



SOCIETY OF PHYSICS STUDENTS

An organization of the American Institute of Physics

Future Faces of Physics Award Report

Project Proposal Title	The Signs of Physics
Name of School	University of Central Arkansas
SPS Chapter Number	1059
Project Lead (name and email address)	Maxwell Milan maxmilan4@gmail.com
Total Amount Received from SPS	\$300.00
Total Amount Expended from SPS	\$300.00

Summary of Award Activity

Students from the University of Central Arkansas' Society of Physics Students reached out to hard-of-hearing physics students by designing and implementing a demo show for students and facilitators at the Arkansas School for the Deaf. The UCA Chapter developed four unique demos and entertained and inspired an audience of 15 students and 3 facilitators.

Statement of Activity

Overview of Award Activity

The members of University of Central Arkansas Society of Physics Students created a unique demo show designed for students and faculty at the Arkansas School for the Deaf, and in doing so, provided material resources for continued use by the School.

The faculty requested demos be restricted to two categories: optics and waves. For deaf students, the latter category presents a unique challenge as the students lack the means to interpret audio stimuli, one of the primary ways people encounter waves in nature. To compensate, our group developed new demos to exhibit wave phenomena via sight and touch and fine-tuned our presentation techniques so as to communicate (through an interpreter) as easily as possible.

Our chapter has long maintained a culture of outreach through our annual demo shows. This project added another layer of depth and opportunity by allowing us to reach out to hard-of-hearing students who aren't represented enough in physics education programs at all levels. The project tested our chapter's Design and Build Committee's ingenuity by challenging us to design new demos and gave our Demo Committee opportunity to develop new teaching techniques for reaching this community.

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

The project proposal listed two primary goals: 1) develop a demo show for the Arkansas School for the Deaf and 2) develop a template for use in future demo shows which cater to the hard-of-hearing. By crafting demos and performing a demo show on April 21, 2015, we fulfilled our first goal. As for the second, while we didn't create a formal template for future shows, we did generate a list of best practices when communicating with an audience composed of the hard-of-hearing; for instance, one shouldn't turn one's back to the audience while speaking (as those who can lip-read a little won't be able to follow the conversation); don't gesture and speak at the same time as gesturing may be interpreted one way and one's words (through translation) another; be mindful of lighting conditions, especially if demos require a darkened environment which further hampers communication.

In addition, we went beyond our project goals by providing a scientific strobe light to the School for use in our demo show and for future experiments at the School's discretion.

Our assessment plan included recording the number of students in attendance, providing a post-event survey to facilitators at the School for the Deaf, and providing requests for more information coming from students. At the demo show, we counted 15 students in attendance and 3 facilitators. We did not provide a formal post-event survey to the facilitators; however, we did get feedback from the primary teacher who said she was thrilled

to get new resources from of the project and thought the demo show went incredibly well. Finally, several students were very interested in the goings on of the demos and engaged the UCA SPS students with questions during the event.

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

From our research, we learned about the underrepresentation of hard-of-hearing students at all levels of physics education. We also learned about the challenges physics teachers encounter when communicating with these students and best practices for effective teaching. Because of the project, we've become more aware of the both the needs and the opportunities present in ushering the hard of hearing into the physics-learning community, a community to which they also have a right to belong.

The project also inspired one of our members to start participating in research dealing with deaf and hard of hearing physics students within the context of physics education research, potentially leading to a career involving working with the deaf and hard-of-hearing community.

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? (Please be as specific as possible.)	Hearing students and hard-of-hearing students
How many attendees/participants were directly impacted by your project? Please describe them (for example "50 third grade students" or "10 high school volunteers").	15 middle/high school students; 3 facilitators
How many students from your SPS chapter were involved in the activity, and in what capacity?	3 UCA students facilitated the demo show; 4 UCA students developed the demos; 3 UCA students wrote grants and reports
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 funds were sufficient. Additional funds would have been used to purchase more demo equipment for future use by the teachers and students at the Arkansas School for the Deaf.
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 plan on working with this community again in a more general outreach capacity.

What new relationships did you build through this project?	We strengthened the relationship between our university and the School for the Deaf.
If you were to do your project again, what would you do differently?	We would like to have performed the demo show earlier in the semester in order to give the students more time to be more involved in the project. For instance, one of our demos, the wave machine, could have been built by the students themselves prior to the demo show.

Expenditures

Expenditure Table

Item	Please explain how this expense relates to your project as outlined in your proposal.	Cost
Scientific Strobe Light	Frozen Falling Water Demo	213.00
Empty Buckets (2)	Frozen Falling Water Demo	6.00
Rubber (Latex) Tubing	Frozen Falling Water Demo	28.00
Dishwashing Gloves	Frozen Falling Water Demo	3.00
9 Volt Battery	Frozen Falling Water Demo	12.00
DC Motor	Frozen Falling Water Demo	4.00
Wooden Shish-Ka-Bob Skewers (2)	Wave Machine Demo	4.00
Duct Tape (2)	Wave Machine Demo	10.00
Gummy Bears (5)	Wave Machine Demo	20.00
Total of Expenses		\$ 300.00

We designed our show from requests made by the teaching staff at the Arkansas School for the Deaf. The staff wanted to focus on wave and optics phenomena and indicated that their equipment was weakest in those areas. They also submitted the following request (video) and asked if we could reproduce something like it.

Video Source: https://www.youtube.com/watch?v=uENITui5_jU

In the video, an oscillating falling water source appears to remain suspended in air due to the interplay between the oscillator's frequency and the frame rate of the video recording device. While impressive, the demo suffered from a major flaw: viewers wouldn't see the effect if they saw the experiment without using a video camera.

We designed our demonstration to overcome this flaw and provide a more panoramic viewing experience by replacing the video's frame rate with a controllable strobe light. Students could see the effect from any angle and also control the effect by adjusting the settings on the strobe light.

The Arkansas School for the Deaf didn't have a strobe light, so we allocated funds from our budget to provide one. We reasoned that a decent scientific strobe light would enable students at the School to recreate the demonstration we had designed and to create new demonstrations and experiments of their own. We suggested using the strobe light to view suspended waves on a vibrating string, measure the gravitational constant by looking at falling objects through the effects of the strobe light, and other similar demonstrations. Purchasing the strobe light allowed us to increase the teaching capacity of the School for the Deaf beyond a single demonstration show.

Activity Photos





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