

Science

- Scientific Skills and Methods

- Scientific Knowledge



Very young children are natural scientists and are easily fascinated by everyday happenings. During the infant and toddler years, they use their senses to learn about the world around them. Through varied and increasingly complex explorations, they observe, manipulate, listen, reflect, and respond to guidance and encouragement from the adults around them. As they enter their preschool years, they are prepared to make decisions and become higher-level thinkers.

In quality early childhood settings for infants and toddlers, science experiences require a balance of content and process, using a multi-sensory approach. Before age three, children can begin to acquire a foundation of science-related concepts and knowledge on which to build a clear understanding of their world.

Adults should look for opportunities to expose infants and toddlers to science-related concepts and experiences, especially those present in the natural world around them.

Strategies to support inclusive learning environments:

- ❖ Use special or adaptive devices to increase a child's level of participation
- ❖ Encourage hands-on and sensory experiences such as touching, holding, exploring, tasting, smelling, and manipulating
- ❖ Use physical guidance and support when needed to promote the child's full participation

Some general accommodations to support children with special learning or developmental needs can be found on page 9 of this document, and in NDE Rule 51.

Scientific Skills & Methods

Infants (Birth to 18 Months)

Widely Held Expectations

- Child shows interest in surroundings by focusing on faces and objects in close range
- Child gathers information through the senses (mouthing, grasping, reaching, etc.)
- Child repeats actions that have been successful in reaching a goal
 - Uses cause and effect strategies (drops toys over side of highchair, etc.)

Learning in Action: Examples

The Infant

- Learns about the environment through movement and sensory exploration (seeing, hearing, touching, tasting, etc.)
- Shows initiative and curiosity (pursues interesting object - first visually, then by reaching, crawling, etc.)
- Manipulates new toy to discover what it will do
- Pats, pushes, squishes, and pounds play dough to experience how it feels

The Adult

- Provides toys and materials that encourage safe, active exploration based on the child's abilities (rattles, balls, water play, etc.)
- Describes the child's actions and the properties of objects as the child explores and manipulates them
- Supports the child's interest in and exploration of the environment, both indoors and outdoors

THE ENVIRONMENT INCLUDES

- Materials that are accessible throughout the day for observation, exploration and manipulation (rattles, blocks, activity boxes, etc.)
- Opportunities to experience natural objects and events (rain and snow, living creatures, plants, etc.)

Scientific Skills & Methods

Toddlers (18 Months to 3 Years)

Widely Held Expectations

- Child begins to develop scientific skills and methods
 - Makes observations, describes objects and actions in the environment
 - Begins to make comparisons between objects that have been observed
 - Demonstrates initiative and curiosity in exploring the environment
- Child uses descriptive words in speech
- Child uses senses, materials, events in nature, and the environment to investigate and expand knowledge

Learning in Action: Examples

The Toddler

- Explores the environment and uses objects in a variety of ways to find out how they work, what they can do, etc.
- Describes objects and actions (big ball, run fast, lights off, etc.)
- Initiates activity and makes choices (toy to play with, clothing to wear, etc.)
- Uses water and sand toys to explore texture, weight, measurements, etc.

The Adult

- Provides materials that invite and encourage safe manipulation and exploration (blocks, puzzles, art materials, books, puppets, etc.)
- Promotes children's active exploration of the environment, both indoors and outdoors
- Talks with children about their activities (including open-ended questions)
- Encourages children's curiosity and answers questions

THE ENVIRONMENT INCLUDES

- Materials that are accessible throughout the day for observation, exploration and manipulation, including natural objects and events (plants, fish tank, scales, water and sand toys, etc.)
- Opportunities to experience and interact with sand and water, rain and snow, plants and animals

Scientific Knowledge

Infants (Birth to 18 Months)

Widely Held Expectations

- Child uses all five senses to explore and understand surroundings
- Child begins forming a basic understanding of simple cause and effect relationships
- Child begins to name common objects in the environment

Learning in Action: Examples

The Infant

- Explores strategies to create a result (shakes rattle to see if it produces a sound, tries to activate musical toy, etc.)
- Gains knowledge about the environment through observation and physical manipulation (banging hard objects together produces a sound, stack of blocks falls when pushed, water splashes, etc.)
- Names some natural items (dog, tree, bird, snow, etc.)

