



SOCIETY OF PHYSICS STUDENTS

An organization of the American Institute of Physics

Future Faces of Physics Award Report

Project Proposal Title	Shining Light on the World of Optics
Name of School	University of the Sciences
SPS Chapter Number	5619
Project Lead (name and email address)	Despina Nakos dnakos@mail.usciences.edu
Total Amount Received from SPS	\$500.00
Total Amount Expended from SPS	\$500.00

Summary of Award Activity

Six members of the USciences SPS chapter travelled to Upper Darby High School which has a high population of minority student and is also economically disadvantaged. We performed optics-themed physics demonstrations to stimulate interest in optics and physics and received very positive feedback from the students and teacher.

Statement of Activity

Overview of Award Activity

Brief description

Six USciences physics majors arrived at Upper Darby High School around 7:30 am to begin setup in the physics classroom. Our event consisted of 4 sessions, to correspond with their block scheduling. We set up all of our demos around the classroom in different stations. There were 6 stations, each containing multiple demonstrations that fell in the overarching category of the station, and the big themes were focused around reflection, refraction, holography and light. The students from each class broke up into small groups of about 4-6 students and cycled around from station to station every 10-15 minutes for the class period. The students showed a lot of interest in the demos and asked quite a lot of questions while we were explaining everything, which was encouraging for us and what we had hoped for. We prepared a short questionnaire for the students to fill out about the event and what they liked/didn't like. We felt it was important to get feedback from them on how we did, since demonstrating and explaining optics to student who haven't had much experience in physics.

Outcomes

After our outreach, our team felt successful and excited. Going in, we were a little skeptical due to the fact that our audience was going to be students who haven't really learned any type of optics. . When we got started and interacted with the students, that feeling went away. Most students were *eager to understand* the physics behind the demos, more so than just our basic run through of the demo itself. A few times, we even had to cut off the questions because we were out of time and they had to go to their other classes. This was a great feeling because we had tangible evidence that we were providing a useful source of learning for these students and making physics more enjoyable. Our overall goal of the project was to make physics fun and enjoyable, and hopefully pique at least one student's interest in the subject. Reading the questionnaires that were filled out, we saw that we definitely accomplished our goal, as quite a few of the students said they were interested in physics. Along with making a good impression on the students, their teacher was excited to have us and interact with us as well. *A week later the teacher got in contact with our project leader and asked about the demos because he wanted to get them and showcase them at a girls scouts science festival.*

Audience

The target audience was about 100 students belonging to varying years at Upper Darby High School. We have been looking at Upper Darby for a couple years and thought this outreach would have the best impact on the students there. We had four classes of students with about 25 students in each, so around 100 students in total were impacted directly.

Context of the Project

Our chapter here at USciences is very active on campus and with outreach. From the first year as members, we are encouraged to join grant-writing. It also helps that the physics department also does a lot and helps us with anything we need to help with. This encourages us to continue to get more involved and apply for grants and funding to do our own events, such as this one. Along with this grant, we also received the Marsh White award, which shows how eager we are to promote physics and share our interests with others.

Highlights and stories

The project was very successful, and I am glad I had the opportunity to be the project leader and share my knowledge with others. There was one student that really caught our attention, he was a junior and very quiet at first, he would not talk, and it seemed to me that he was zoned out the whole time. After their class was over I asked him if he had learned anything and he said "Of course, I did" and when I asked him if he had any questions or maybe concerns he replied " No you guys were amazing and now I see physics differently and I think I like it more." This shows that even simple demos can change someone's point of view on physics.

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

The main goals of our project were to promote not only physics but science in general to minority groups, and also to generate more interest and a friendlier, more welcoming environment in physics for these under-represented groups. After visiting the school and completing the project I would say we met both of our goals comfortably. We picked a high school that the students are mostly in the minority

groups to ensure that we were focusing entirely on our targeted audience, we wanted that to be the main goal.

