TEACHER QUEST TAMPA BAY PROGRAM

ACTION PLAN

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Lesson Title: Energy Antics
Grade Level: 6-8
Subject Area: Physical Science
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Summer Work Experience

During my externship at Lakeland Electric I was responsible for creating a career guide and a teacher's toolbox.

I created a career guide to interest students in the newly added Energy Cluster. To accomplish this, I met with people in all aspects of Lakeland Electric. I shadowed them for a short period of time and wrote a description of their job.

--For example, I spent a day with the line workers and learned that at Lakeland Electric**,** line workers must practice rescuing an injured "man-ikan" from the top of a power pole. They are required to rescue him in less than 2 minutes.

--While spending time with a training specialist, I learned that Lakeland Electric often cross trains their staff to be able to complete more than one job in the plant.

--The Alternative Energy Specialist took me to see the largest solar array in Lakeland, which happens to be on top of the Convention Center.

--When visiting with the system's operations crew I got to see how they divert power when the linemen need the power shut off on the lines they are working on.

I then used the job descriptions for the various occupations, along with salary information, to create brochures that highlighted each position. In total, I gathered information for and prepared 15 individual brochures.

The final portion of this project was to combine the most interesting information into an Energy Cluster Career Guide using Photoshop. This career guide will be sent to schools around the state for students who are interested in the energy cluster.

The teacher's toolbox includes lessons that teachers in Polk County can use to integrate information about Lakeland Electric into their lessons, and includes as well some of the job description brochures. The objectives are listed below.

Lesson Plan

Objectives

- Students will be able to design a machine that does energy conversions to do work.
- Students will be able to identify different types of energy and classify each type as kinetic or potential energy.

Sunshine State Standards

- SC.6.N.3.3 Give several examples of scientific laws
- SC.6.P.11.1 Explore the Law of Conservation of Energy by differentiating between potential and kinetic energy. Identify situations where kinetic energy is transformed to potential energy and vice versa.
- SC.7.P.11.2 Illustrate that the sun's energy arrives as radiation with a wide range of wavelengths, including infrared, visible, and ultraviolet, and that white light is made up of a spectrum of many different colors
- SC.7.P.11.3 Cite evidence to explain that energy cannot be created nor destroyed, only changed from one form to another.

Materials

- Bouncy balls
- Personal fans like you buy at amusement parks
- Windup toys
- Flashlights
- Matchbox cars
- Candles
- Solar cell kits with motor
- Copper wire
- Magnets
- Funnels
- Tubing
- Beakers
- Pinwheels
- LCD light bulbs
- String- several types including fishing wire
- Balloons—large long ones
- Straws
- Paper clips
- Clothes pins
- Newton's Cradle

- Marbles
- Pipe insulation roller coaster track

Instructional Procedures

Engagement:

1. Build a roller coaster out of pipe insulation with the starting hill the same height as the next hill. Ask students what they think will happen. Show students that the marble does not go over the second hill. Ask why. Discuss the fact that some energy is turned to heat because of friction.

2. Using a Newton's cradle show when 3 balls are pulled back 3 balls go out on the other side. This shows that the energy remains the same.

Exploration:

- Hold up a deflated balloon and ask students if they think the balloon can be used to transport things to the ceiling of the classroom. Discuss the student responses. Place students in groups of 3 or 4. Give each group large long balloons (Several per group), fishing line, straws, small paper cups, paper clips, tape, and clothes pins. Place triple beam balances around the classroom so students can find the mass of each load lifted. Give students the instructions for building their balloon rocket and the NASA Rocket Transportation Data Collection Sheet.
  http://er.jsc.nasa.gov/seh/Rocket_Transportation.pdf

- Allow students to experiment to find the maximum load their rocket will lift. Once all groups are finished discuss how the rockets got the energy that it took to raise the load. Discuss the different types of energy present. Ask how this relates to the engagement activities.

Explanation:

- Lakeland Electric Slideshow - Identify all of the energy transformations that take place.
- Read and discuss pages 107 to 115 of the Glencoe Physical Science textbook using the Read and Say Something method, where one student reads a paragraph and the other person summarizes. Then students switch roles after each paragraph. Students should identify questions that need answering and discuss what was read with another group or the whole class.

Elaboration:

- Have students complete the Energy Transformations graphic organizer or use it to play Bingo.

From: To:	Chemical	Radiant	Thermal	Mechanical	Electrical	Nuclear
Chemical						
Radiant						
Thermal						
Mechanical						
Electrical						
Nuclear						

Evaluation

- Students will create a system that will use energy transformations to do work (light a light bulb, pull a car, etc.).

1. Students will use a flow chart to identify all the energy transformations that are taking place, as well as if it is potential or kinetic energy.
2. Students will need at least four energy transformations throughout their model.
3. Students will draw diagrams that will allow another group to replicate their system.

Criteria	3	2	1
Diagram	Diagram of model is labeled so that replication is possible	Diagram of model is mostly labeled 1 - 2 assumption would be made for replication	Diagram contains few labels more than 2 assumptions would be made for replication
Number of exchanges	4 or more energy conversions present	2-3 energy conversions present	1 energy conversions present
Flow chart	Flow chart has all parts of the system shown	Flow chart is missing fewer than 1/3 of the parts	Flow chart is missing more than 1/3 of the parts
Conversions	conversions are correctly labeled	conversions are mostly correct	conversions are mostly incorrect

Integration of Summer Work Experience/Follow-up Activities

- Use a PowerPoint presentation to discuss how we use energy conversion in the real world and jobs that are part of the energy industry. Students will experience being system engineers to create a new system and test that system.

Assessment Instrument

Rubric