

ANNUAL TEACHERS' TRAINING COURSE YEAR 2007 SEMESTER 1

SCIENCE

What is Science for young children?

- Knowledge obtained by observations
- Based on experiments
- Proven facts

Goals (purpose):

- Cognitive
- Affective
- Psychomotor

Objectives (what you want to achieve):

- Reasoning thinking
- Cause-Effect relationship
- Make predictions

Natural Science

- Living and non-living things
 - ❖ Human, animals, plants
 - ❖ Food, things around us
- Environment
 - ❖ Weather, seasons
- Energy
 - ❖ Water, wind, sun
- Nature
 - ❖ Sea, land, mountain

How to teach young children Science?

- Observe (close-to-far)
- Compare (known-to-unknown)
- Record / Measure (elaboration)
- Discuss / Make predictions or inferences

Scientific thinking

- Mastering scientific thinking skills allows children to interact with materials and environmental phenomena.
- We should cultivate an exploratory and investigative behaviour in children from young.
- The fundamental skills of the scientific thinking process is mastered through *observations, comparisons, measuring, and making predictions or inferences.*

Concepts

The recommended concepts for teaching Science are:

1. **Organisation.** Scientists have made the study of science manageable by organising and classifying natural phenomena. eg. objects can be arranged according to their categories. Young children can be introduced to this concept by sorting objects like leaves, shells, or rocks according to their characteristics.
2. **Cause and effect.** Nature behaves in predictable ways. Searching for answers is the major activity of science; effects cannot occur without causes. Young children can learn about cause and effect by observing the effects that light, water, and warmth have on seeds and plants.
3. **Systems.** A system is a whole that is composed of parts arranged in an orderly manner according to a plan. In science, systems involve matter, energy, and information that move through defined pathways. Introduce this concept by letting children track changes among the individual parts. Children can learn about systems by studying the notion of balance eg. by observing the movements and interactions in an aquarium.
4. **Scale refers to quantity, both relative and absolute.** Thermometers, rulers, and weighing devices help children see that objects and energy vary in quantity. It's hard for children to understand that certain phenomena can exist only within fixed limits of size. Yet young children can begin to understand scale if they are asked imagine an ant the size of an elephant. Would the ant still have the same proportions if it were that large?
5. **Change.** The natural world continually changes, although some changes may be too slow to observe. Rates of change vary. Children can be asked to observe changes in the position and apparent shape of the moon. Parents and children can track the position of the moon at the same time each night and draw pictures of the moon's changing shape to learn that change takes place during the lunar cycle. Children can also observe and describe changes in the properties of water when it boils, melts, evaporates, freezes, or condenses.
6. **Structure and function.** A relationship exists between the way organisms and objects look (feel, smell, sound, and taste) and the things they do. Children can learn to infer what a mammal eats by studying its teeth, or what a bird eats by studying the structure of its beak.
7. **Variation.** To understand the concept of organic evolution and the statistical nature of the world, children first need to understand that all organisms and objects have distinctive properties. Some of these properties are very different and nothing connects them - eg. living and nonliving things, or sugar and salt. But, in most of the natural world, the properties of organisms and objects vary continuously. Young children can learn about this concept by observing and arranging color tones. Older children can investigate the properties of a butterfly during its life cycle to discover qualities that stay the same as well as those that change.
8. **Diversity.** This is the most obvious characteristic of the natural world. Preschoolers know that there are many types of objects and organisms. Children need to begin understanding that diversity in nature is essential for natural systems to survive. Children can explore and investigate a lake to learn that different organisms feed on different things.

Young children and Science

Young children are scientists at play. While they're baking mud pies or building worm playgrounds, you may catch them conducting playful experiments. If you listen, in addition to giggling you may hear an exchange of observations or well thought-out theories. In their early encounters with nature, children develop ideas about our world based on experiences with real things.

Young children love to stick their noses into nature, but they need your help. You can support their explorative play by giving your children the time, space and equipment needed for investigating the world around them. Science doesn't require direct instruction, but it does take practice. Your most important role is to encourage, rather than direct, your children's explorations.

