

Strath Haven Middle School Project Synergy

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What Were Our Goals When We Started This Project?

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01

CHROMEBOOKS

Chromebook charging is expensive. So we wanted to create a cheaper way to charge them.

02

SUSTAINABILITY

When we charge Chromebooks they use electricity which comes from fossil fuels. We feel guilty because we are contributing to global warming.

03

Awareness

We wanted to raise students awareness of global warming and wanted them to help prevent it

04

Variations

When we made our first variation of the Synergy charging station we wanted to improve on our designs because it was bulky and hard to move around.

05

IMPLEMENTATION

We wanted to put our above plan into action and to improve our designs more and more.

**What Were Some Challenges
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Safety Measures



For safety measures we needed airflow to keep our inverter from overheating, but didn't want students to hurt themselves with our Rickrolls, so we added a box on it with little holes for the airflow and mesh on the holes so nobody can stick in their fingers.

Portability




For the charging station, we wanted it to be able to go with students so they can successfully learn while trying to be where they learn best, or need to be, like learning at a table with no outlets nearby. There are also wheels on the bottoms of the Rickrolls for portability.

Cost



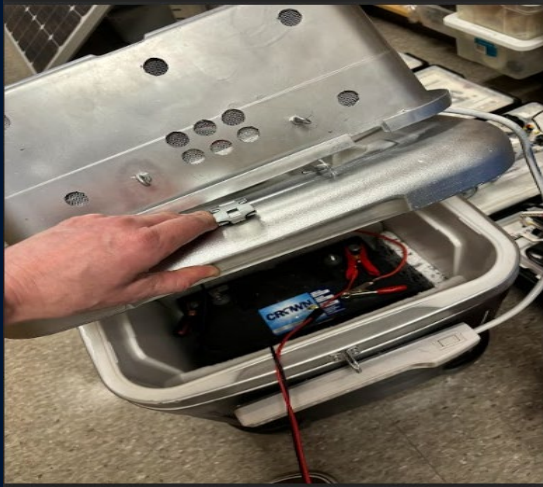
The charging station costs somewhere between \$140 - \$150, the most expensive part is the car battery we used, we might replace it with something else.

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- ## **OUR JOURNEY:**
- 1. Our school is creating an outdoor classroom, which began in 2017**
 - 2. Part of the plan of the outdoor learning center is to experiment with solar power. We are making a solar panel station outside.**
 - 3. We want to use solar energy collected by the outdoor panels to power laptops and appliances in the classroom.**
 - 4. We decided to use a marine battery to store the electricity from the sun.**
 - 5. We came up with a mechanism to move the battery around the school.**
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THE MECHANISMS WE CREATED:



SYNERGY 1:



- 1. The prototype was created through a design build process by the group of our team-members who are now in the High School.**
- 2. The body is a cooler, the inside has styrofoam to help cushion a 12 volt marine battery.**
- 1. Our team-members drilled holes through the cooler to facilitate wiring.**
- 2. There is an inverter on top of the cooler**
- 3. There is a surge protector placed on the front of the cooler (this allows the device to charge four lap tops)**

SYNERGY 2:



- 1. Our team created the second Synergy. We studied what our team-members before us has built, and made improvements on this design.**
- 2. Just like the first, our model contains a 12 volt marine battery, styrofoam, and an inverter.**
- 3. Innovations: a) We added two surge protectors instead of one. Our goal is to charge twice as many laptops (8).
b) We used a smaller cooler to try and make the mechanism lighter**

FUTURE LOCATION OF SOLAR PANELS (TO CHARGE OUR SYNERGY MODELS):



1. Our team member in the red shirt, Abhay Singh (7th grade), is labeling where the charging station for the Synergy's battery will be constructed.