A small five-question survey was given to all of the students as they went around to the stations for them to fill out and return. Included were questions such as “Which demo was your favorite and what concept of physics did you learn from it?”, “After today, what is your interest in physics from 1-10?”, “What do you think we could do better for next time?” and similar questions. These easy-to answer questions were intended to keep the students engaged and thinking about what we were teaching them and to see if we did a good job of conveying our knowledge to them. We got a lot of positive comments and feedback. The FFP-funded outreach was featured in USciences Community News Article and was also displayed on the USciences SPS Facebook page:

USciences News Article: For Future Faces of Physics

<https://www.usciences.edu/blog/noteworthy/posts/physics-students-share-passion-for-science-with-high-school-students.html>

USciences SPS Facebook Feature:

https://www.facebook.com/pg/USciencesSPS/photos/?tab=album&album_id=995427093985362

Key Metrics and Reflection

Please answer the questions below. Please indicate if a question is not applicable to your project.

The Future Faces of Physics Award is designed to promote projects that cross cultures. What cultures did your project attempt to bring together?	Our project was centered around a high school that is very culturally diverse.
How many attendees/participants were directly impacted by your project? Please describe them (for example “50 third grade students” or “10 high school volunteers”).	There were at least 100 high school students that were directly impacted. The students were mostly Juniors and seniors with a few sophomore students.
How many students from your SPS chapter were involved in the activity, and in what capacity?	6 SPS members were involved from beginning to end.
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?	Yes, the amount of money was sufficient.
Do you anticipate repeating this project/activity/event in the future, or having a follow-up project/activity/event? If yes, please describe.	Yes, we would love to visit Upper Darby High School again because we could tell that we had a big impact on the students.
What new relationships did you build through this project?	We built a relationship with the physics department at the high school
If you were to do your project again, what would you do differently?	I think if we did this project again we could do it on a bigger scale so that more students could attend. We only had 100 students out of the 4,000 in the whole school.

Expenditures

Please provide a brief explanation of your expenses. Include a written description of your expenditures below, those covered by your SPS funding and by other funding sources, and then fill in the table with the name and cost of each item purchased with your SPS funding. Add rows as needed.

The Future Faces of Physics funds was used to purchase optics demonstration equipment and supplies. Our department has limited programming and equipment for optics and funding from SPS helped us bring our own demos to impact the community. For example, we procured polarizers and total internal reflection setups to produce visually-stunning demos of wave properties of light. We purchased Jelly marbles to show invisibility by matching indices of refraction. We also used UV flashlights and beads to introduce ultra-violet and fluorescence. We also created hologram-looking images using reflection. We purchased and used laser pointers for some of our refraction and diffraction demos. Lab equipment, including a He-Ne laser from Dr. Ramos was used to complement our laser pointers.

Expenditure Table

Item	Cost
Total Internal Reflection	\$49.99
Tuning Fork Sine Wave	\$19.99
Laser Pointers	\$15.95
Mirror Pieces	\$9.20
Transition Glasses Demo	\$17.99
Vanishing Jelly Marbles	\$15.99
Polarizers	\$167.00
Polarizing film	\$24.00
UV flashlight	\$18.00
UV beads	\$10.00
CD cases	\$26.00
Hand Held Spectroscope	\$54.75
Phone Hologram Projector	\$10.00
Liquid Crystal Sheet	\$25.00
Acrylic Box	\$10.00
Optical Illusion Coloring Pages	\$12.00
Transportation Expenses	\$15.15
Total of Expenses	\$500.00

Activity Photos

Please include captions and credits for each photo. By including photos below, you are giving SPS and the American Institute of Physics permission to use these photos in their online and printed publications.



Left: USciences sophomore physics major Steven Simpkins explains holography and how to mimic it with reflection as high school students craft a 3D imager using CD cases.

Right: Upper Darby students study invisibility using the idea of matching indices of refraction. Here students drop jelly marbled in a jar of water where they disappear to the untrained eye.





Right: USciences sophomore physics student Matthew Becker guides Upper Darby HS students through the a demonstration of invisibility using matching of indices of refraction. Right: USciences physics junior Brett Conti leads a discussion introducing spectroscopy and uses hand-held portable spectrometers enabled by the Future Faces of Physics Award.



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