



SOCIETY OF PHYSICS STUDENTS

An organization of the American Institute of Physics

Marsh White Award Report Template

Project Proposal Title	Demo Show Series Inspired by the Next Generation Science Standards (NGSS)
Name of School	University of Central Arkansas
SPS Chapter Number	1059
Project Lead (name then email address)	Charles Bertram cabertram92@gmail.com
Total Amount Received from SPS	\$500.00
Total Amount Expended from SPS	\$461.14

Summary of Award Activities

Over the last few years, the University of Central Arkansas Society of Physics Students and the Department of Physics and Astronomy have reached out to their community to invite local schools to visit UCA for a fun and educational field trip. SPS has also reached out to visit schools in the local community and do science demonstrations for classrooms. In the hopes of improving the experience for students, a series of kits were put together that focused on topics from the Next Generation Science Standards (NGSS). Demos were tested at two different schools. Google forms were used to get feedback from teachers who attended the shows. Despite some issues that arose with scheduling, the the shows went incredibly well.

Statement of Activity

Overview of Award Activity

For the last few years the UCA Society of Physics Students has worked with the Department of Physics and Astronomy to participate in science field trips. Local schools would bus students to UCA for a planetarium show, a nature walk, and a demo show. For the last three years, SPS helped to host increasing numbers of demo shows for these students. Last year alone, our chapter was fortunate enough to be able to reach out and perform a fun and engaging science demo show for upwards of 1300 students. While we were successful performing the same show again and again, it was our hope to develop new material on a large scale. Five new demo shows were designed after themes taken from the Next Generation Science Standards (NGSS) in the hopes that when scheduling demo shows teachers could choose topics they wanted their students to learn about. The five shows were put together as a series of self-contained kits that could be easily stored, transferred, and performed. The five shows are: “Under Pressure” which focuses on pressure, “Heart of the Matter” which focuses on phases and properties of matter, “Electric Avenue” which focuses on electricity and magnetism, “Push It” which focuses on forces and momentum, and “Sound and Vision” which focuses on waves, light, and sound.

It was our intention to perform demo shows for the schools who attended field trips to UCA. However, there was an unforeseen logistics issue that arose. UCA recently finished the construction of a brand new science building with an improved planetarium. The new planetarium is significantly larger and can hold significantly more students. Unfortunately, this removed the need for a demo show to entertain students while they waited for their turn in the planetarium. To compensate for the lack of shows from this source, we reached out to schools we have worked with in the past. Two schools responded inviting us to present demo shows to their school. In total, we performed 5 shows for Woodrow Cummins Elementary and 2 shows for Florence Madison Elementary.

The shows were designed to entertain a wide range of grades (K-4) and engage them to think critically about the outcomes of various demos. The shows give students a lot of opportunities to offer hypothesis or ask questions. Several teachers and administrators from both schools reported how pleased they were with the performance. Students were engaged and entertained and the teachers from both schools have already requested demo shows for next year. Despite the great praise and thanks received in person, very few teachers responded to the Google Forms survey when it was sent after the show. A Google form was also used to provide the presenters with a chance to reflect on the show for ways to improve.

One of the best moments in any demo show is when the students start asking questions to further investigations. For example, students often want to know what will happen if you put a balloon on the Van de Graaf generator. The students at Woodrow Cummins were particularly receptive and eager to engage and ask lots of questions. These questions opened a lot of interesting conversations about becoming a scientist, setting things on fire, and the difference between chemistry and physics.

Impact Assessment: How the Project/Activity/Event Promoted Interest in Physics

The goal for this project was to create a series of fun and engaging science demo shows that could be requested by local teachers for community outreach. The project was designed in a way that it could be maintained with little funding for years to come. To ensure that demo shows were up to standard a Google Form was written to collect feedback from teachers who attended the shows, and there was also Google Form meant to prompt a self-reflection for the presenters.

The feedback form was designed to be an assessment on the impact that the show had on students. The form focused on student and teacher satisfaction with the presented show. However, one of the many problems that we faced was the fact that teachers are very busy and we received very little feedback from the Google Form. What feedback we did receive, either from the form or from teachers and parents talking to the presenters in between shows

was remarkably positive without a single complaint or suggestion for improvement. We could tell that the students were engaged in the show and learning because they thought critically about the outcomes of demos. They offered hypothesis and asked the presenters questions about additional experiments. In this regard, we consider the project to be a huge success and we hope to greatly increase the number of schools that we visit next year.

Key Metrics and Reflection

Who was the target audience of your project?	K-4 Students
How many attendees/participants were directly impacted by your project?	26 Classes of Students k-4th grade (643 students)
How many students from your SPS chapter were involved in the activity, and in what capacity?	2 students helped to develop the kits and performed the shows for the students
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 and how would the additional funding have augmented your activity?	No, in order to develop the kits we wanted to put together we required a budget of \$1,000.00. Our department agreed to pay for any expense outside of the SPS funding, and ultimately contributed \$295.75.
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 intend to improve the kits and shows and reuse them for many years to come.
What new relationships did you build through this project?	Both Elementary schools that we visited have already requested we return next spring.
If you were to do your project again, what would you do differently?	There are a number of tweaks to demos that can improve the overall show. Also, there was a surprising lack of teachers who filled out the google forms on their own time. We anticipate a better response rate if we used a printed survey returned immediately after the show is over.

Press Coverage (if applicable)

Our project did not receive any press coverage.

Expenditures

Proposed funds were used to purchase demonstration show equipment as described in the original proposal. SPS funds totaling \$461.14 were used to purchase the equipment listed below. Additionally, department funding was used to complete demonstration kits. The department match contribution totaled \$295.75. Additional expanded budget tables can be provided upon request.

Expenditure Table

Item	Please explain how this expense relates to your project as outlined in your proposal.	Cost
10 Gallon Aquarium	Heart of the Matter	\$14.72
Plastic Speaker	Heart of the Matter	\$31.99
Electric Hot Plates	Under Pressure	\$16.56
Ping Pong Balls	Under Pressure	\$3.26
Large Glass Flask	Under Pressure	\$10.95
Bed of Nails Materials	Under Pressure	\$46.31
Electric Hair Dryer	Under Pressure	\$9.84
Bike Pump	Under Pressure	\$22.9
Sympathetic Resonators	Sound & Vision	\$26.01
Neodymium Magnets	Electric Avenue	\$11.99
Van de Graaff Generator	Electric Avenue	\$147.65
Snap Circuits	Electric Avenue	\$83.00
LEDs w/ Resistors	Electric Avenue	\$2.99
Bike Wheel + Handles	Push It	\$32.97
Total of Expenses		\$461.14

Activity Photos



Students Raising hands to tell Charles Bertram their hypothesis

Picture by Kimberly Manriquez



Charles Bertram using a candle to heat a water balloon

Picture by Kimberly Manriquez



Having a student cast the levitation spell from Harry Potter to demonstrate Bernoulli's Principle
Picture by Kimberly Manriquez



Charles Bertram having a student hold onto a Van de Graaf generator
Picture by Kimberly Manriquez



If you have any questions, please contact the SPS National Office Staff
Tel: (301) 209-3007; Fax: (301) 209-0839; E-mail: sps-programs@aip.org