SOCIETY OF PHYSICS STUDENTS
An organization of the American Institute of Physics

Future Faces of Physics Award Report

Project Proposal Title	Lab for Kids
Name of School	Adelphi University
SPS Chapter Number	SPS Chapter #2 Sigma Pi Sigma Chapter #124
Project Lead (name and email address)	Julianna Yee, juliannayee@mail.adelphi.edu
Total Amount Received from SPS	$205.60
Total Amount Expended from SPS	$203.45

Summary of Award Activity

"Lab for Kids" is an outreach program led by student volunteers from Adelphi University's SPS Chapter aimed to encourage STEM participation. It allows local high school students - often from underrepresented groups - to experience enjoyable hands on experiments. These students are divided into groups alternating between different stations hosted by our volunteers. This year, "Lab for Kids" was held in Adelphi's Department of Physics. As a result, we were able to have our volunteers give tours of our department's labs and rooftop observatory. We also taught them aspects of spectroscopy, circuits, motors, optics, angular momentum, gravity, sound, and electrostatics.

Statement of Activity

Overview of Award Activity

Groups of around 6 to 7 high school students alternated between four stations, run by several of our student volunteers. Our first station dealt with LED circuits and DC motors. We provided the students with the diagrams for series, parallel, and advanced circuits. They all had access to solderless breadboards as well as the required components for making their own circuits. For the other half of the students' time at this station we also allowed them to make their own DC motors with batteries, magnets, and wire -- which we allowed them to take home with them to continue working on. The second station combined spectroscopy, optics, and the speed of light. Students were able to see spectroscopy in action using various elements (such as neon, hydrogen, etc). They also measured the speed of light, and were able to experiment with polarizers and refraction glasses. The third station combined angular momentum, gravity, electrostatics, and sound. For angular momentum we demonstrated its effects using a bike wheel, and also allowed students to feel the effects themselves by spinning on a platform and increasing or decreasing their arm radius. For both gravity and sound we used the SOCK kits. One of our volunteers made a pipe circle which we attached a sheet to to simulate the universe and gravity's effects on objects in space; students were encouraged to use marbles and weights to simulate the orbits seen in celestial objects. As for sound, we used slinkys to demonstrate the propagation of longitudinal and transverse waves. With the boomwhackers students were able to further understand the creation and propagation of sound waves while creating music that we had created music sheets for. In electrostatics, students were allowed to take part in a demonstration using the Van de Graaff generator and various materials (including but not limited to various fabrics, aluminium tins, bubbles, and light bulbs). Lastly, the fourth station was a tour of our department. Volunteers currently doing research with our professors explained their research and posters to students, and also showed them around the labs. Additionally, Students were also able to take a tour of our rooftop observatory.

Our project was able to teach a wide array of subjects to a large group of high school students containing several underrepresented groups in physics. From an academic perspective, we were able to improve their knowledge and understanding of many principles that can benefit their education now and for the future. On a more personal level, we believe that by allowing these students to freely experiment and ask questions, we were able to strengthen a passion for the field of physics that may not have otherwise grown without this opportunity. As a result, we hope to not only increase the number of students who pursue higher education in the STEM field, but also increase the number of physicists from currently underrepresented groups.

We aimed to reach out to all of the high school students in attendance, many of which were from groups that make up a small component of the physics community. As our program touched upon many different fields with a large variety of ways to participate, we believe that all of the 26 students in attendance were impacted by the opportunity to not only learn, but to enjoy science in a new light.

Our SPS chapter is always striving for inclusivity in our field, as well as increasing the number of successful students that are able to obtain fulfilling careers in physics. We believe that the path to understanding the world through physics should start early, and be a lifelong endeavor. With the current limited school curriculum that often neglects physics education, it is a main goal of ours to reach out to young minds in order to give them the opportunity to enjoy physics and consider seeking a future in it. It is also important for our SPS members to understand how to communicate their knowledge to others in understandable ways -- regardless of whether or not they anticipate going into the educational field. Whether it be amongst those in the physics field, our own peers, or with individuals with only a basic understanding of physics, we try to provide our members with the opportunity to use what they've learned to spread their knowledge to others, as well as learn new concepts themselves.

