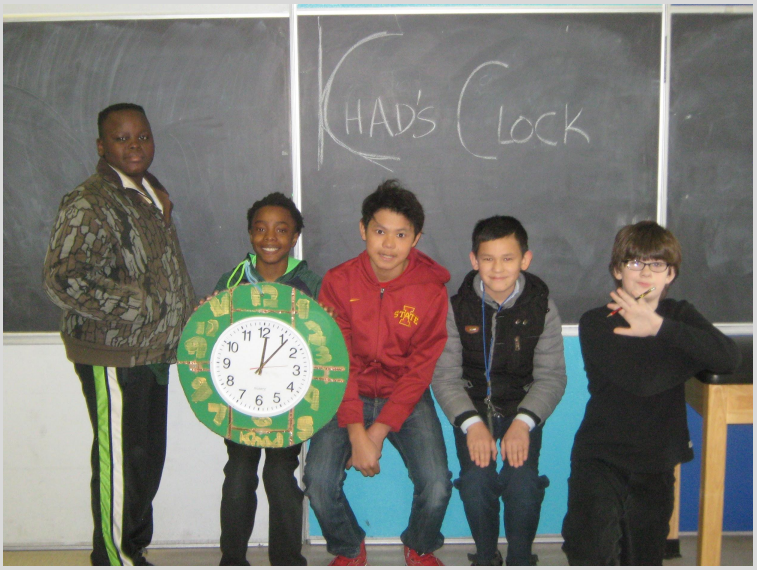
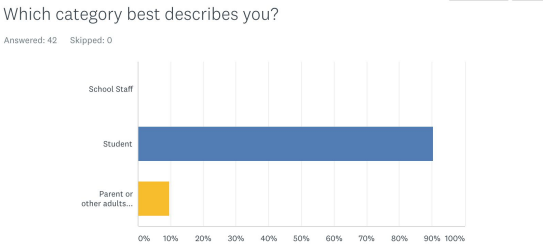
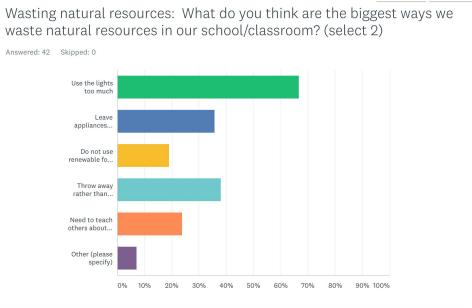
KChad's Clock:
Keon, Caleb, Hernando, Mohammed, Django



Defining the Problem: Using the Lights Too Much





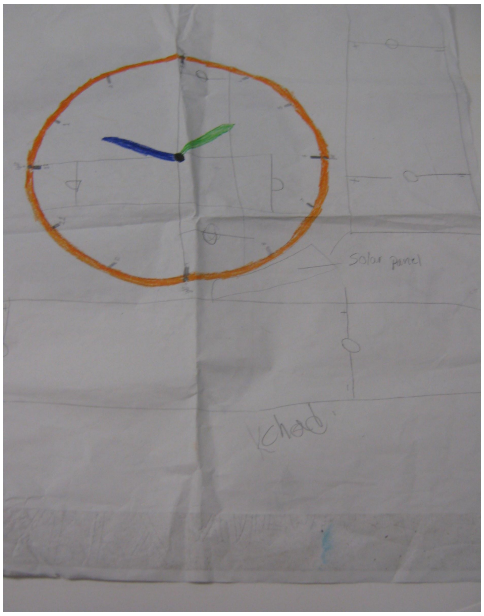
Why is this a problem:

