Soil

Earth & Space Science | Lesson Guide

3rd Grade

Photo Description

This image shows a cross-section of soil with three distinct layers stacked on top of each other. The top layer contains dark soil mixed with green plants and roots. The middle layer shows reddish-brown soil, and the bottom layer is darker, more compact soil. Together, these layers make up the ground beneath our feet where plants grow.

Scientific Phenomena

Anchoring Phenomenon: Why does soil look different in different layers?

Soil naturally forms in layers over time through a process called soil development. The top layer (called topsoil) is rich in nutrients and organic matter because decomposing plants and animals break down there. The middle layer (subsoil) contains minerals that have washed down from above and contains fewer nutrients. The bottom layer (parent material) is breaking down from rock below. Plants have deeper roots that reach into these different layers to find water and nutrients. This layering happens naturally as soil matures—it's not something someone creates, but rather something nature builds slowly over years.

Core Science Concepts

1. Soil Composition: Soil is made up of tiny pieces of rock, decomposed plants and animals (organic matter), water, and air. Different soils have different amounts of each ingredient.

2. Soil Layers: Soils form distinct horizontal layers. Each layer has different properties and serves different purposes for plants and organisms living in the soil.

3. Plant-Soil Relationships: Plant roots grow downward into soil layers to absorb water and nutrients needed for the plant to survive and grow.

4. Decomposition: Dead plants and animals break down in soil, returning nutrients to the ground so new plants can use them.

Pedagogical Tip:

When teaching about soil layers, avoid the term "dirt" with students. Encourage them to use the word "soil" instead, as it emphasizes that soil is a living system, not just something dirty. This subtle language shift helps students develop respect for the soil ecosystem and builds scientific vocabulary.

UDL Suggestions:

For visual learners, create a large soil layer diagram on the classroom wall where students can move tactile materials (real topsoil, sand, small rocks) into labeled sections. For kinesthetic learners, have students lie down in order to represent soil layers with their bodies—one child as topsoil, one as subsoil, one as parent material—to physically experience the concept. For students needing additional support, provide a labeled diagram and word bank before discussions.

Discussion Questions

1. What do you notice about the colors of the soil layers in this picture, and why do you think they look different? (Bloom's: Analyze | DOK: 2)

2. How do you think the plants at the top of the soil got their water and food? (Bloom's: Understand | DOK: 2)

3. If we left dead leaves on the ground for a whole year, what do you predict would happen to them, and where would they end up? (Bloom's: Evaluate | DOK: 3)

4. Explain why soil is important for living things on Earth. (Bloom's: Comprehend | DOK: 1)

Extension Activities

1. Soil Layer Jar Experiment: Have students fill a clear plastic jar with layers of actual soil samples (topsoil, sand, clay, gravel) collected from different depths. Add water and observe how the layers settle differently. Students can predict which layers will sink first and why, then record their observations in a science journal.

2. Decomposition Investigation: Place dead leaves, a piece of paper, and a small piece of food waste in separate soil-filled containers with a moisture source. Over 2-4 weeks, have students observe and sketch what happens to each material, then discuss how decomposition helps plants grow.

3. Soil Organism Hunt: On a field walk or in the outdoor classroom, carefully dig small areas and use magnifying glasses to observe insects, worms, and other soil creatures. Create a labeled chart of organisms found and discuss what each one does to help break down soil material.

NGSS Connections

Performance Expectation:
3-LS4.A: Structure and Function - "Construct an argument that some animals form groups that help members survive." (While this PE focuses on animal groups, soil supports this by providing habitat structure)

Disciplinary Core Ideas:
- 3-ESS2.A - Earth's Materials and Systems - Understanding that soil is made from weathered rock and organic matter
- 3-LS1.A - Structure and Function - Plants need soil, water, and sunlight to grow
- 3-LS2.B - Cycles of Matter and Energy Transfer in Ecosystems - Decomposition returns nutrients to soil

Crosscutting Concepts:
- Patterns - Soil consistently forms in predictable layers
- Structure-and-Function - Each soil layer has different properties that serve different purposes
- Cause-and-Effect - Plants die and decompose, which changes soil composition

Science Vocabulary

* Soil: The dark, crumbly material covering Earth where plants grow and that contains bits of rock, dead plants, and living organisms.

* Topsoil: The top, darkest layer of soil that is richest in nutrients and where most plant roots grow.

* Subsoil: The middle layer of soil that is lighter in color and contains fewer nutrients than topsoil.

* Decompose: When dead plants and animals break down slowly into smaller pieces that become part of the soil.

* Organic Matter: Dead plants and animals, or materials that once were alive, that mix with soil to make it richer.

* Nutrients: Natural substances in soil that plants need to grow strong and healthy.

External Resources

Children's Books:
- Who Lives in the Soil? by Jennifer Owens (National Geographic Little Kids)
- Soil by Gail Gibbons (Holiday House)
- The Tiny Seed by Eric Carle (simplifies plant-soil relationships)

YouTube Videos:
- "Layers of Soil" by Crash Course Kids - A 4-minute overview of soil layers with clear animations appropriate for third graders. https://www.youtube.com/watch?v=4ggWRbWSccs

- "What Lives in the Soil?" by National Geographic Kids - An engaging 3-minute video showing the organisms and materials that make up soil. https://www.youtube.com/watch?v=OgqWGo-jI8Y

This lesson invites students to observe, question, and explore the living system beneath their feet. Soil is a powerful anchor for third-grade Earth science because it connects directly to students' experiences and serves as the foundation for all terrestrial life.