



Electric Charades

Students illustrate through a whole-body demonstration how electricity flows from the power plant to appliances in their classroom.

Grade Level: K–4

Subject Areas: English
Language Arts, Science

Setting: Classroom

Time:

Preparation: 30 minutes

Activity: Two 50-minute periods

Vocabulary: Current,
Electric current, Electricity,
Electron, Energy

Major Concept Area:

- Development of energy resources

Objectives

Students will be able to describe how electricity flows to items in their school.

Rationale

In addition to becoming more aware of equipment in their school that uses electricity, this activity helps students understand where the electricity comes from and how it travels to the school.

Materials

- Props for charades (optional)
- Electrical appliance
- Find additional resources related to this activity on keepprogram.org > Curriculum & Resources

Background

In the typical classroom, there are many examples of appliances and devices that use energy. Appliances change energy from one state, or form, to another (e.g., electrical to mechanical, or electrical to light). The energy source for most of these items is electricity. Schools usually get their electricity from a power plant. Power plants use a variety of energy resources to generate electricity, including fossil fuels (coal, oil, and natural gas), nuclear power, and renewable energy resources (biomass, hydropower, solar, and wind). Each of these resources (except for solar) is used to cause a turbine shaft to rotate. The rotating turbine shaft is connected to a generator containing a large wire coil. As the turbine shaft spins, it causes the generator's wire coil to turn. The spinning wire coil spins around large magnets, creating an electric current. Through this process, the generator converts the mechanical energy of the spinning turbine to electrical energy. The electric current produced by the generator in the power plant is then transmitted through power lines to homes and businesses in the surrounding community.

A simplified definition of an electric current is moving electrons. Electrons move because of the energy provided by a battery, a generator, or a similar source of electricity. Electrons flow through materials, such as copper wire, that will conduct them. Human beings can also conduct electricity, which is why it is extremely important to stay away from power lines and to avoid touching wires that are frayed or damaged. Contact your local utility representative to learn other safety precautions.

When electricity reaches the school (or home or business) through the power lines, wires in the building carry the current through the school. Electrical sockets are ways to connect appliances to the electrical current supplied by the power plant.

Appliances are conversion devices that change energy from one state to another. For example, a light bulb changes electrical energy to light energy. Other appliances have motors that convert electricity to mechanical energy, such as in a blender or a fan in a SMART Board® projector. Other signs of energy observed in appliances include sound, light, movement, and heat.

Another major energy user in schools is the heating, ventilation, and cooling system (HVAC). The majority of schools in Wisconsin use furnaces or boilers that burn natural gas, fuel oil, or propane (also called liquid petroleum gas, or LPG). Biomass is used to heat some schools in northern Wisconsin and electric baseboard heat is used in some smaller schools.

Schools use large amounts of energy to light classrooms, run appliances, and maintain comfortable room temperatures. Next to personnel costs, energy expenses are usually a school's largest budget item. If schools spend less on energy, those funds will be available for other items students need.

Teachers and students can help reduce energy costs by turning off lights and appliances when they are not in use and encouraging the school to purchase energy-efficient items. Schools could save close to 30 percent of their energy expenditures through operational changes (such as energy-efficient lighting, insulation, and innovative HVAC systems).

The Focus on Energy Agriculture, Schools and Government Program is a comprehensive program that provides technical support and access to financing for schools interested in reducing their energy costs. For more information about this program, visit Focus on Energy at focusonenergy.com.

Procedure

Orientation

List several items in the classroom such as the SMART Board®, computers, and the lights. Ask students what these items have in common. See if the students list electricity; if they do not, help them recognize electricity as a common element (for example, ask what you have to do to turn the items on and make sure they are running).

Steps

1. Tell students they are going to play a game of charades in which groups of students will act like an electrical item and the class will need to guess what item is

being portrayed. Inform students this is a whole-body demonstration in which they will become the appliance or electrical item and should illustrate how it functions or works (evidence of energy). For example, if they are an electric pencil sharpener, three students could hold hands and stand in a circle (representing the sharpener) and turn around a student (representing the pencil) standing in the middle. They should not demonstrate the pencil sharpener by acting out a person putting pencil in a pencil sharpener. Decide if props and sound effects are allowed.