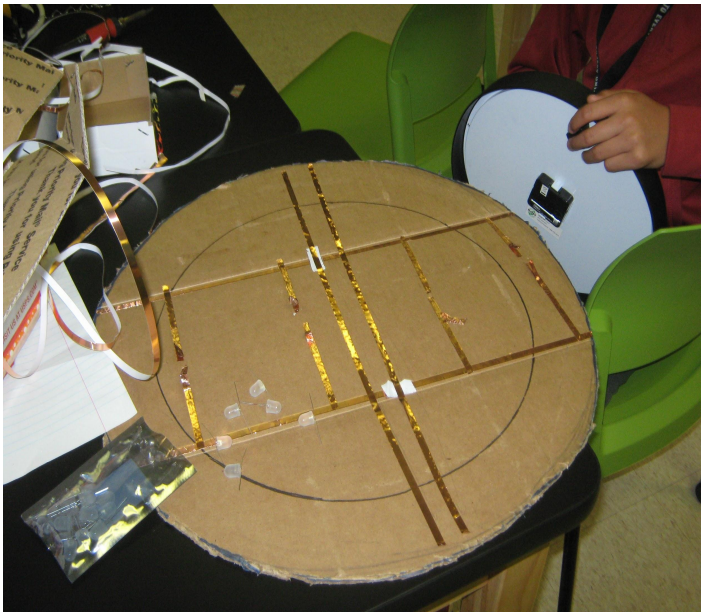
- It was the biggest concern for all of the survey participants and for the kids.
- Noticed kids in the class were not able to see the clock when Mrs. B turned off the lights during CNN morning news (as an effort to be sustainable)
- Kids needed to see the clock to know if they needed to change classes or see another teacher
- Kids usually try to look at the time on their phones, "but their phones are always dead from playing games", and its disruptive to turn on the lights while everyone else is watching the news

Designing the Solution: A Clock with LED lights!

- Designed a clock with lights on it while repurposing the use and idea of “a turning clock in our classroom”
- Wanted to make sure that students had access and was able to see the clock with lights off/even without glasses.
- Also decided to call the clock Kchad’s because it stands for the names of the group members, including Ms. B and it is also in reference to one of the group member’s country of origin--the clock was a way to honor his legacy as a United States refugee.

Sketch-up



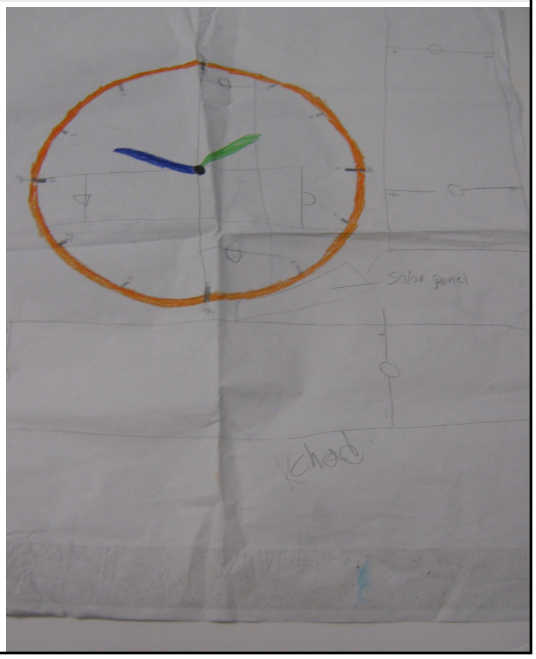


Feedback on Solution

Technical Considerations:	Social Considerations:
• Type of circuit • How many circuits • Type of energy source • How to position the lights to make it work effectively	• Can they read the clock with the LED lights • Coloring the light bulbs • The distribution of the lights is enough to see the clock from far away

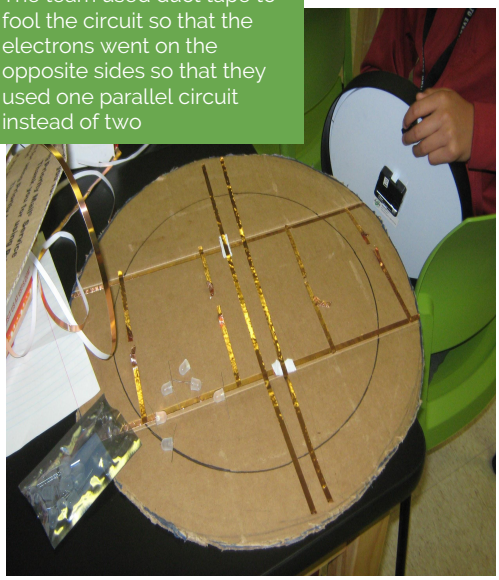
Teacher Tip: Recognizing all members as the group as experts