Impact Assessment: How the Project/Activity/Event Promoted Physics across Cultures

Our goal was to reach students from minorities underrepresented in physics. This included racial minorities, women, and economically disadvantaged students. Of the 26 students that participated in the event, many were of these demographics, thus we were successfully able to attract our target audience to the event. Majority of our

assessment of the project was to be done through observation as well as verbal confirmation. From our observations, many students appeared to enjoy the stations we had provided. We saw that many were able to overcome their inhibitions and actively participate as well as ask questions to our volunteers openly. This signaled to us that we had awakened their curiosity enough to elicit repeated participation. While we can not say for certain whether these students will go on to pursue a career in physics, we do know that we were able to improve their understanding and interest in the subject. Some of our volunteers also directly asked students one on one whether they were understanding the material, enjoying the experiment, or having some sort of difficulty. Many of the responses we received were positive, or otherwise asked for verification of a certain subject or idea, which our volunteers were able to promptly answer. Although we typically have this event at the Cradle of Aviation, there was an issue in booking the space, and we were not able to do so for the required date. However, this worked in our benefit in that it allowed us to prep earlier with more ease as we did not have to organize carpools to transport members and equipment to another venue. Having it in our own department also allowed us to show the students what it's like at our campus and in real laboratories.

Impact Assessment: How the Project/Activity/Event Influenced your Chapter

While our members have a wide range of goals extending outside of STEM education, we see from our alumni and statistics that a significant number of physics students will go on to work in the education system. "Lab for Kids" allows our members to have hands on experience teaching young students, and to see whether or not pursuing such a career may be a desirable goal. Not only did our members have to work with students, they also had to work with each other to ensure that each group received consistent lessons and experiences. In all of the stations our members were outnumbered by students, and there was typically little to no prep time between groups. As a result, they needed to improve their group efficiency to make sure that they would also be prepared for the next group while simultaneously catering to the needs and inquiries of their current group. This forced members to be more vocal and organized. Additionally, members at a station were organized such that there was a mix of upper and underclassmen. This allowed us to work with others we would otherwise only see casually in the department with little to no interaction. By working together the bonds between those in our department were strengthened and became more personal.

Key Metrics and Reflection

The Future Faces of Physics Award is designed to promote projects that cross cultures. What cultures did your project attempt to bring together? (Please be as specific as possible.)	We aimed to reach underrepresented groups in physics including but not limited to women and racial minorities.
How many attendees/participants were directly impacted by your project? Please describe them (for example "50 third grade students" or "10 high school volunteers").	26 high school students.
How many students from your SPS chapter were involved in the activity, and in what capacity?	13 of our students volunteered to assist in the running of our stations. Typically, each student focused on one area, but a few were moving around to ensure that all stations were running accordingly.
Was the amount of money you received from SPS sufficient to carry out the activities outlined in your proposal? Could you have used additional funding? If yes, how much would you have liked? How would the additional funding have augmented your activity?	The money we received from SPS was sufficient to carry out this event.
Do you anticipate repeating this project/activity/event in the future, or having a follow-up project/activity/event? If yes, please describe.	This has become an annual event for our chapter, and we intend to have another next year around the same time. We will work with the teachers at the high school for a specific date. It is likely that we will continue with our current station set up, but may add or remove lessons to fit with the high school students' curriculum.
What new relationships did you build through this project?	We saw that many of the participating high school students were able to take away important lessons in physics, as well as a new appreciation for the field. Our own members were also able to bond to one another through the teaching experience.
If you were to do your project again, what would you do differently?	We want to increase the number of our volunteers to better assist the students and answer their questions on a more personalized level. Additionally, we would like to improve the quality, and number of our photos of the event-- possibly by assigning a volunteer solely to go around taking pictures. It would also improve the quality of future outreach events to have written explanations and plans of the experiments that we could prep volunteers with. Furthermore, we could have more time allocated for the students to stay at each station or allow us to perform more activities with the students.

