Learning Cycle Planner

Electricity Audit Lesson

Common Curriculum Goal:

Topics: global climate change, energy efficiency, alternative energy, green building

Learning Objective: Students actively calculate the amount of energy used by specific objects and

Exploration Phase:

Hands-on Activity: Quantifying the amount of electricity used by individual products and the entire classroom and finding the costs of this energy usage.

Exploration through Media: Portland News Program: Energy Makeover with the Energy Trust of Oregon http://www.youtube.com/watch?v=vaQQ4P9msSg

Concept Development Phase:

Concepts to be taught: Residential energy use, resource consumption, energy conversion from one form to another, renewable and non-renewable energy, pollution, externalized costs

Procedures to be taught: Inquiry, complicated, multi-step calculations

Activities: Building Value in a Net Zero Home article: http://www.financialpost.com/story.html?id=1531054

Connections to other Lessons: Electromagnets, Energy efficient homes

Teaching across the Curriculum:

This lesson could be taught in direct collaboration with math class, or as a math lesson to support connections to other lessons.

Electricity Audit (Adapted from Energy Trust of Oregon, 2009, Altered by Orzali, 2009)
Procedure:
First, determine the area of the energy audit (example: house, classroom, school, office, etc.) and locate all the items that use electricity. We will be calculating how much electricity these items use and how much it costs to run them.

1. Name an item that uses electricity.
2. How many of those items are there in the audit area?
3. How many hours per day is the item using electricity? (If the item is left on all day and night, count that as 24 hours).
4. Look on the chart or on the item (it should have the Watts labeled on the back or the bottom) to determine how many Watts it uses.
5. How much electricity (in Watt-hours) do all these items use in one day? Multiply how many items are in the audit area (#2), by how many hours the items are on per day (#3) by how many Watts the item uses (#4). *[Formula: (#2) x (#3) x (#4)= Watt-hours]*
6. Convert the Watt-hours to kilowatt-hours. Do this by dividing the Watt-hours (#5) by 1000. [Formula: (#5)/1000=kWh]
7. How much electricity (in kilowatt-hours) does the item use per year? Multiply the kilowatt-hours used in a day (#6) by 180 (We are assuming there are 180 days in the school year). *[Formula: (#6)/180=kWh]*
8. How much does it cost to run the item for one day? Multiply the kilowatt-hours (#6) by $.07 (we are assuming this is the cost of electricity). *[Formula: (#6) x (.07)=$/day*
9. How much does it cost to run the item for one year? Multiply the cost per day (#8) by 180. *[Formula: (#8) x (180) = $/year]*
10. What are some things you could do to use less electricity at home and at school?

Helpful Information:
Most information for energy usage is available on an appliance or by research on the internet, however if a voltmeter is available or can be purchased, it is very useful.
Before the activity, ask students: How much electricity they use in a day? How is electricity use measured? How much does that electricity cost? Where does it come from?
Bring in a few copies of your electricity bill and pass them around. Be sure to blackout personal information. Use the electricity bill and the above questions to introduce the activity.
Have a few good examples of appliances or electronics to use as examples. Use the examples to show students how to use the formulas and record data. If possible collaborate with the math

teacher to do this activity to provide more time and more math expertise. Use step 10 above as the basis for a full class discussion.

References:

Energy Trust of Oregon. (2009). *Do it yourself energy audit*. Retrieved July 26, 2009, from, http://www.energytrust.org/forms/BE_FM_CommercialSelfAudit.pdf