

The Workshop for Young Engineers

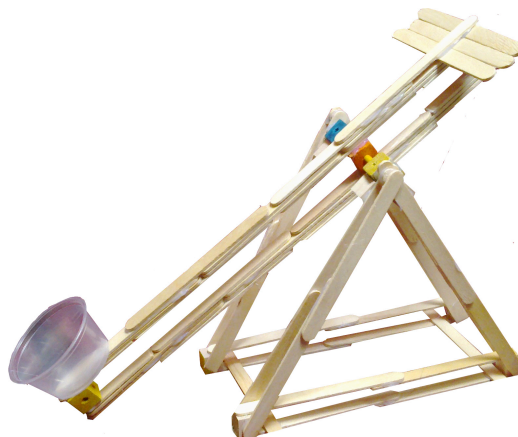
Teaching Guidelines

Class structure

- Arrive fifteen minutes early to set up materials
- Announce the project at hand. Spend ten minutes or less guiding the students through the phases of construction and explaining key concepts. Allow students to ask questions at the end, but not during the lecture. Keep the momentum going.
- The bulk of the class time should be spent monitoring the students as they build their design. Check up on the progress of each student and offer your help during this time. Encourage students to experiment, but also use their time effectively.
- Have the students help clean up in the last five minutes.
- Return the room to its original condition.

Before-class checklist

- Acquire a firm understanding of the project's mechanics and key concepts; try building the project at home.
- Gather and organize materials.
- Outline the lesson on a note card and bring it to class if necessary.
- Arrive at the class site 15 minutes before class and set up materials. Taking room constraints into consideration: set up two stations: a building station and a materials/tools station. Arrange an open space for students to test their projects if needed.



Please note that this document is designed for teachers working in an after school extracurricular setting. Some aspects of this guide may not apply to your situation.

The First Day

Prepare a project that is easy for you and the students.

Take a moment to weigh the benefits and downsides to your class space. Do you have collapsible tables that can become ramps for cars? Do you have access to an open outdoor space for helicopters? Is there a place where you can store incomplete projects until next week? Take note of your resources to give yourself a clearer understand of which projects are most suitable for your situation.



Welcome the students and introduce yourself. Talk a little bit about what an engineer is by giving them real life examples of engineering. I like to point out to students that almost everything manmade is influenced by engineering, such as the chair they're sitting on, the machines that built the chair, the room they are in, etc.

Explain the class structure, including how cleanup is conducted. Tell the students what types of materials they'll be working with and some projects they can expect. Ask the students to be open with you if they are feeling bored or unmotivated. Let them know that you will help them find something fun to do if the day's project isn't resonating with them.

Encourage experimentation. Many good ideas have come from students, so give them permission to try new things. Let them know that failure is a great thing because it leads to greater understanding. Students should congratulate each other or high-five whenever someone fails. This helps take away some of the social stigma around failure.

Hot glue guns

The tip of the glue gun and melted glue can cause very painful burns. Tell the students to exercise caution each time glue guns are used. If a student gets burned, he/she should immediately set the glue gun down and move swiftly to the nearest faucet. Run cool water over the burn until the pain ceases. If pain returns, run over cool water again and repeat as necessary. For more serious burns, send the student with a partner to the office for an ice pack.

Misbehavior and boredom

In my experience, most students misbehave because they're bored. Offer options to misbehaving students, i.e. if they do not want to build a car, suggest that they build a tank, or something else entirely. Ask the student what he/she wants. The class is a success as long as every student is engaged with building something constructive.

Cleanup tips

Enforcing cleanup time can be difficult. Students are often too engaged with their project to focus on cleaning their mess, or they may feel unsure about what exactly to clean. To make things easier, announce to your students that you need them to fulfill a tangible clean-up goal. For example, "Everyone needs to put away ten pieces of trash or put away ten things that can be used again before recess."

Be flexible

You have permission to act flexibly. If a project is not resonating with the students, mix it up, or scrap it altogether and play freeze tag outside. Don't have enough time to finish a project? Find an inconspicuous nook in the class space to store incomplete projects and pick it up next week. Use your intuition and good judgment to decide what works best for the class.



Your ideas are important

Your ideas and the ideas of students are highly valued. Please feel free to inform Lance Akiyama at Lance@theWYE.com if you have a great new project or an improvement to a design.