1. Our team member in the purple shirt, Veer Bhandar (7th grade), is labeling where the solar panel will be installed (all the team members are standing on a false roof built in the outdoor classroom to simulate a roof with a solar panel on it)

SOLAR PANEL TO BE PLACED IN THE OUTDOOR CLASSROOM



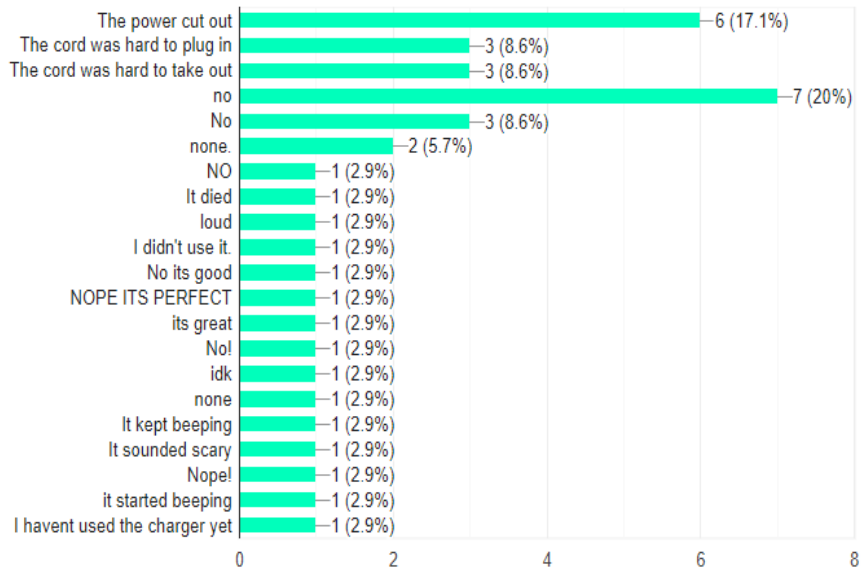
SYNERGY IN THE CLASSROOMS

- 1. Last year, we gained some qualitative data about how effective Synergy was charging laptops in the classroom.**
- 1. This year (2024), we have, for the first time, put both synergies in classrooms and have been gathering more quantitative data to assess how well the devices charge laptops**
- 1. Until the solar panels are installed, we have been charging the battery from a wall outlet**

SYNERGY DATA 2024:

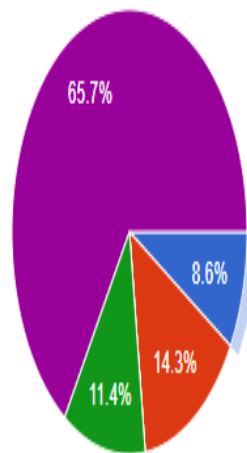
Do you have any problems when you're charging?

35 responses



How long do you think your computer stayed charged after charging it with Rick Roll?

35 responses



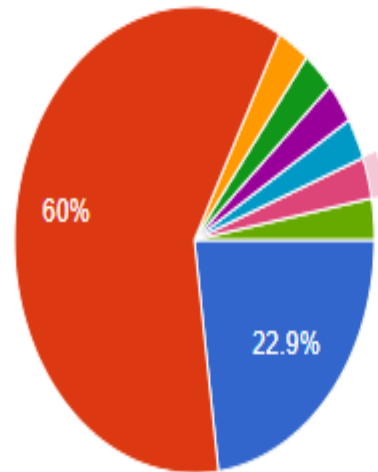
- One full period
- Less than four periods but more than one period
- Four periods (half a day)
- More than four periods but less than a full day
- Full Day (all seven class periods, including your lunch period)



DATA (continued):

Does the charger overheat?

35 responses



- Yes
- No
- Makes weird noises
- idk man i never use it
- idk, but from my knowledge about electronics, id say yes, but not often (it hasn't happened during my class)
- it freezes
- I forgot.
- Idk I havent used it.

FUTURE PLANS:

- 1. Continue gathering and analyzing data on the usage of the mobile chargers**
- 2. Designing a third and subsequent models, improving upon the original two designs using collected data to inform our innovations**
- 3. Installation of Solar Panels in the outdoor classroom**

**Strath Haven Middle School, Wallingford
Swarthmore School District**

Wallingford, Pennsylvania