Indoor Classroom Renovation
Lesson Plan

Project 1: Lighting Solutions

Overview

Skills and connections: electricity, perimeters, measurements, and length, engineering design process

Age: 3rd grade

Community problem: Students from an urban school became aware that a corner of their classroom is darker than they'd like.

Student design goals: Students aimed to brighten the dark corner such that the brightness could maintain the same brightness for a period of time with an easily changeable power source and a working switch at a height that a student could access. Furthermore, only battery power was feasible as there was no electrical outlet available, and the students could not use a bulb bigger than a small bulb or an LED.

Details

A group of four students experimented with different combinations of batteries and bulbs making a number of working circuits. After a working circuit was created, they worked on other smaller problems such as how to easily change the battery, how to attach the circuit to the wall, how to keep all the pieces of the circuit securely attached together, and how to create a switch all students could access. The team connected three small light bulb holders in a parallel circuit. The switch was created by connecting two alligator clips together.

More Information

Module Specific Standards

- *NGSS, Gr. 3 Physical Science (3-PS2-3):* Ask questions to determine cause and effect relationships of electric or magnetic interactions between two objects not in contact with each other
- *NGSS, Gr. 4 Physical Science (4-PS3-2):* Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents

- *NGSS, Gr. 1 Physical Science (1-PS4-2):* Make observations to construct an evidence-based account that objects in darkness can be seen only when illuminated
- *CCMS, Gr. 3 Measurement & Data (2.MD.D.8):* Solve real world and mathematical problems involving perimeters of polygons
- *CCMS, Mathematical Practices (MP1):* Make sense of problems and persevere in solving them

Project 2: Storage Solutions

Overview

Skills and connections: basic forces, testing and data gathering, measuring lengths, engineering design process

Age: 3rd grade

Community problem: Students from an urban school realize the backpack and jacket storage area is too cramped and crowded.

Student design goals: Students aimed to create a storage solution that allows for more space and different sized bags and jackets. Existing hooks assume that everyone needs the same amount of space. This project required that not only would the new racks allow for adaptable and easily accessible space for bags of varying size, but they would use pre-existing mounting points in the classroom without drilling into the brick.

Details

A group of three students cleared clutter and installed a more adaptable storage unit comprised of a PVC pipe, 90 degree elbows, and S-hooks. The students debated amongst each other how to best attach the PVC pipe to the existing structure. The original plan, constructed with the aid of the teacher, did not work. Students were integral in the making of the device, using hand tools with the aid of the teacher.

More Information

Module Specific Standards

- *NGSS, Gr. 3 Physical Science (3-PS2-1):* Plan and conduct an investigation to provide evidence of the effects of balanced and unbalanced forces on the motion of an object
- *NGSS, Gr. 2 Physical Science (2-PS1-2):* Analyze data obtained from testing different materials to determine which materials have the properties that are best suited for an intended purpose

- *CCMS, Gr. 3 Measurement & Data (3.MD.B.4):* Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch
- *CCMS, Mathematical Practices (MP6):* Attend to precision