

Dabble Lab Lesson Plan

Series: Science Brain Builders

Title: *Electrical Programming: Learn It, Try It!*, by Ed Sobey

GENERAL INFORMATION: Grade Level(s): 4-9 Lesson Plan Title: Magnetic North Curriculum Area: Electrical Engineering

Overview of Lesson: In this lesson students will learn how electromagnets can be used to power machines. By taking apart a machine as a class, learning to read a directional compass, and building an electromagnet, students will begin to understand the power of electromagnetism.

BENCHMARKS OR LEARNING OBJECTIVES:

AASL Skills Indicator 1.1.2: Use prior background knowledge as context for new learning.

Grade 5 Benchmark: Predict answers to inquiry questions based on background knowledge and beginning observations or experiences.

Grade 8 Benchmark: Observe and analyze an experience, demonstration, or source that introduces a topic, problem, or question to gather background information.

AASL Skills Indicator 1.1.9: Collaborate with others to broaden and deepen understanding.

Grade 5 Benchmark: Work in teams to produce original works or solve problems.

Grade 8 Benchmark: Work in self-managed teams to understand concepts and to solve problems.

AASL Skills Indicator 2.1.3: Use strategies to draw conclusions from information and apply knowledge to curricular areas, real-world situations, and further investigations.

Grade 5 Benchmark: With guidance, draw a conclusion about the main idea.

Grade 8 Benchmark: Identify connections to the curriculum and real world.

ASSESSMENT METHODS & CRITERIA:

Each student will complete the provided handout based on his or her collaborative efforts and discussions. Each student pair will have also completed the creation of an electromagnet.

RESOURCES AND OTHER LEARNING SUPPORT MATERIALS:

- One buzzer that can be taken apart
- Screwdriver to take apart the buzzer
- 2 feet (0.6 meter) of insulated wire with 1 inch (2.5 centimeters) of insulation removed from each end per student pair
- Large nail for each student pair
- Two paper clips per student pair
- Two clip leads per student pair
- 9-volt battery with holder per student pair
- Wire stripper or pocketknife for teacher/librarian to prepare insulated wire pieces and for making any fixes as needed
- Handouts for each student with directions for this project (see pp. 16–17 of *Electrical Engineering: Learn It, Try It!* by Ed Sobey). On this handout, in addition to the directions, ask students to describe their observations and answer questions, such as; “What else do you think your electromagnet could pick up? What other types of machines, other than a buzzer, use electromagnets? Which type of electromagnet has a stronger magnetic field?”
- Directional compass for each student pair

INSTRUCTION AND ACTIVITIES:

1. Begin class by getting the attention of students with a buzzer.
2. Take the screwdriver to begin taking the buzzer top off. Ask students what they think is inside the buzzer?
3. Pass the buzzer around and ask each student to write down how sound is created within the buzzer. What is causing the sound? What is the process?
4. As a class, ask students to share their written observations and then explain how the buzzer works. (See p. 19 of *Electrical Engineering: Learn It, Try It!* by Ed Sobey for more.)
5. Assign each student a partner, and explain that each pair will be creating an electromagnet to better understand how the buzzer works.
6. Pass out and review the directions on the handout with a demonstration, if time permits.
7. Pass out the materials required for each student pair to create an electromagnet.
8. Give students time to create their electromagnet and complete the handout provided.
9. Discuss as a class students' findings and observations.
10. Pass out a directional compass to each student pair.
11. Ask students to point North.
12. Explain what magnetic north means and how a compass uses Earth's magnetic field.
13. Ask students as a class to hypothesize what will happen if they put their compass near their electromagnet.
14. Discuss as a class what happens and why. (See p. 18 of *Electrical Engineering: Learn It, Try It!* by Ed Sobey.)

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