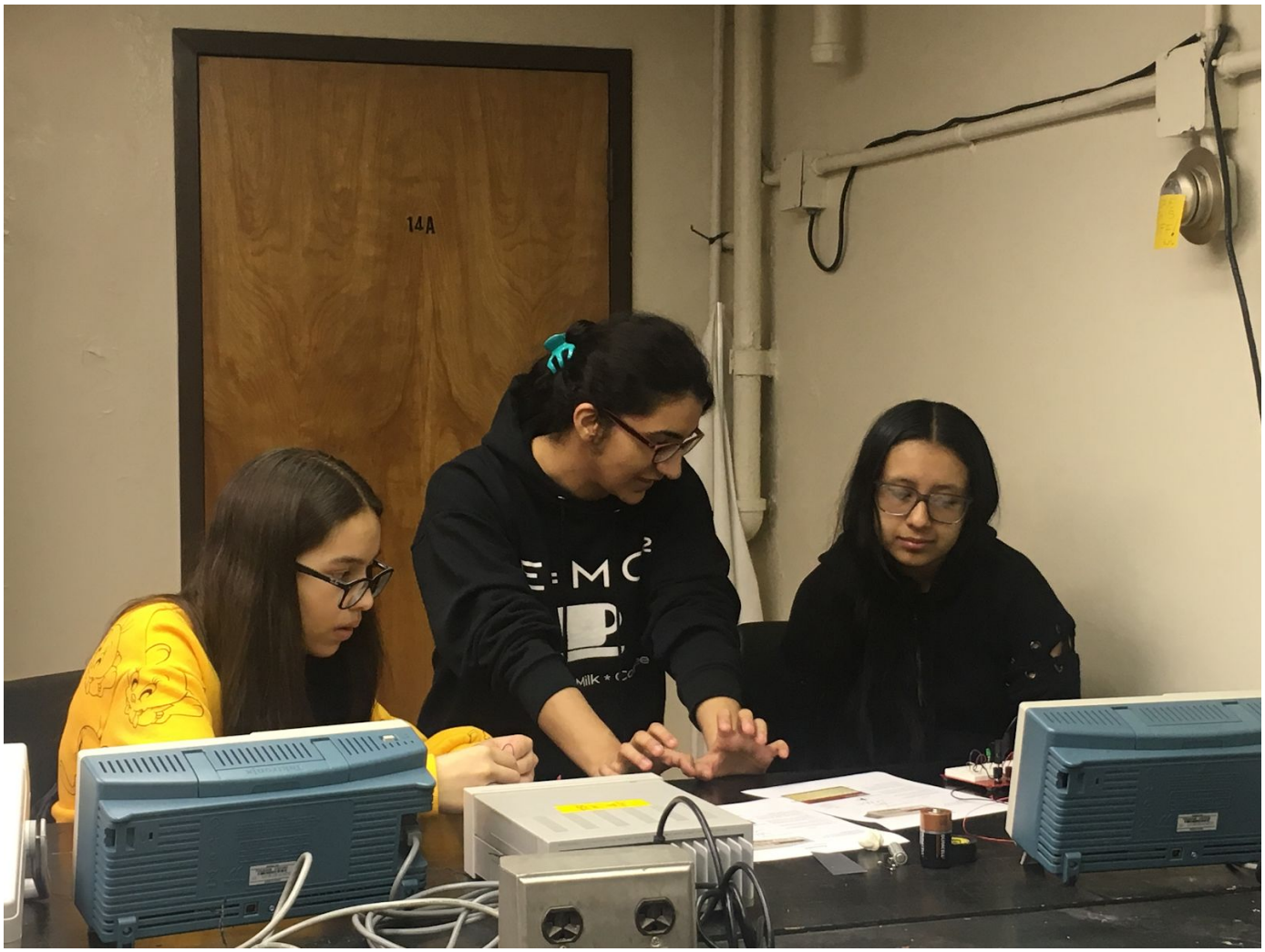
Expenditures

Expenditure Table

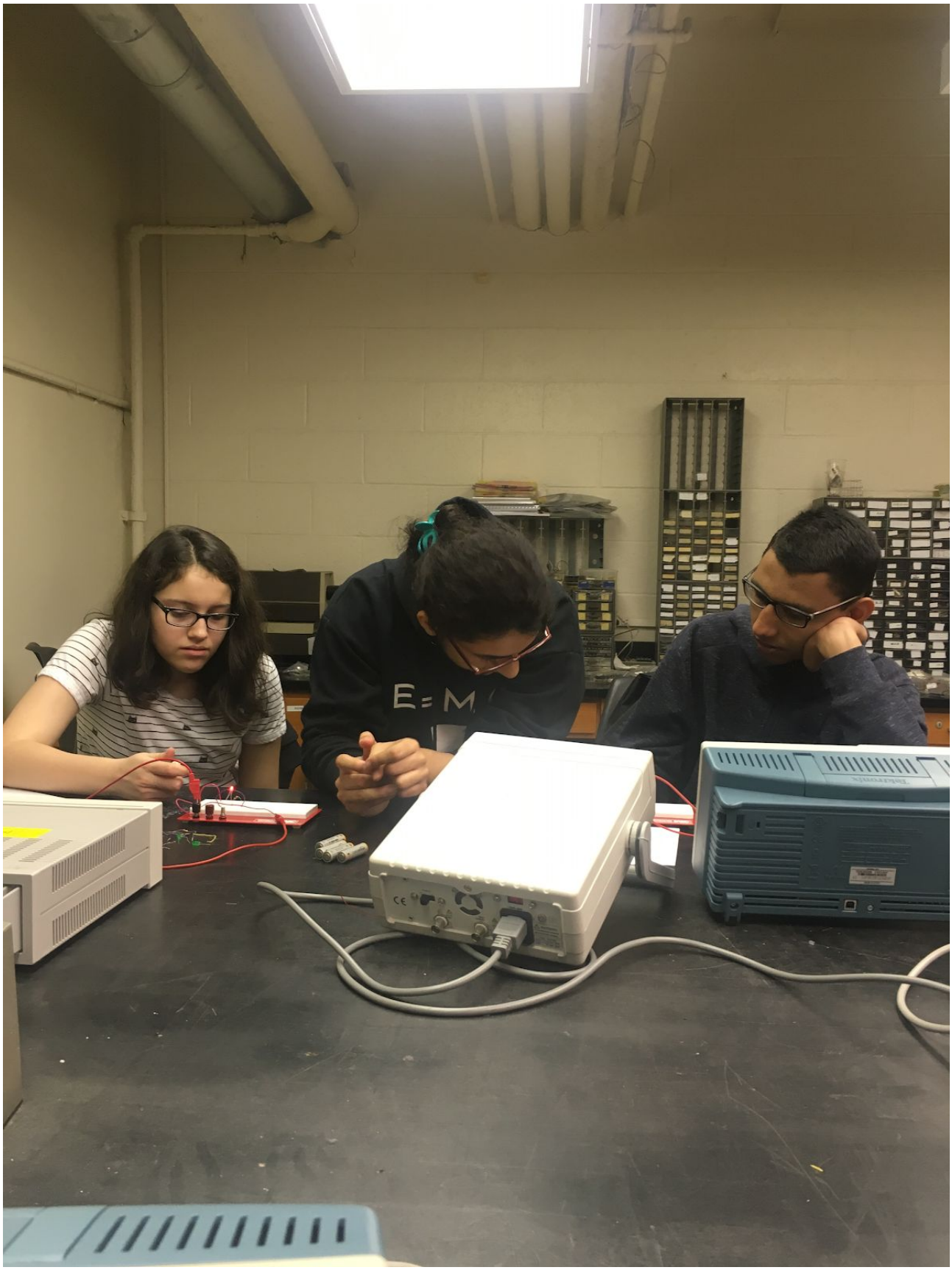
Item	Please explain how this expense relates to your project as outlined in your proposal.	Cost
Soap Bubbles	The soap bubbles will aid in demonstrations in the Van de Graaff generator experiment.	18.99
Ceramic Magnets	The magnets are used to create the DC motors which are also taken home by the students.	41.94
D Batteries	The D batteries are used to run the DC motors. The attending students will use the DC motors when they perform the experiments. The students are given the batteries to take home so they may continue experimenting at home as well.	74.55
Electric Tape	The electric tape is also used in the DC motor experiment. It is used to fasten the pins and wire to the battery.	13.88
Sand Paper	The sandpaper is used to strip the enameled wire that we provide to perform the DC motor experiment.	17.29
Curved Safety Pins	The safety pins are used heavily in the DC motor experiments and they are also taken home with the students projects.	36.80
	Total of Expenses	203.45

