The Compost Bucket Lesson Plan

Overview

In this lesson, children will learn that plants and soils have a close relationship. Plants are dependent upon the soil for the nutrients they need to grow. But plants also return nutrients to the earth to help keep soil fertile. A photo essay will help students understand the common practice and natural process of composting, and then students will observe the process of plant decay over the course of several days. Children will begin to learn that plants and soils are two parts of one system and they are connected through a cycle of growth and decomposition.

Anticipated lesson duration: One introductory, 45-minute class period with subsequent observations of a decomposing plant for two weeks. Students will record periodic drawings of a decomposing plant.

Suggested Lesson Sequence	See Earth Systems Foundations: Plants and Soils module
Lesson Level	Entry
Science Connections	• Students will observe that plants and soils are closely connected throughout the cycle of growth and decomposition • Students will learn that plants need nutrients to grow • Students will learn that when plants die and drop their leaves, nutrients within the plants replenish the soil
Human Connections	• Students may recycle plants in school compost piles
Technology Connections	• Students may use a digital camera to document decomposition of a bean plant • Students will use a computer to view photos and satellite images of plant leaves turning from green to brown during the fall
Assessment	Assessment and Standards Table (Word) Assessment Activity Description Extensions for Authentic Assessment

Materials

Small plants (lima bean plants work well)
Art supplies (e.g. colored pencils, crayons)
Decomposition Drawing Sheet
Nutrient Cycle Assessment
Decomposition Photo Essay-- a slide show to be viewed together as a class
Digital Photos Record Sheet

Vocabulary Words

Decompose: To break down into smaller parts. To disintegrate or decay.
Compost: A mixture of decayed organic matter that can be used to enrich soil and fertilize plants.
Nutrients: Vitamins and minerals that support the life and growth of plants and animals.
Recycle: To use something over again in the same or different form.

Procedure

I. Assessing Prior Knowledge

Engage students in a conversation about the basic needs of living things (people, other animals, and plants). After children create a broad list of needs, focus the attention of the children on food and water needs. You might use the following questions to illicit more specific prior understandings (and misunderstandings):

How do people get food and water?
What happens to people or plants if they don't get enough water?
How do plants get food and water

II. Contextual Preparation

In this lesson, students will be exposed to an introduction of the nutrient cycle-- how nutrients in plants eventually return to the soils from which they originated. Specifically, students will observe the process of plant decay over the course of several weeks. To help prepare them for this activity, the Decomposition Photo Essay ay be used to both stimulate their curiosity and introduce several key ideas about the decomposition process. The photo essay begins with a picture of a compost bucket. Students may be familiar with composting practices. If not, the photo essay may be used to introduce them to the idea that organic matter does not have to be thrown into the garbage. Rather, it can be used to replenish nutrients in the soil. Specific questions that appear in the photo essay include:

1) What is composting?
   Response: Composting is a natural process in which nutrients are cycled through living organisms back to the soil.
2) Why do we compost?
   Response: To do our part to help nature recycle nutrients.
3) Does nature "know" how to compost?
   Response: Yes! Every fall plants drop leaves that replenish soils.

Introduce the following observational experiment as an opportunity to learn more about out how plants get the food and water they need to grow. Introduce the word *nutrient* as the word that scientists use to talk about the food needs of living things.

III. Observational Activity

1. Start the plants Teachers may use bean plants grown in the Roots and Shoots lesson or grow plants from lima bean seeds in small cups. To grow lima beans from seeds, add potting soil to a small clear plastic cup. Plant a lima bean seed about 1 centimeter under the soil and close to the edge of the cup. Water regularly to keep the soil moist (yet not waterlogged) and place near a window if possible. After a few days, the seed will germinate.

2. Observing growth Children should use either the Decomposition Drawing Sheet or Digital Photos Record Sheet to record observations. As the plants are growing, engage children in conversations about how the plants are getting the water and food that they need (a connection between roots and soil).

3. Waiting for decay After the plants are 5-10 cm tall, stop watering them. Within a week or two, the plant should begin to wilt and lose its green color. This may be a problem for young children who become attached to their plants. Therefore the teacher may choose to grow some plants for the children to take home, and some plants to remain at school for continued observation after the plant is no longer living.

5. Observing decay Eventually, the wilted plant will fall over and will begin to decompose into the soil. As the plant decomposes, it becomes more blended with the soil. Discuss that the plant is breaking down and going back into the soil. Eventually the decayed plant will be taken up again by new plants. To help speed the decomposition process, it helps to: 1) keep the cup in a warm place, 2) place the dead plant in direct contact with the soil, and 3) keep the soil slightly moist.

IV. Assessment

Invite students to create a skit or collection of drawings to show the plant-soil connection.

Children should understand that when plants die they break down and return to the soil.

For a more formal assessment opportunity, distribute the Nutrient Cycle Assessment activity sheet. On this assessment activity, students need to cut out six pictures and order them in a way that illustrates the nutrient cycle.

Extensions for Authentic Assessment

1. Composting at school: To engage children in learning more about plant decomposition, start a compost pile on the school playground. Using plant-based food scraps from the cafeteria or grass clippings and other organic matter from the playground, start a pile in a sunny location. Add a thin layer of soil and leaves to the top of the pile. Make sure the pile doesn't dry out and turn with a shovel every week or two. This could also be done on a smaller scale using a small aerated bucket in the classroom (if in the classroom, several earthworms should be added to the compost to help with the decomposition process). Children can record the progress of the plant composting with a digital camera or drawings. Discuss the benefits of composting in your own yard, reminding students about the plant nutrients. Where would the nutrients from the plant scraps go if they didn't go into the compost? (They would probably go into the city dump.)

2. For children to see direct evidence of how materials (such as nutrients) may be carried back into a plant, do a "carnation coloring" experiment. Purchase two or three fresh white carnations and place them in clear cups in the front of the classroom. Next, add food coloring to the water (use a different color for each carnation). Within a few days each white carnation will begin to show the color of the food coloring in its water. Discuss how the food coloring is similar to nutrients in that they are both brought into the plant by water.