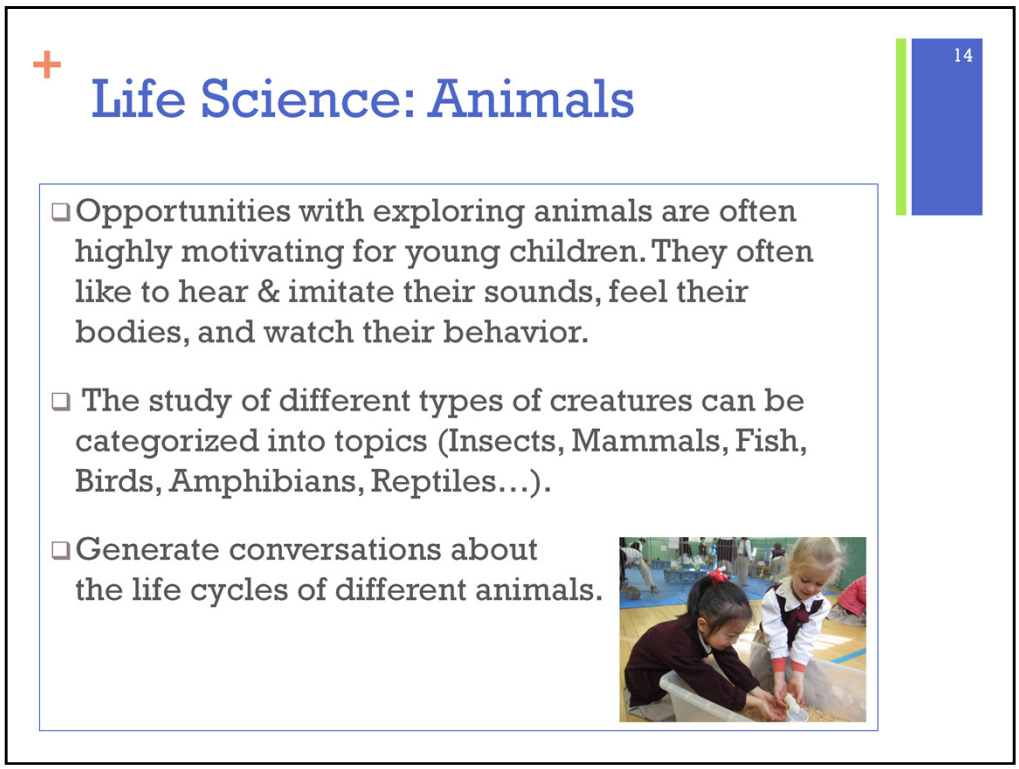
Handout #4: Plants

Allow time for participants to discuss other important words in the life science area relating to plants. Past teacher feedback for additional "plant" words have included: petals, germinate, sun, pollen, tropism/autotropism/phototropism, root hairs, absorb, seeds, and bulb.

Activity #4: Plants: Comparing & Contrasting

Participants will join with a partner to discuss how to involve young children in comparing/contrasting relating to plants. For example, if children wanted to know how the tree on the playground changes throughout the year – the class might take photos of the tree during different seasons to compare/contrast. Another example would be comparing/contrasting different types of seeds. Discuss with your partner and share your ideas with the larger group of participants.

A recent research investigation (Tu, 2006) found that 70% of the preschool classrooms in the study had a live plant in the classroom and 20% of the classrooms had outdoor gardens, but the study found that the plants were often not utilized for actual scientific inquiry. How are plants used in your setting? Are the children involved in the care of the plants? Are there classroom conversations about the plants? Comparing/contrasting activities are a great way to encourage plant exploration with young children.



Handout #5: Animals

❑ Opportunities with exploring animals are often highly motivating for young children. They often like to hear & imitate their sounds, feel their bodies, and watch their behavior. Young children love to pretend they are the creatures that they study; the dramatic play area is an excellent area of the preschool classroom to integrate life science into dramatic play.

❑ The study of different types of creatures can be categorized into topics (Insects, Mammals, Fish, Birds, Amphibians, Reptiles, etc.); have children discuss the key characteristics of these groups and how they are the same & different.

❑ Generate conversations about the life cycles of different animals. Discuss how young animals are different than adult animals. Compare and contrast the different animal life cycles.

Animals

Animal science vocabulary may include: fur, feathers, skin, cold-blooded, warm-blooded, amphibian, metamorphosis, shed, gallop, slither, beak, scaly, hibernate, nocturnal. What other science "animal" words would you include?

Activity #5: Animal Investigation

Participants will share some ways that their preschoolers have investigated living creatures in their preschool setting and discuss ways to expand and extend their ideas to include scientific inquiry, science vocabulary, additional science area materials/activities, and integration throughout the curriculum.

Early Science Development

- Engaging children in meaningful activities about:
  - Physical Science, Life Science, and Earth Science
  - Scientific Inquiry
  - Science Vocabulary
  - Science Area Exploration
  - Integration of Science Throughout the Day