Activity Photos

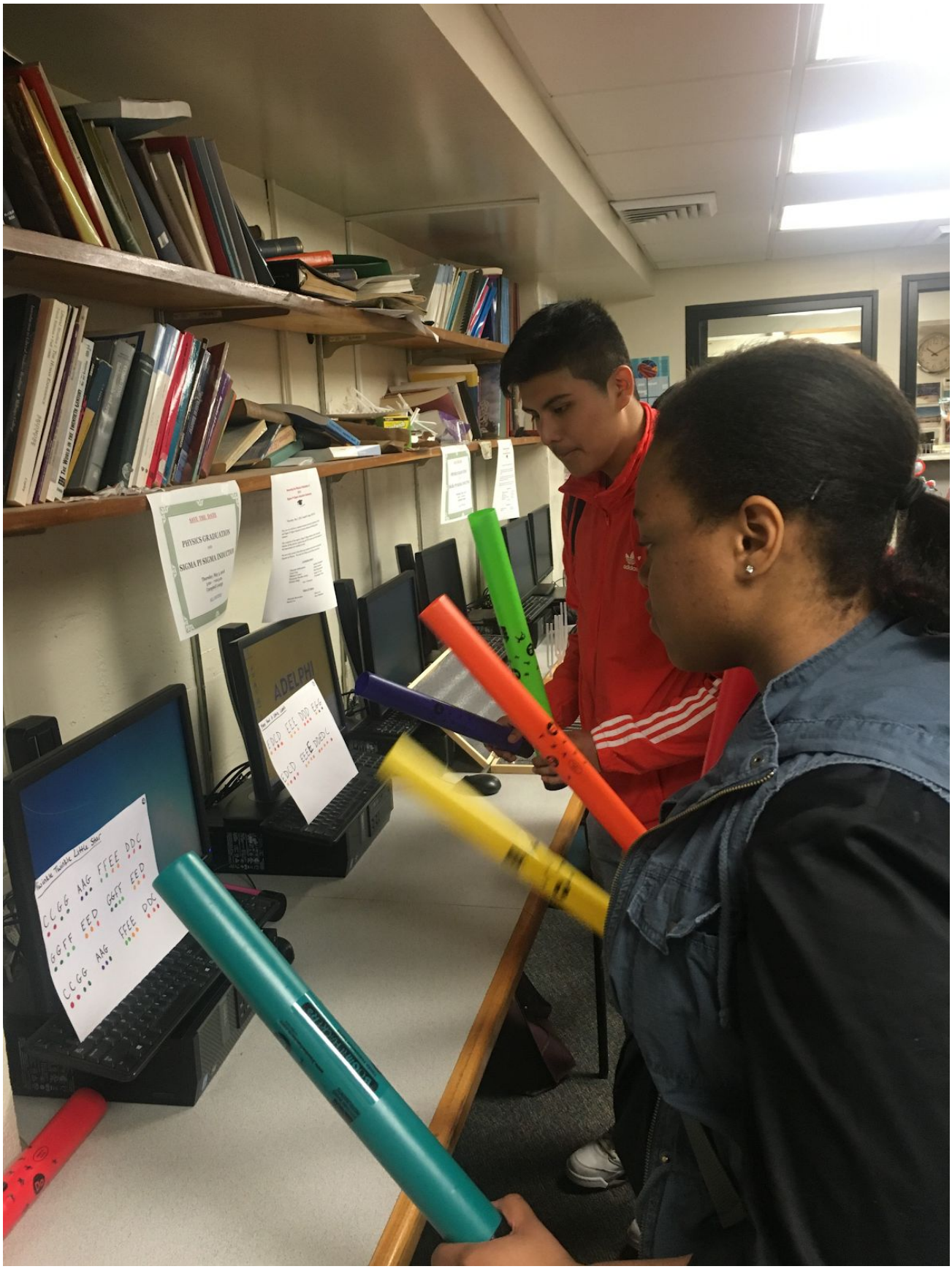
1. 
    a. We had six stations of breadboards available in the electronics lab for the students to create their own circuits.
    b. Credit: Sally Lau

2. 

