Lesson Plan

Grade/Subject **6th Science**	***Energy at Your School***
Core: 6.2.4	

Standard/Objective

6.2.4 Design *an object, tool, or process* that minimizes or maximizes heat energy transfer. *Identify criteria and constraints, develop a prototype for iterative testing, analyze data from testing, and propose modifications for optimizing the* ***design solution****.* Emphasize demonstrating how the structure of differing materials allows them to function as either conductors or insulators. (PS3.A, PS3.B, ETS1.A, ETS1.B, ETS1.C)

Lesson Performance Expectations (description):

Students will analyze and interpret data to determine the energy efficiency of their school. Students will ask questions about their own homes energy efficiency and construct explanations and design solutions for their home..

Materials: IR heat Gun, Slide Show, Data Chart, website https://energy.dudesolutions.com/?bbID=JORDANSD#BillboardPage

Time: 40 minutes

Teacher Background Information:

1. Infrared guns take the temperature of solid surfaces. They do not measure air.
2. Guide students to look for leaky windows, doors, electric outlets, the difference between exterior and interior walls etc.
3. A school plant manager (custodian) could take students to the boiler room, incinerator or any other energy user in the school.

Student Background: None necessary.

Student Performance

Phenomenon: ***Observation of event, data or other evidence of activity.***

Ask the students to compare these two photos and ask what they think the emissions of each would be and the source of the emissions. Ask the students to try to identify what is being burned to create the emissions. .

Michael P. Harker

Teacher Resources:

1. **This is a sample from Jordan School district of data they collect on each school:** https://energy.dudesolutions.com/?bbID=JORDANSD#BillboardPage

Assessment of Student Learning.

1. How does heating a school create pollution?
    a. The heat escapes and is itself a pollutant.
    b. A fuel must be burned to create the heat.*
    c. Pollutants from the outside air are drawn inside.
    d. Heating allows carbon dioxide from breathing to build up,

2. How does the design of school buildings reduce energy loss?
    a. Insulation is added*
    b. Convection is stopped.
    c. Conduction is encouraged.
    d. Absorption is prevented.

3. What are schools doing to reduce energy loss? Choose all that apply.
    a. Shortening the school day.
    b. Using energy efficient light bulbs.*
    c. Turning off lights when not in use.*
    d. Adding high ceilings to most rooms.
    e. Increasing the number of hours the building is in use.
    f. Controlling temperatures to prevent over/under heating.*

4. Why do school districts keep careful track of the energy expended by each school? Choose all that apply.
    a. To reduce costs.*
    b. To punish schools that overuse energy.
    c. To know which schools need updated equipment.*
    d. To increase the amount of public awareness of energy.*
    e. To increase the maximum heat and cooling of a school.

5. What are common locations of heat loss in a school?
    a. hallways
    b. projectors
    c. walls
    d. windows*

6. What are ways you can conserve energy use in your home?
    a. Leave doors and windows open
    b. Turn the thermostat up in the winter
    c. Add insulation to attic and walls*

d. Caulk windows to prevent drafts*	
Extension:	Have the student take their action plan home and discuss it with their parents. You may want to check out the IR gun to students so that they can check for energy leaks in their homes.
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Energy at Your School
Name_____

Phenomenon: Look at the picture of the two schools. How is energy used in each?
1.

2.

3.

Introduction: Schools and other buildings are big users of energy and emit pollution depending on the energy source. Most buildings are insulated to decrease energy loss. Your school was designed in a certain way to manage energy and in this activity you will investigate how that was done.

Procedures

1. Listen as your teacher describes the infrared heat gun. Make sure you know how to use it.
2. Field trip!! Follow your teacher around the building and take notes of places you think were designed to use or save energy. Maybe a plant manager will join you!
3. Take turns using the heat gun and discover where your school is warmer or colder. Write down your results.
4. Watch the website shared by your teacher showing actual school energy use.

Data:

Location	Energy features	Temperature

Analysis:

1. What are the energy saving features of your school?

2. What type of energy does your school use to warm and cool the air?

3. Where might energy be lost to the environment at your school?

4. Why are school districts so interested in energy efficiency?

5. Think of your home, where might there be energy leaks in your home? List three.

6. Think of action plans that you could take at home to reduce the amount of energy that your home uses. Describe in detail what one of those plans would be.