- Providing them with a doable first step in sketching up the design
- Providing them with the materials (using school clock, even though they themselves could not use it or chose to use it)
- Supporting their decision to be inclusive of Hernando's reason for having a clock (since he wanted to be more connected to his home country through using time as a way to connect classroom, his home experiences and design).



Prototyping

The team used duct tape to fool the circuit so that the electrons went on the opposite sides so that they used one parallel circuit instead of two



"The clock uses a parallel circuit that runs across the middle and it transports to the other lights and it makes the lights turn on on all four sides. We fooled the parallel circuit by using duct tape to cover the positive and negative in order to make all four lights turn on. It uses a hand crank that people can crank for others who want to see the lights on the clock in the class."

Teacher Tips: The teacher allowed the students to explore a new way to light up the circuit, by using duct tape to fool the circuit and tried it out with them until it worked.

Troubleshooting

Here you can see Django, Mohammed, Keon, and Hernando discussing the clock and how they made it to Mrs. B during a fourth grade event.

Sharing science and engineering with others is a way to recognize students for their knowledge!

Kchad's Clock

We noticed that kids in the class were not able to see the clock in Mrs. Bleisener's class when she turned off the lights during CNN News. Because our phones are dead all the time from playing games, and we did not want to turn on the lights just to see the time, we decided to invent a clock that not only had lights on it, but also repurposed the the idea of a turning clock in our classroom. We call it Kchad's Clock because it stands for our names and Ms. Bleisener, but most importantly it stands for a country where one of our group members, Herman, was while he was refugee before coming to the United States. Through making this clock, we also wanted to honor his legacy.

The clock uses a parallel circuit that runs across the middle and it transports to the other lights and it makes the lights turn on on all four sides. We "fooled" the parallel circuit by using duct tape to cover the positive and negative in order to make all four lights turn on. It uses a hand crank that people can crank for others who want to see the lights on the clock in the class.

Our design uses four different lights in a parallel circuit, and they worked fine, but when we started to do technical tests with the hand crank, we noticed that the crank was burning up on the lights. Our lights were blowing and there were bad smells many many times. A separate test we did was with the clock to see if we should open it up or not and if you can see the numbers with the clock being like the regular school clocks. We found that we couldn't see the lights very well and the clock since it was so thick, you couldn't see the lights very well.

We asked people if they could see at night, including 10 of our our classmates and we found that we could see the numbers better with the lights on. The feedback also gave us ideas that we should use a bigger clock, with large numbers holographic numbers and only use four light bulbs where we originally had 6. We feel very proud of our invention because we figured out how to turn on four lights in four corners using a parallel circuit and duct tape to fool the flow of electrons throughout the clock. A person during our design phase said "there is always a better time tomorrow"

Inventors (Kchad's):

[redacted]: like to win, and if I win the lottery I am moving to Fiji"

[redacted] "I like engineering"

[redacted]: "I am so proud of our group because we accomplished a big thing that makes me proud"

[redacted] like playing soccer and learning math"

[redacted] All I do is win, win, win, no matter what"!

(honorary member: Selena Bleisener)

Materials List:

Clock; paint; copper tape; LED bulbs; hand crank; duct tape; cardboard

Reflection Rubric

1. What **knowledge** and **practices** did the students develop and use?
2. How were the students **recognized** for their expertise?
3. In what ways, did students have opportunities to take **action** in meaningful ways?
4. What outcomes were made possible by the combination of the students' knowledge/practices, recognition and action?

Write any questions you have that will help you teach this design cycle.

Students' Reflection on the Projects