Too much direction can dampen your child's budding interest in science and nature. Activities with lots of choices will allow her to follow her own paths of inquiry. When you give your child choices in how he experiences science, you'll be treated to a kaleidoscope of unique and meaningful explorations.

Tools are important too. If you give your children a wide array of equipment, they can pursue many different investigations. Watch your children exploring, and you may observe them pausing to search for the right tool, such as a magnifying glass or a stethoscope. By itself, each tool helps a child focus on a particular avenue of exploration. A child with a magnifying lens is bound to look closely at things, while a child with a mirror may end up playing with light.

Another valuable way to encourage your children's interest in science is seizing the moment. On rainy days, children can investigate earthworms and puddles. During a snowstorm, bundle them up to explore the crystals in snowflakes. A walk in the park may reveal hidden caterpillars or sparkling rocks.

One of the best things about science for young children - and about childhood as a whole - is the joy of wondering. Why? How? Where? When? As an adult, you may want to jump in and give the right answers, but if you let go of that impulse, you too may be immersed in the wonder. By sharing your thoughts as a partner, not the source of all knowledge, you can participate in your children's ponderings. Join in the wonder and go where it takes you!

Excerpted from "Science Their Way" by Michael Elsohn Ross

Suggested Activities

Activity 1: Learning About the 5 Senses Using the Body Dice

Description: The purpose of this activity is to teach children about the functions of the 5 body senses.

Goals: Children will explore how their bodies receive information from the outside world using a combination of storytelling and a simple game.

Objectives: There are two objectives for learners:

- (1) Students will listen to a story about the 5 body senses read aloud by the teacher;
- (2) Each student will describe how they used a sense to gather information about the world around them as shown on the Body Cube.

Procedure:

1. Describe the purpose of the lesson.
2. Show children the e-themes software – Level 1 Science – My Body (Our Five Senses).
3. Introduce the Body Dice.
4. The rules are simple. Each student will roll the Body Cube on the floor. The player must describe how they used a sense to gather information about the world as shown on the side of the cube, e.g., I used by tongue to taste morning snack before recess.
5. Answer students' questions before beginning the game. Peers may assist students who have difficulty describing use of a body sense.

Variations: When playing Body Dice with older students, increase the complexity of the rules and ask players to describe what life would be like without the use of that sense;

Activity 2: Are You Right Handed or Left Handed?

Objectives:

- 1.To orally distinguish their left hand from their right hand.
- 2.To orally and manually identify whether they are right handed, left handed, or ambidextrous.

Materials: paper, pencil

Procedure:

Ask students to scratch their backs. After a few seconds of scratching, tell students to freeze and put the hand that they were using to scratch their back high up in the air. Ask students to share whether the hand they are holding high in the air is their right hand or their left hand.

Instruction:

Inform students that most people are born with a tendency to use one hand more than the other. Explain to students that today they are going to do some experiments to determine whether they are left handed, right handed, or ambidextrous (which means that they use both hands equally). Tell students that for each experiment they will write either an R, an L, or an A depending on which hand they use.

Ask students to record R, L, or A for the hand used to scratch their back. Have students clasp their hands together. Which thumb is on top? Students record R, L, or A. Have students cross their arms. Which arm is on top? Students record R, L, or A. Ask students to notice which hand they are writing with. Students record R, L, or A.

Instruct students to count the number of R's, L's, and A's they recorded. Students are to figure out whether they are left handed, right handed, or ambidextrous by which letter had the greatest number of occurrences. Construct a tally on the board or on chart paper of how many students are left handed, how many students are right handed, and how many students are ambidextrous. Ask the class if more people are left handed, right handed, or ambidextrous in the class. Ask the students if they can come up with more experiments to discover if they are left handed, right handed, or ambidextrous. Have students perform their own experiments.

Closure:

Teach students the following chant to further reinforce their understanding of right and left: "This is my right hand. I'll raise it up high. This is my left hand. Watch me touch the sky. Right hand and left hand, listen to them clap. Right hand and left hand, fold them in your lap."

Assessment: Record students' responses on a tally chart. Observe students doing experiments. Monitor student responses to teacher posed questions.