2. Divide the class into groups of three or four. Assign each group an electrical item or have them choose their own (you will need to make sure there are no repeats). See **Electrical School Equipment** for a list of ideas. Give each group time to prepare its skit, providing coaching as needed. Make sure each presentation illustrates how the item works.
3. Have each group demonstrate its item and see if the rest of the class can guess what is being portrayed. Encourage the groups to identify the item and the evidence of energy displayed. Award points if desired.
4. When students have completed the skits, plug an appliance into an electric socket and turn it on. Ask them if they know where the electricity to run the appliance (as well as the items portrayed in their skits) comes from. Note their responses.
5. Explain that electricity is generated at the power plant and travels through wires to the school and to the appliances. Refer students to the power lines they see around their school and home and wires that run to their home. Inform them that many wires run underground so they might not see them. This might be a good opportunity to stress electrical safety (see **Extensions**).
6. Tell students they can add electricity flow to their charade skits. Have one group come to the front of the classroom and demonstrate its electrical item. Have the rest of the class represent a power

Electrical School Equipment

Computer	Printer
SMART Board® projector	Radio
Ipad	Refrigerator
Photocopier	DVD player

line running from a power plant to the appliance by standing in a row with one end near the modeled electrical item. Stand or have a student stand at the other end to represent the power plant.

7. Inform students that the power switch for the item has been turned on and that they will symbolize the flow of electricity from the power plant to the school. To show this, the “power plant” taps the first student in the “wire” row who taps the second student, who taps the third, and so on until the last student in the row is tapped. This last student taps one of the students in the modeled electrical item. (Students can also say the word “electricity” during tapping to emphasize energy transfer.) When one of the students in the modeled item is tapped, those students begin to act out their charade. To emphasize energy flow, the power plant should continue tapping until the power switch for the item has been turned off.

Closure

Have the class review items in their classroom and school that use electricity and where the electricity comes from. Students can repeat the electricity flow for other items and relate the activity to appliances they use at home.

Assessment

Formative

- How creative and accurate were student demonstrations of electrical appliances?
- Did students effectively illustrate the flow of electricity?

Summative

- Have students describe how various electrical items in their home display energy use.
- Ask students to diagram how electricity flows to electrical items from a power plant.

Extensions

Adapt the activity into a version of the game Red Light/Green Light. One student plays the on/off switch. When her back is turned the electric current flows, and it stops

when she turns around. The students demonstrating the electric flow should try to anticipate when the switch will be turned on and off (when she turns toward and away from them) and not be spotted moving.

Help students understand that the flow of electricity continues whenever an item is left on. Repeat the skit using an electrical item with the row of students lined up (explained above). Have one student act as if he turned the item on and left the room. What does the current do? Students might know that their parents have to pay an electricity bill. Essentially, they are paying for this flow of electrons to pass through their home. So more electrons are transferred the longer an item is left on, which results in a more expensive bill. Discuss simple ways students can reduce their energy use (specifically, turning items off when they are not in use). Students can create stickers to post on or near electrical items such as light switches reminding people to turn off items when not in use.

Involve students in a scavenger hunt to look for appliances that have the ENERGY STAR® label on them. Explain that this symbol represents items that use energy efficiently so we need less electricity and can save money. Take students on a tour of an appliance store or ask an energy consultant to explain the advantage of ENERGY STAR®-labeled items.

Invite someone from the local utility to speak about electrical safety. Inform students that electricity will flow through other items besides wires, including water and human bodies! Tell students that they can be harmed or killed if they touch a wire that is broken or frayed, because the electricity might be transferred through them.

Related KEEP Activities

Prior to this activity have students participate in “Classroom Energy Flow.” The activity “Waterwheels, Windmills, and Turbines” introduces students to electricity generation. Older students can further their understanding with “Circuit Circus” to learn about circuits. NOTE: “Circuit Circus” represents electrical flow from a battery (direct current, or DC), which is different than the type of current received by schools and homes (alternating current or AC).

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