Seedling

Life Science | Lesson Guide

3rd Grade

Photo Description

A small plant with green leaves is growing from a clear plastic bottle filled with dark soil. The bottle is lying on its side on a windowsill. This shows how plants can grow in different containers when they have soil, water, and sunlight.

Scientific Phenomena

This image represents the Anchoring Phenomenon of plant growth and adaptation in alternative environments. The plant is demonstrating its ability to germinate, grow, and orient itself toward light (phototropism) even when planted in an unconventional container. The seedling's stem is growing upward against gravity (gravitropism) while the roots grow downward into the soil, showing how plants respond to environmental stimuli to meet their basic needs for survival.

Core Science Concepts

1. Plant Basic Needs: Plants require sunlight, water, air, nutrients, and appropriate temperature to survive and grow, regardless of their container.

2. Plant Responses to Environment: Plants exhibit tropisms - they grow toward light (phototropism) and roots grow toward gravity (gravitropism) to optimize their survival.

3. Life Cycles: This demonstrates the early stages of a plant's life cycle, from seed germination to seedling development.

4. Resourcefulness and Recycling: Using recycled materials as planters shows how humans can repurpose items while supporting plant life.

Pedagogical Tip:

Have students make predictions about what would happen if you rotated the bottle or moved it to different locations. This engages them in scientific thinking and helps them understand that plants actively respond to their environment.

UDL Suggestions:

Provide multiple ways for students to document observations - through drawings, photos, written descriptions, or verbal recordings. This supports different learning preferences and abilities while building scientific observation skills.

Zoom In / Zoom Out

1. Zoom In: At the cellular level, plant cells are using chloroplasts to capture sunlight energy and convert carbon dioxide and water into sugar through photosynthesis. Root cells are absorbing water and nutrients from the soil through tiny root hairs.

2. Zoom Out: This single plant is part of larger ecological cycles - it produces oxygen that animals breathe, its roots help prevent soil erosion, and eventually it may produce flowers that feed pollinators or fruits that feed other organisms in the ecosystem.

Discussion Questions

1. What do you think would happen if we moved this bottle to a dark closet for a week? (Bloom's: Predict/Analyze | DOK: 3)

2. How is this plant similar to and different from plants growing in your garden? (Bloom's: Compare/Analyze | DOK: 2)

3. What evidence do you see that tells you this plant is healthy and growing? (Bloom's: Evaluate | DOK: 2)

4. If you wanted to help this plant grow even better, what changes would you make and why? (Bloom's: Create/Synthesize | DOK: 4)

Potential Student Misconceptions

1. Misconception: Plants only grow in regular pots or in the ground.
Clarification: Plants can grow in many different containers as long as their basic needs (sunlight, water, air, nutrients, space) are met.

2. Misconception: Plants don't move or respond to their environment.
Clarification: Plants actively respond to light, gravity, and touch by growing in specific directions, though this movement is much slower than animal movement.

3. Misconception: The bottle is "feeding" the plant.
Clarification: The bottle is just a container - the plant gets its food from the soil nutrients and makes its own food through photosynthesis using sunlight.

Cross-Curricular Ideas

1. Math Connection - Measurement & Graphing: Have students measure the height of the plant seedling weekly using a ruler or non-standard units (paperclips, blocks). Create a simple bar graph or line plot showing how much the plant grew each week. This integrates measurement and data visualization skills.

2. ELA Connection - Narrative & Descriptive Writing: Ask students to write a story from the plant's perspective: "A Day in the Life of a Seedling." Encourage them to use descriptive words (adjectives) for colors, textures, and sensations. This builds vocabulary and creative writing skills while deepening understanding of plant needs.

3. Art Connection - Observational Drawing: Have students create detailed drawings of the plant at different stages of growth. Display these drawings in sequence to show the plant's development over time. This develops fine motor skills and scientific observation while creating a visual record of the phenomenon.

4. Social Studies Connection - Community & Responsibility: Discuss how people can help the environment by recycling bottles and growing plants. Connect to themes of environmental stewardship and responsible citizenship in their community and homes.

STEM Career Connection

1. Botanist - A botanist is a scientist who studies plants and how they grow. Botanists work in gardens, greenhouses, and laboratories to learn about different plants, figure out why some plants get sick, and help grow food for people. They might help farmers grow better crops or protect plants that are disappearing from nature. Average Salary: $63,000/year

2. Horticulturist - A horticulturist is someone who grows plants and takes care of gardens, greenhouses, and farms. They know all about what plants need to be healthy and beautiful, and they help decide what plants to grow where. Some horticulturists work at plant nurseries, botanical gardens, or help people design their home gardens. Average Salary: $57,000/year

3. Environmental Scientist - An environmental scientist studies how living things (like plants) interact with soil, water, and air to keep our planet healthy. They might test soil to see if it's good for growing plants or work on ways to help plants survive in different climates. They help protect nature and make sure ecosystems stay balanced. Average Salary: $74,000/year

NGSS Connections

- Performance Expectation: 3-LS1-1 - Develop models to describe that organisms have unique and diverse life cycles but all have in common birth, growth, reproduction, and death.
- Disciplinary Core Ideas: 3-LS1.B - Growth and Development of Organisms
- Crosscutting Concepts: Patterns and Systems and System Models

Science Vocabulary

* Germination: When a seed starts to grow into a new plant
* Seedling: A young plant that has just started growing from a seed
* Phototropism: The way plants grow toward light sources
* Nutrients: Food substances that plants need from soil to stay healthy
* Environment: All the things around a living thing that affect how it grows
* Adaptation: How living things change or adjust to survive in their surroundings

External Resources

Children's Books:
- From Seed to Plant by Gail Gibbons
- The Tiny Seed by Eric Carle
- A Seed Is Sleepy by Dianna Hutts Aston