The Adult

- Provides natural objects for children to explore, both indoors and out, as well as experiences related to science concepts (snow, wind chimes, animal sounds, various textures and scents, etc.)
- Names natural objects and describes comparisons between objects (big/little, soft/hard, wet/dry, etc.)
- Provides books, pictures, and toys that represent nature realistically (photos of animals rather than cartoon-type animals, etc.)
- Talks with children about everyday events as they occur in nature

THE ENVIRONMENT INCLUDES

- A variety of materials, both indoors and outdoors, from the natural world (plants, animals, etc.)
- Time outdoors to observe natural objects and events

Scientific Knowledge

Toddlers (18 Months to 3 Years)

Widely Held Expectations

- Child develops scientific knowledge through active exploration of the environment
 - Shows interest in the natural world
 - Interacts with materials to gain knowledge about them
- Child develops understanding of simple cause and effect relationships
- Child shows interest in scientific concepts related to space and time
- Child shows increased knowledge and memory for details and routines

Learning in Action: Examples

The Toddler

- Gains knowledge about the environment through physical manipulation (puts shapes in shape box, engages in sand and water play, etc.)
- Recognizes and identifies properties of objects (big/little, hot/cold, in/out, etc.)
- Expands vocabulary related to scientific concepts: names animals, describes weather (rain, snow, sun, etc.)
- Goes to sink to wash hands when called for lunch or snack

The Adult

- Provides natural objects for children to observe and explore, both indoors and outdoors
- Provides books, pictures, and toys that represent nature (photos of animals rather than cartoon-type animals, etc.)
- Talks with children about natural objects and everyday events as they occur in nature
- Encourages children to make comparisons between objects (big/little, soft/hard, wet/dry, etc.)

THE ENVIRONMENT INCLUDES

- A variety of materials, both indoors and outdoors, from the natural world (plants, animals, etc.)
- Time outdoors to observe natural objects and events
- Field trips to farm, aquarium, zoo, nursery, garden, etc.

Resources

Bugs to Bunnies -- Ken Goin, Eleanor Ripp, and Kathleen Nastasi Solomon

Everyday Discoveries: Amazingly Easy Science and Math Using Stuff You Already Have -- Sharon MacDonald

Hollyhocks and Honeybees: Garden Projects for Young Children -- Sara Starbuck, Marla Olthof, and Karen Midden

Kitchen Science -- Shar Levine and Leslie Johnstone

Learning Through Play: Blocks -- Ellen Booth Church

More Mudpies to Magnets: Science for Young Children -- Elizabeth A. Sherwood, Robert A. Williams, and Robert E. Rockwell

Nature in a Nutshell for Kids: Over 100 Activities You Can Do in Ten Minutes or Less -- Jean Potter

Pint-size Science: Finding-Out Fun for You and Your Young Child -- Linda Allison and Martha Weston

Your Child At Play: Birth to One Year: Discovering the Senses and Learning About the World (2nd Edition) -- Marilyn Segal

Books for Children

Farm Animals -- Phoebe Dunn

Growing -- Fiona Pragoff

I Love You, Sun I Love You, Moon -- Karen Pandell and Tomie dePaola

I Can, I See, I Hear, I Touch -- Helen Oxenbury (4 books)

Machines At Work -- Byron Barton

Mud! -- Charnan Simon

The Five Senses -- Keith Faulkner

Animal Sounds for Baby -- Cheryl Willis Hudson

Ring! Bang! Boom! -- Little Golden Books

Touch and Feel Series -- Dorling Kindersley Publishing

Push, Pull, Empty, Full: A Book of Opposites -- Tana Hoban

The Very Hungry Caterpillar -- Eric Carle