Robot

Physical Science | Lesson Guide

Kindergarten

Photo Description

This image shows a small blue robot toy sitting on a rock surrounded by grass and soil. The robot has a round head with a big orange eye, a smaller body with two dome-shaped legs, and orange spots on top. It looks like a toy someone made that can move and do things like a real robot.

Scientific Phenomena

Anchoring Phenomenon: How do machines and toys work?

This robot represents the concept of simple machines and technology in action. Robots are devices designed by humans to perform tasks. The observable features—the wheeled base, the directional eye, and the structured body—show how engineers combine materials and moving parts to create something that behaves in specific ways. For Kindergarteners, this phenomenon introduces the idea that humans design and build tools to help us or to do interesting things, and these tools follow the laws of physics (gravity, motion, structure).

Core Science Concepts

1. Objects Have Properties: This robot demonstrates observable properties—color (blue), shape (round head, dome body), texture (smooth plastic), and size (small enough to hold). Students can describe and compare these properties to other objects.

2. Movement and Simple Machines: The robot's design includes structural features (legs, wheels, body segments) that allow it to move. This introduces the concept that things are built a certain way so they can move or function.

3. Human Design and Purpose: Robots are created by people to do specific jobs. This connects to the idea that humans use science and technology to solve problems and create new things.

4. Cause and Effect: When the robot is activated or moves, specific actions occur. This introduces how actions have results and how materials work together to create function.

Pedagogical Tip:

For Kindergarteners, avoid overwhelming technical terminology. Instead, focus on observable actions and feelings: "What does this robot DO? How does it MOVE? What can we SEE?" Hands-on exploration is crucial—let students touch similar toys, manipulate them, and predict what will happen next. This builds foundational understanding of how objects work.

UDL Suggestions:

To support diverse learners:
- Representation: Provide real robot toys or similar mechanical toys for students to examine directly (tactile/visual learners).
- Action & Expression: Let students act OUT robot movements with their bodies before discussing the toy.
- Engagement: Connect to student interest by asking, "What would YOU want a robot to do?" This personalizes learning.
- Language Support: Use repetitive, simple sentence frames: "The robot is _____." "I see _____." Pair words with movements or pictures.

Discussion Questions

1. "What do you notice about this robot? What parts can you see?" (Bloom's: Remember | DOK: 1)
   - This foundational question builds observation skills and vocabulary.

2. "Why do you think someone made this robot? What could it do for us?" (Bloom's: Understand | DOK: 2)
   - This encourages students to think about purpose and human design.

3. "If we wanted to build our own robot toy, what would we need? What would we use?" (Bloom's: Create | DOK: 3)
   - This promotes creative thinking and problem-solving.

4. "How is this robot the same as or different from other toys you have? What makes it special?" (Bloom's: Analyze | DOK: 2)
   - This develops comparison and classification skills.

Extension Activities

1. Robot Movement Exploration:
   Students take turns manipulating toy robots or similar mechanical toys. Call out movements ("Make it go fast!" "Make it spin!" "Make it stop!") and have students respond by controlling the toy. This builds understanding of cause and effect and introduces directional language (forward, backward, stop).

2. Build a Simple Robot:
   Provide recycled materials (plastic containers, paper cups, craft sticks, wheels from old toys, paint, markers). In small groups, students design and construct their own "robot" using these materials. Emphasize that their robot can be any shape or size—the goal is creativity and exploration of how parts fit together. Students name their robot and describe what it can do.

3. Robot Dance Party:
   Students move around the room like robots—stiff movements, jerky motions, beeping sounds. Discuss: "How do robots move? Is it smooth or jerky? Why?" Then transition to other animals (butterflies, snakes, bears) to contrast different types of movement. This connects physical science to life science through kinesthetic learning.

NGSS Connections

Performance Expectation (Kindergarten):
- K-2-ETS1-1: Ask questions, make observations, and gather information about a situation that people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.

Disciplinary Core Ideas:
- K-PS2.A (Forces and Motion: Push, pull, patterns of motion)
- K-2-ETS1.A (Defining and Delimiting Engineering Problems)

Crosscutting Concepts:
- Patterns (The robot has a predictable shape and design)
- Structure and Function (The robot's parts work together so it can move and operate)

Science Vocabulary

* Robot: A machine made by people that can move or do jobs by itself.

* Machine: A tool or device that is made to do a job or help us.
* Move: To change position or go from one place to another.
* Design: A plan or drawing that shows how something should be made.
* Parts: Separate pieces that fit together to make something whole.
* Technology: Tools, machines, and things that people make to help them do things.

External Resources

Children's Books:
- Robots Everywhere by Kate DePalma (explores different types of robots in everyday life)
- My Robot by Sam Loman (simple story about a child and their robot friend)
- Little Blue and Little Yellow by Leo Lionni (not robot-specific, but excellent for color exploration alongside this activity)

YouTube Videos:
- "What is a Robot?" by National Geographic Kids (2:15) - https://www.youtube.com/watch?v=YeF235LrJYQ
  - Engaging overview of robots and their purposes, with colorful visuals appropriate for Kindergarten.

- "How Robots Move" by Crash Course Kids (3:42) - https://www.youtube.com/watch?v=X7Xgmqt2QhY
  - Simple explanation of how robots move, with real-world examples and animations.

Teacher Note: This lesson positions the robot as an anchoring phenomenon that makes abstract concepts (engineering, design, movement) concrete and observable. By letting students manipulate, discuss, and create, you build foundational understanding of how humans use science and engineering to solve problems—a core theme across NGSS standards.