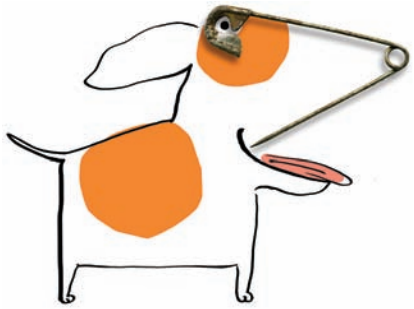

Science Standards

In the National Science Education Standards, the National Research Council sets forth standards in eight areas that cover a broad range of science skills and understandings for children in kindergarten through grade 12. These standards have been adapted to apply to young children. Science as Inquiry, Physical Science, Life Science, Earth and Space Science, and Design Technology are addressed in this Guide. Not included are Science in Personal and Social Perspectives and the History and Nature of Science.

Science as Inquiry

The process skills of science are the Science as Inquiry standard, listed below in alphabetical order. Children need to practice the process skills of science so that they learn to ask questions about the world and then study the world in special ways to find answers, just like scientists do.

Young children learn science by doing science. Young children need experiences that allow them to explore, over and over. They need to use a variety of materials and tools, talk about what they are doing, ask questions, and try to find answers.

Science as Inquiry includes:

Asking Scientific Questions
For young children, this includes...
- Questions such as: "What's that?," "How did it happen?," "What if...?" and "How many?"

Collecting and Using Data
For young children, this includes...
- Thinking back on what they have observed, sorted or measured, in order to explain their ideas about the world around them

Communicating Information and Ideas
For young children, this includes...
- Using conversations, drawings, and/or simple charts to tell others about what they have learned and to offer explanations, even though they might not be scientifically accurate

Designing and Making Models
For young children, this includes...
- Planning and creating models
- Building from plans

Estimating and Predicting
For young children, this includes...
- Using clues to make informed guesses about quantities, causes and effects, or unknown information

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Experimenting
For young children, this includes...
• Pursuing answers to questions through controlled investigations

Finding Patterns
For young children, this includes...
• Noticing repeated sequences and organized arrangements in the world, seeing and understanding how one thing influences another

Measuring
For young children, this includes...
• Making comparisons of sizes, temperatures, and weights, as well as using numbers to quantify measurement. For young children, measurement can rely on non-standard units of measurement such as spoons, straws, shoes, etc., not just feet and inches

Noticing Change Over Time
For young children, this includes...
• Recognizing and describing how objects and living things change—either quickly (an ice cube melting) or more slowly (a plant growing)

Observing
For young children, this includes...
• Using our senses to explore and learn about scientific objects and events

Recognizing Relationships
For young children, this includes...
• Comparing sizes, shapes, quantities, colors, and events

Sorting and Classifying
For young children, this includes...
• Noticing similarities and differences and putting objects into groups based on shared attributes (characteristics)

Using Simple Tools of Science
For young children, this includes...
• Using tools, such as magnifiers, eyedroppers, water pumps, balances, sieves, binoculars to explore and investigate

Design Technology

Young children are always making things. Design Technology is about the many ways people, and now computers, have designed tools, machines and other inventions to solve problems big and small. Young children are naturally interested in tools and machines; they want to try to use them and they want to understand how they work. They also enjoy using their imaginations to invent solutions to everyday problems.

Here are some ways children learn about Design Technology:

- Asking questions such as: How can we build it? What is it made of? How can we change it?

- Responding to What if? questions, such as: What if someone had not invented a zipper? What would we do if we didn't have cars to get us from one place to another? What if there were no bridge over the water?

- Taking apart a broken telephone or clock and naming the different pieces

- Noticing a problem and coming up with possible changes in design

- Using varied materials to build an imaginative invention and describing the problem it would solve

- Examining a collection of kitchen or carpenter's tools and making guesses about what each one does

Earth and Space Science

Young children are interested in many different aspects of the land and sky that make up our world. As young children experience soil, sand, rocks, puddles, streams, ponds, rainbows, shadows, the moon and stars in their everyday life they begin to notice characteristics, patterns and changes related to these elements of earth and space. As young children gain knowledge about earth and space they may also learn to respect and care for the environment.

Here are some ways children learn about Earth and Space Science:

- Noticing and describing similarities and differences between night and day, the seasons, and weather conditions

- Collecting, describing and weighing rocks, pebbles, soil and/or sand

- Investigating the shape, position and change in shadows

- Looking for "cloud pictures" in the sky and naming different types of clouds

- Noticing and talking about the sun, moon and stars

- Sorting a collection of clothing footwear or objects according to seasons

- Looking at a thermometer to decide whether or not to wear a jacket for outside play

- Flying kites on windy and calm days

Life Science

Living things are a source of endless fascination for young children. When children observe and talk about a variety of living things they learn about basic needs, ways of moving, life cycles, habitats, growth patterns and the interdependence of living things.

Here are some ways children learn about Life Science:

- Measuring themselves and recording their own heights and weights
- Planting seeds, watching them grow, and giving them sunlight, water and plant food
- Using a hand lens to study worms, insects or a flower
- Collecting and sorting different types of leaves
- Matching and sorting pictures of animals based on what they look like, where they live or what they eat

Physical Science

As children explore the world around them, they learn about the properties of objects and materials—what they're made of, their size, shape, color, texture, weight and temperature. They also learn about motion, sound and light.

Children are fascinated by what happens to various objects in different situations: Do the objects sink or float in water? Do they dissolve or disintegrate? What do we notice when water gets very hot or very cold?

Here are some ways children learn about Physical Science:

- Collecting and examining objects such as rocks with a hand lens and sorting them into groups based on shape, color, or texture
- Rolling, catching, bouncing, kicking and throwing different kinds of balls
- Making musical instruments out of materials such as cardboard tubes, tin plates, cans and jar lids to explore sound in all its varieties

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