

Design a Sturdy Table

Lesson Objective

In this lesson, students will explore the engineering design process by building a table out of tubes of newspaper that is strong enough to hold a heavy book.

Activating Prior Knowledge & Concept Building

Sustainability is the ability to maintain a certain status or process in existing systems. The most frequent use of the term **sustainability** is connected to biological or human systems in the context of ecology. The ability of an ecosystem to function and maintain productivity for a prolonged period is also sustainability.

The Science Behind It

Sustainability is important because all the choices we pursue and all the actions that we make today will affect everything in the future. We need to make sound decisions at present in order to avoid limiting the choices of generations to come.

For example, if you continue wasting water and polluting the dwindling supply of freshwater that we have today, we leave future generations with no other choice than to desalinate saltwater or treat contaminated water for their consumption and daily use. We can also be assured that, if that happens, all life that depends on clean freshwater will become extinct.

Materials:

- Newspaper

Instructions for Instructor:

1. **Introduce the challenge.** (5 minutes.) Gain interest by asking, “Do you think you can build a table out of newspaper?”
2. **Have students discuss** how a flimsy piece of paper could support a hefty weight. Have them look at the furniture in the room and describe the different supports they see that keep surfaces on tables and chairs from tilting or twisting.
3. **Demonstrate how to make a strong tube** by rolling it tightly. Start at one corner and roll diagonally toward the other corner, with the first roll about the diameter of a straw. Tape the tube closed with a strip or two of tape and wave it around to show how stiff it is. *Hint: To avoid having to spend time teaching each student how to make a tube out of newspaper, make samples that illustrate the process in advance and tape them to a poster board. For instance, take three pieces of newspaper. Use one to show how tight the first roll needs to be to make it strong. Roll the second paper halfway up. With the third, show a finished tube.*
4. **Demonstrate different shapes.** Take two newspaper tubes; bend one into a triangle, a common shape for supports, and the other into a square. Tape them closed and set them on the floor. Push down on them and rock them from side to side. The triangle will withstand more force and provide more stability than the square, but orientation matters! A triangle resting on its point will be weaker and less stable than before.
5. **Have students brainstorm** (10 minutes) how they could use these materials to make a paper table that’s at least 8 inches tall and strong enough to hold a book. Ask them to sketch their designs on a piece of paper or in their design notebooks.
6. **Distribute the newspaper and have the kids begin building.** (35 minutes)

If problems arise, ask questions to encourage students to think about how they might solve their design problems:

- The table legs tilt or twist. (*Support the legs by running tubes between them.*)
- A tube buckles when loaded down. (*Roll loose tubes tighter. Tape securely. Reinforce or replace dented or wrinkled areas that weaken legs.*)
- The table wobbles. (*Make sure it isn't lopsided and has adequate supports. Reduce height to increase stability.*)
- The table collapses. (*Check that the base is truly sturdy. In general, the more triangles kids use, the stronger their tables will be.*)

Closing

Review the activities of the day with the students and assess what concepts they took away or what they missed. List the key learning points on the board. Have students reflect on the activity by sharing out and writing about it in their science journals (or activity document).

Debrief Questions: Did you make paper support more weight by changing its shape? How did knowing certain arrangements of materials, like triangles, influence the table's design? What helped make a table especially strong? How does recycling and reusing help our environment? Why do you think people do not recycle more often? How could you change your habits to reuse more materials?

Source:

<http://teachers.egfi-k12.org/paper-table/>