



# Bee Buzzer: Engineering Design

**Time:** 45 Minutes

**Skill Level:** Beginning (age 9-11), Intermediate (age 12-14)

## Background

### What is Science Inquiry?

Children are natural scientists. From a very early age they explore the world, ask questions and seek answers. This journey of exploration and discovery is Science Inquiry. Science Inquiry helps young people understand their environment, solve problems and gain knowledge about scientific ideas and processes. In this activity students will use the engineering cycle to design a Bee Buzzer that makes different sounds.

### Science and Engineering Practices Youth Should Become Familiar With Are:

1. Asking questions (for science) and defining problems (for engineering)
2. Developing and using models
3. Planning and carrying out investigations
4. Analyzing and interpreting data
5. Using mathematics and computational thinking
6. Constructing explanations( for science) and designing solutions (for engineering)
7. Obtaining, evaluating, and communicating information

### FYI-

Engineering begins with a problem, need or desire that suggests an engineering problem needs to be solved. Engineering makes use of models to test possible solutions to problems. A simple engineering design cycle consists of six steps:

1. State the Problem
2. Generate Ideas
3. Select a Solution
4. Build the Item
5. Evaluate
6. Present Results

Help the students use these steps to address the engineering challenge of the Bee Buzzer's design. When students are testing their Bee Buzzers be sure to ask them to create a flight safety zone to prevent injury.

**Watch the Video:** <http://oregon.4h.oregonstate.edu/science-engineering-and-technology>

**Materials List:**

Craft sticks

3"x5" Index cards

Erasers caps

Scissors

Stapler

String

A wide rubber band (1/4 inch wide), long enough to stretch lengthwise around the craft stick

**Discuss....**Use the FYI section information to explain the engineering cycle. How can students imagine using the materials provided to make Bees that have different buzz sounds?

**Predict....**Generate Ideas. Select a Solution

**Experience “What to Do”- What is the plan for the investigation?**

Show students how to do the following: (1)Put an eraser on each end of a craft stick. (2) Place an index card so it fits in the space between the two erasers on the craft stick. Staple the card to the stick. (3) Cut enough string—about two feet—to safely swing the card. Tie the string next to one erasers. Use several knots so it's secure. (4) Stretch a rubber band around the craft stick from one eraser to the other. It should fit snugly. (5) Try it out: Swing the Bee Buzzer in a circle. You should hear a sound like bees buzzing. If it does not produce a sound, adjust the rubber band or paper card. This is the basic design. How can it be modified for different results?

**Share ...**Encourage students to discuss what their Bee Buzzer did and how they might change something on the Bee Buzzer to have a different result.

**Reflect ...Analyze and interpret the data and results. Discuss among the group.**

Help the students develop questions of their own. Some example questions may be:

What part of the Bee Buzzer produces the sound---What experiment or test would you do to find out?

What would you change on the Bee Buzzer to find out what produces the sound?

What would you leave the same when you do your next Bee Buzzer flight?

Can you produce a different sound by changing another variable?

**Generalize ...to real world examples. Construct explanations.**

Did you find out what causes the sound?

Does the shape of the paper make a difference?

Does the length of the string change the sound?

Does the type of rubber band make a difference?

**Apply ...outside the classroom or club meeting.**

Describe something else that you know that produces a sound similar to the Bee Buzzer?

How would you apply this learning experience or questioning process to other areas of your life?

Developed by Patrick Willis, Washington Co. 4-H Agent, [patrick.willis@oregonstate.edu](mailto:patrick.willis@oregonstate.edu)

Agriculture Sciences & Natural Resources, Family & Community Health, 4-H Youth, Forestry & Natural Resources, and Extension Sea Grant programs. Oregon State University Extension Service offers its programs and materials equally to all people.