

Dabble Lab Lesson Plan

Series: Science Brain Builders

Title: *Structural Engineering: Learn It, Try It!*, by Tammy Enz

GENERAL INFORMATION: Grade Level(s): 4-9 Lesson Plan Title: Materials Matter Curriculum Area: Structural Engineering

Overview of Lesson: In this lesson, students will test out the strengths of various materials. Students will understand the process of an experiment, collaboratively determining their hypothesis and reflecting on the results. Students will then be challenged in collaborative groups to create the tallest freestanding structure in the class.

BENCHMARKS OR LEARNING OBJECTIVES:

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: Encourage team members to share ideas and opinions.

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: Review ideas held at beginning of inquiry and reflections captured during note taking.

Grade 8 Benchmark: Compare information found to tentative thesis or hypothesis; revisit or revise hypothesis as appropriate.

ASSESSMENTS METHODS:

Each student will complete the provided handout based on his or her collaborative efforts and discussions. Additionally, each group of students will have produced their attempt of the tallest freestanding structure.

RESOURCES AND OTHER LEARNING SUPPORT MATERIALS:

Part I:

- Paper and pencil per student
- One 10 inch (25 centimeter) piece of wire from a coat hanger (wire cutter) per group
- One 10 inch (25 cm) piece of string per group
- One 10 inch (25 cm) wooden skewer per group
- One uncooked spaghetti stick per group
- One cooked spaghetti noodle per group
- One marshmallow for instruction

Part II:

- One marshmallow per group
- 1 yard (0.9 meter) of string per group
- 1 yard (0.9 m) of masking tape per group
- 20 sticks of uncooked spaghetti per group

INSTRUCTION AND ACTIVITIES:

Part I:

1. Create mixed gender groups of four or less, and place the necessary materials on each group's desk.
2. Introduce students to structural materials and forces as described in Chapter 2, pages 8–15 of *Structural Engineering: Learn It, Try It!*, by Tammy Enz. Use a marshmallow to demonstrate the various types of forces and how to test for them.
3. Provide a handout for each student with space for a name, date, hypothesis, results (using the table shown on page 14 of *Structural Engineering: Learn It, Try It!*, by Tammy Enz), and reflections on these results. You may choose to include specific reflective questions such as; “Which material(s) received the highest scores? Why do you think this material or these materials received the highest score(s)? If you were building the tallest structure possible, which material would you use and why?”
4. Instruct students to complete the handout as they test each of the materials you have provided.
5. Discuss as a class the results students obtained.
6. Give students time to reflect further after the class discussion.

Part II:

1. Introduce the spaghetti tower challenge: students, in their groups, will have 18 minutes to create the tallest free-standing structure possible using the materials provided for part II. Option: You may display the winner's structure in your library for all students to see.
2. Hand out the set of materials.
3. Start the timer.
4. When time is up, let each group present their structure and share what types of forces are involved.

Co-created by Jessica J. Stewart, M.S. Library and Information Science with School Media Specialization, Syracuse University iSchool; and Courtney K. Friedman, M.Ed. Curriculum and Instruction, University Nevada, Las Vegas M.S. Publishing, New York University