

Energy Audit: Trailer vs. Classroom

Scientists of Ms. Smith's and Ms. Drury's 4th Grade Classes

Shepard Boulevard Elementary School

Results

Introduction

During our study of electricity in the fall of 2012, we were curious about energy use and how to conserve it. As we looked around our classrooms, we realized we use many learning tools that require electricity. We also realized that in fourth grade we had two different learning environments. Ms. Drury's classroom is an old trailer, and Ms. Smith's classroom is inside the building. We wondered if one classroom was more energy efficient than the other one.

Hypothesis #1: Trailers are less energy efficient than indoor classrooms. Our reasons for making this hypotheses were (1) the trailer classroom has five more windows than the inside classroom, (2) the trailer classroom has four outside walls and the indoor classroom only has two, and (3) the indoor classroom walls contain wood, brick, insulation, and drywall, but the thinner trailer classroom walls are just wood, metal, and wood paneling.

Hypothesis #2: We use more electrical energy in both classrooms as a part of our daily learning experience than we really need to use. Our reason for making this hypothesis is that after energy mapping both the indoor classroom and trailer classroom, we saw that we have a lot of things plugged into electrical outlets that we use all day long.

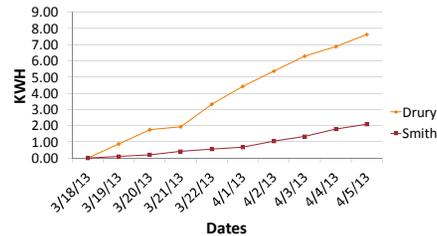
Methods

Hypothesis #1 – For five days, we recorded the temperature at each classroom door and the temperature outside each classroom at exactly 3:15 p.m. We used the same model of thermometer for each measurement.

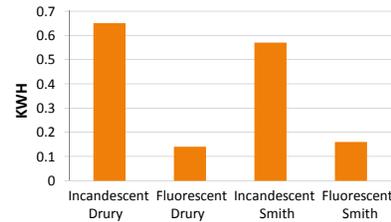
Hypothesis #2 – For ten days, at exactly 3:15 p.m., we used kilowatt meters to record the KWH usage of each classroom's lamp, pencil sharpener, and computer/SmartBoard set-up.



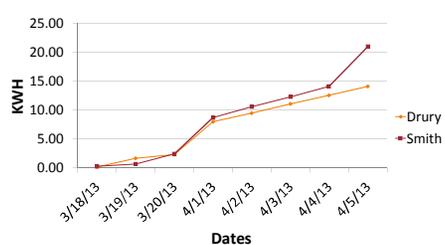
Graph A: Comparison of Classroom Lamps



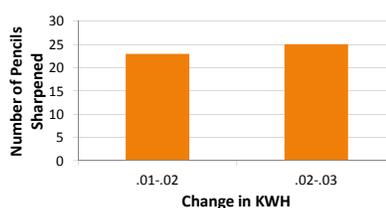
Graph B: Lamp KWH: 9:15 a.m. - 11:45 a.m.



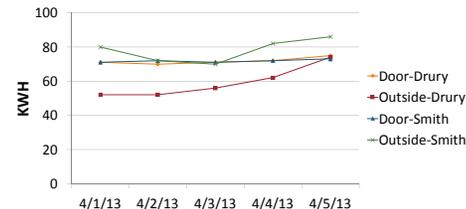
Graph C: Comparison of Computer & Smartboard



Graph D: Pencil Sharpener



Graph E: Comparison of Temperatures



Discussion of Analysis & Conclusions

The data in Graph A indicate that the lamp used in Ms. Drury's classroom used almost one kwh per day, but the lamp in Ms. Smith's classroom used much less. In fact, Ms. Drury's lamp was at 1 KWH by the end of the second day, and it took Ms. Smith's lamp seven days to reach 1 KWH.

The data in Graph B provide evidence that the main reason for the difference in lamp energy use was the light bulbs. So it is true that fluorescent light bulbs use less energy as their manufacturers advertise. We calculated that the incandescent light bulb uses about 2.24 KWH if on the entire school day, while the fluorescent light bulb only uses .42 KWH in a typical school day.

The data in Graph C show that by the end of the ten-day measurement cycle, Ms. Smith's class had used more energy through their computer/SmartBoard set-up, but the difference did not occur until the final day of measurement.

The data in Graph D provide evidence that this particular brand of electric pencil sharpener is energy efficient. It takes the sharpening of about 23 pencils to increase the meter by .01. That means if everyone in Ms. Drury's class, for instance, sharpened one pencil per day for the 180 days of school per year, we would only use 1.80 kilowatts of energy per year.

The data in Graph E show that our outdoor temperatures varied greatly, while the indoor temperatures in both classrooms stayed about the same. Ms. Drury's door opens directly outside, so we expected the temperature at her door to vary depending on the outside temperature. However, the door temperature stayed about the same. We believe this means that doors to trailers do not leak as much energy as we predicted.

Next Steps

- Use only fluorescent light bulbs in the schools.
- Use the brand of electric pencil sharpener we used in our study instead of the wall-mounted, hand-crank sharpeners .

Acknowledgements: Thank you to the principals at Shepard Blvd. Elementary, Khalid Alam, Gail Underwood, and the GK-12 administration for their help as we developed this project.