Electrical Engineering

CONTENT STANDARD: Physical Science

CONTENT TOPIC: Electrical Energy

CONCEPT: Electrical engineers build many types of electrical and electronic devices.

CONTENT OBJECTIVE: To understand what an electrical engineer is and what types of work they perform.

INSTRUCTIONAL OBJECTIVES: The learner will:

- define engineering and electrical engineering
- identify and build simple electrical circuits
- gain an understanding of teamwork and participate in a team

OUTLINE OF CONTENT:

I. Engineering is the application of science to solve problems and create useful products (like the iPod, computer or DVD player) and projects (like a tunnel or bridge).
II. Electrical engineers create things like: computers, power generation, appliances, radar, controls, and communications.
III. Engineers typically work in teams with each team member doing different things.
IV. Students will work as a team to build different projects.

GOAL: To enable students to demonstrate ways of thinking and practicing science; and to exhibit an awareness of the historical and cultural contributions to the enterprise of science. Imagination and creativity contribute to the processes of science through ideas and inventions.

STANDARD(S): The learner will understand that:

Science is based upon suppositions derived from observations of natural phenomena.

BENCHMARK: Unknown or unobserved variables may lead to unanticipated results.

The critical assumptions behind any line of reasoning must be made explicit so that the validity of the position taken can be judged.

BENCHMARK: Prior learning must be accurate and free of incorrect assumptions.

BENCHMARK: Higher order thinking skills, when directed toward the process of science, may produce unique solutions or results.

BENCHMARK: Scientific truths must be supported by data in conjunction with logical evaluations.

CLASSROOM CONNECTORS

TIME REQUIRED: 30 minutes

MATERIALS: SNAP Circuits, paper, science notebooks,

SET:

(Hold up something electrical or turn on/off a light.) Look at all of the electrical "things" around you. Each one of these "things" had a team of people called "engineers" that designed and built them. What is an engineer? (See below for definition) Can you name some different types of engineers? (Bio-engineer, Ceramic, Chemical, Civil, Computer, Electrical/Electronic, Mechanical, Industrial, Metallurgical and many others). What type of things do these different engineers design and build?

INSTRUCTION:

Engineering is an art requiring the judgment necessary to adapt knowledge to practical purposes, the imagination to conceive original solutions to problems, and the ability to predict performance and cost of new devices or process (*Encyclopaedia Briticanna).*

Kinder and 1st: Emphasis on: Engineers solve problems and build things. They do this by working in teams.

For older students: (Discuss different things an electrical engineer might work on.) Since many products made today are designed and built by teams, what different roles do you think engineers perform? Here is an example of a small design team:

1. One roll will be the project manager (PM). The PM's job is to make sure that the team has all the people needed for the job and creates a plan. The PM then makes sure the team peforms that plan.
2. Another role could be in charge of layout of the design.
3. Another role could be the application engineer that builds the design.
4. The last role could be in charge of testing the product.

Electrical Energy Safety:

Electricity is a very useful kind of energy, but it can also be very dangerous. It is safe to use only if certain rules are followed. Here are some of the rules that are necessary to obey when using electricity:

1. Never use an electric appliance when you are touching a water or gas pipe, a wet floor, a sink, or a bathtub.

2. Never touch a light switch, a radio, or TV set while taking a shower or bath.
3. Never use an appliance that has a worn out electric cord.
4. Never touch a wire that has fallen from a power line.
5. Never try to poke anything into an electric outlet.
6. Never climb a tree that is located near an electric wire.

ACTIVE PARTICIPATION:

Today we are going to act like an engineering team and build some electrical circuits. We are going to build a light circuit with batteries, wires, switch and light bulb (younger students).

Have the students form into 6 teams of 3 to 4 students in each team. Each team needs to assign a role to each person.

Let's build some electrical circuits

1. Have each team form up and decide on roles (max of 5 minutes)
2. Give each student team one SNAP Circuits kit.
3. Have the team come up with a plan to build their design (find circuit in book and write down plan. Max of 5 minutes)
4. Have the team build and test their design. Remember there must be a connection from + to -. (10 minutes)
5. For younger students: Show the students the correct parts to build our circuit (batteries, wires, switch and bulb).
6. During the last few minutes have each team present their project.

CLOSURE:

Today we have learned that there are many things that electrical engineers design and build.

1. Can you name some things that you might like to build or work on?
2. Is it easier to work on things by yourself or in a team? Why? (a team will be easier because you have help and many experts to rely on)
3. Name some ways to stay safe around electricity: See above