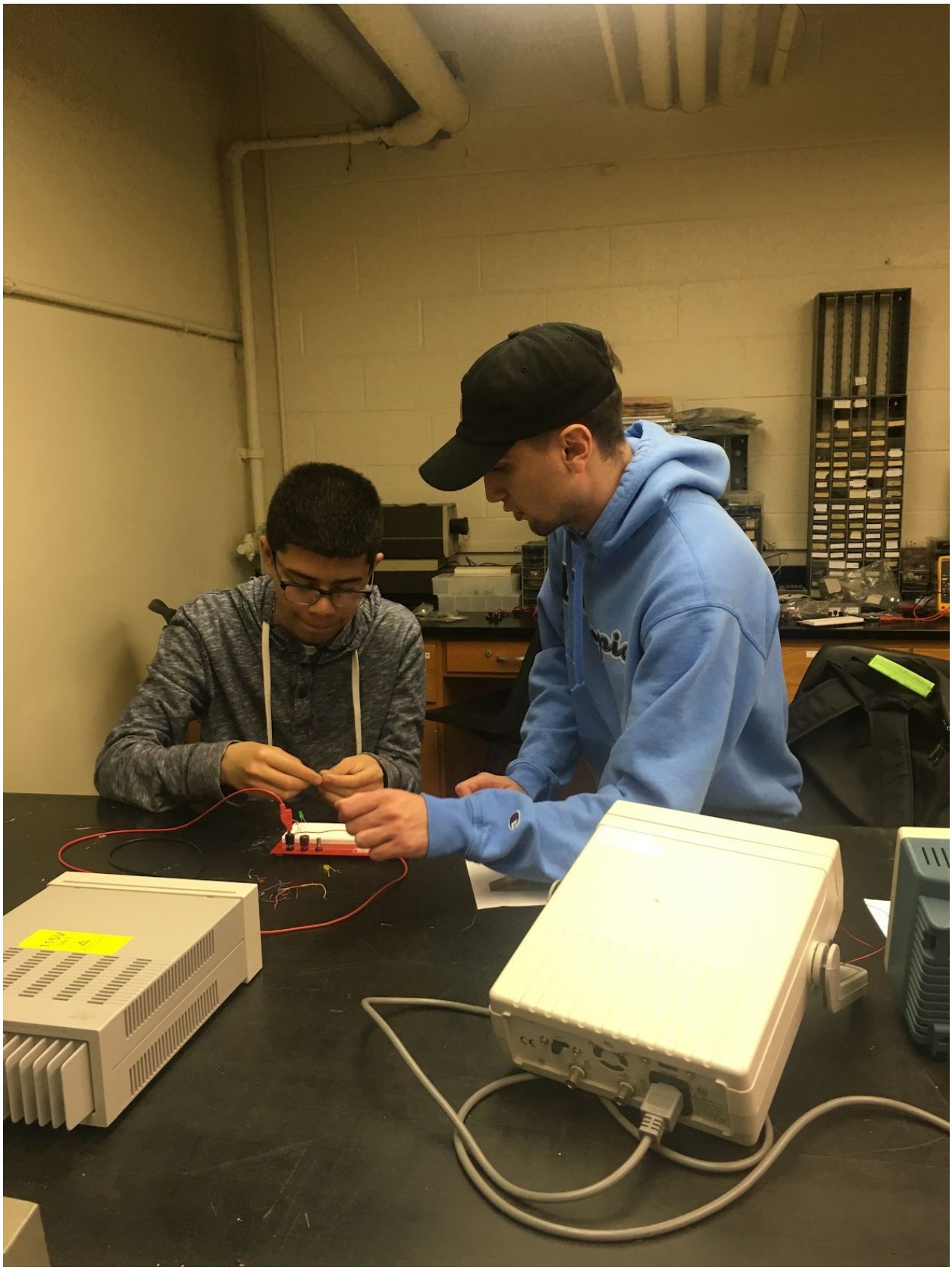
    a. One of our volunteers explaining the physics behind circuits.
    b. Credit: Sally Lau

3. 