Activity 3: Day/Night (Our Earth)

The sun, moon, stars, clouds, birds, and airplanes all have properties, locations, and movements that can be observed and described. Ideally, students should engage in direct observation of both the daytime and nighttime sky throughout this lesson series.

This investigation requires that observations be ongoing, so that students can look for patterns over time. As children become more familiar with objects in the sky, they can be guided to observe changes, such as night and day and the seasons.

Students will investigate objects in the daytime and nighttime sky. This investigation should be confined to observations, descriptions, and finding patterns. Attempting to extend this understanding into explanations using models will be limited by the inability of young children to understand that earth is approximately spherical.

Children at this age also have little understanding of gravity and usually have misconceptions about the properties of light that allow us to see objects such as the moon. Thus, these topics should be avoided.

Activity 4: “Everybody Needs a Home”

Subject(s): Interdisciplinary, Arts/Visual Arts, Science/Animals

Description: Animals need a place in which to find food and water. They also need enough space in which to live and find the food, water and shelter they need. Home is more like a "neighborhood" that has everything in it that is needed for survival. The major purpose of this activity is for students to realise that animals need a home.

Goals: Students will be able to generalise that people and other animals share a basic need to have a home for survival.

Objectives: Students will be able to:

- draw a picture of their homes
- discuss the differences and similarities between homes
- explain why people, animals, and birds need a home

Materials: drawing paper, crayons, pictures of animals and where they live

Procedure:

1. Ask students to draw a picture of where they live. Ask the students to include pictures in their drawing of the things they need to live where they do; for example, a place to cook and keep food, a place to sleep, a neighbourhood.
2. Once finished, have a discussion with students about what they drew. Ask the students to point out the things they need to live that they included in their drawings.
3. Make a “gallery of homes” out of the drawings. Point out to the students that everyone has a home.
4. Ask the students to close their eyes and imagine: a bird's home, an ant's home, a beaver's home, the President's home, their home.
5. Show the students’ pictures of different places that animals live.
6. Discuss the differences and similarities among the different homes with the students. Talk about the things every animal needs in its home: food, water, shelter and space in which to live, arranged in a way that the animal can survive.
7. Summarise the discussion by emphasising that although the homes are different, every animal – people, pets, farm animals and wildlife – needs a home.
8. Talk about the idea that a home is actually bigger than a house. In some ways, it is more like a neighbourhood. For animals, we can call that neighbourhood a “habitat”.eg. People go outside their homes to get food at a store, for example. Birds, ants, beavers and other animals have to go out of their “houses” (places of shelter) to get the things they need to live.

Assessment: Student will be able to:

1. name three reasons why people need homes and three reasons why animals need homes.
2. draw a picture of an animal in its habitat and tell how the habitat meets the animal's needs for survival.

Activity 5: Are Your Hands Big or Small?

Objectives:

1. Sequence objects (hand cut-outs) from largest to smallest.
2. Sort objects into groups of small, medium, and large.

Materials: scissors, construction paper, pencils

Procedure:

Ask one student to come to the front of the class.

1. Ask the student to hold up his/her hand, and then hold up your hand against the student's hand.
2. Ask the class what they notice about the difference between the two hands.
3. Inform students that like most body parts, hands come in all shapes, sizes, and colors.
4. Tell the students that today they will be tracing their hands to see whose hands are the largest, all the way down to whose hands are the smallest.
5. Give each student a piece of construction paper, and divide the students into pairs.
6. One student will place his hand flat on the piece of paper, and the other student will trace the hand.
7. After both students have traced their hands, then the students will cut out their traced hands.
8. Instruct students to come to the carpet, and have them place their hand cut-outs in the center.
9. Ask the students to come up individually and try to put the hand cut-outs in order from longest to shortest.
10. The entire class will have input on the final outcome. The cut-outs will also be ordered from widest to skinniest.
11. Review sizes by holding up the largest hand cut-out and the smallest hand cut-out and asking the children to tell the difference between the two.
12. Ask students to trace their parents' hands and to bring in the cut-outs for class the next day. Students will order their parents' hands from largest to smallest.

Assessment: Check to make sure that the students can order objects from largest to smallest. Monitor responses to teacher posed questions.