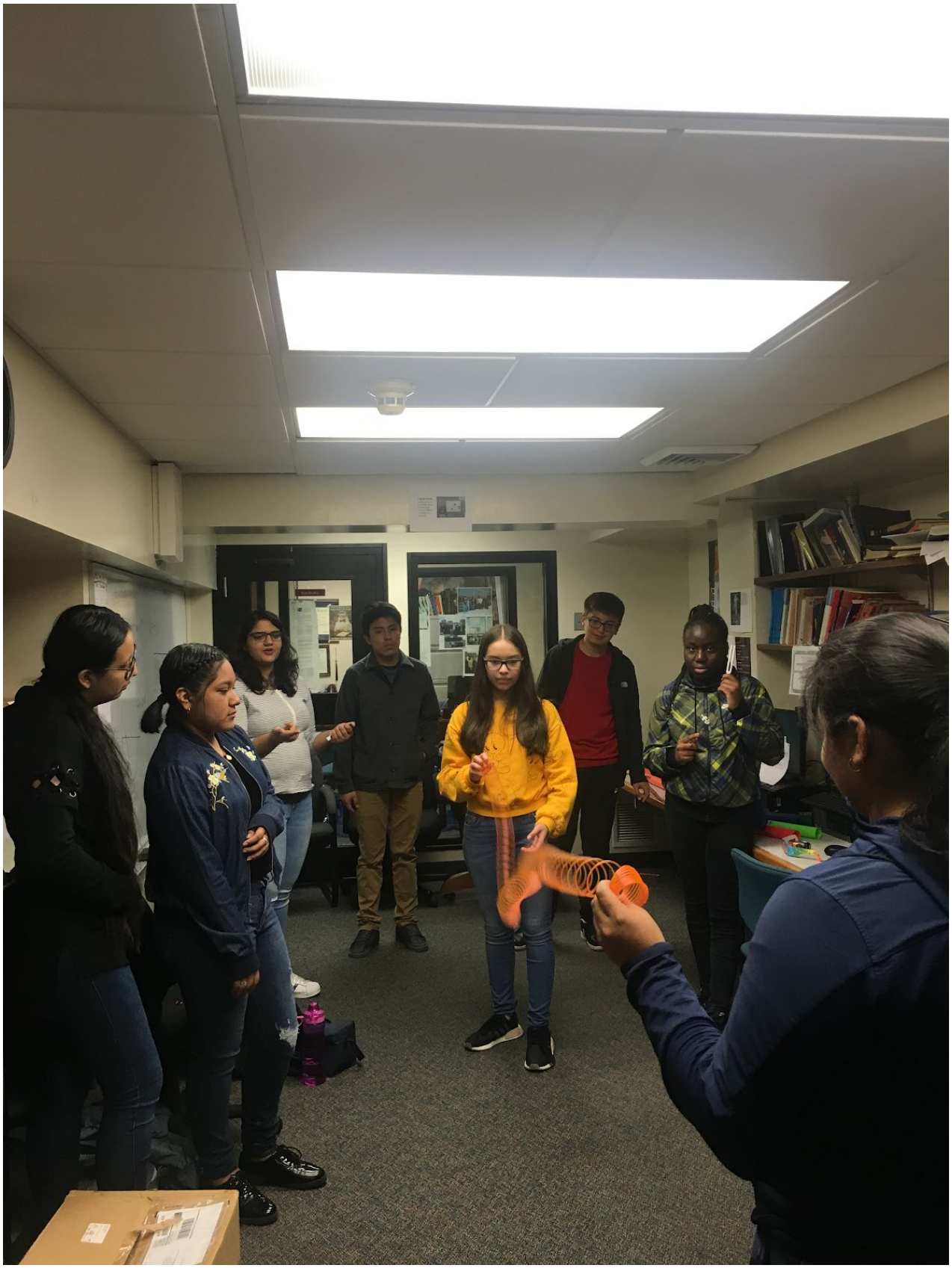
    a. To the left a student has successfully created a series circuit as one of our volunteers examines the progressing circuit of another student.
    b. Credit: Sally Lau

4. 

   a. Students have some fun with Boomwhackers and perform popular songs utilizing the basic physical concepts of sound and pitch.
   b. Credit: Sally Lau

5. 
    a. One of our volunteers helping a student create an parallel circuit.
    b. Credit: Sally Lau

6. 
    a. Volunteers explain the propagation of a longitudinal wave using the classic slinky.
    b. Credit: Sally Lau

7. 
    a. Students demonstrate the propagation of a longitudinal wave with the slinky.
    b. Credit: Sally Lau

If you have any questions, please contact the SPS National Office Staff
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