

Future Faces of Physics Award Report

Project Proposal Title	SPS Super Sound Science Show
Name of School	Rhodes College
SPS Chapter Number	5940
Project Lead	Josh Ortega ortjp-20@rhodes.edu
Total Amount Received from SPS	\$496.78
Total Amount Expended from SPS	\$404.78

Summary of Award Activities

The Rhodes College SPS Chapter created a Science of Sound show for elementary and middle school students in the Memphis, Tennessee area. For this project, we designed a fun and engaging presentation in order to demonstrate various topics in acoustics, including standing waves, harmonic frequencies, resonant frequencies and vibrations. A large part of the show itself involved audience participation to make the topic more impactful than merely lecturing. Hands-on learning is incredibly important to nail down fundamental ideas about science, and so a large part of our show was intended to get the students directly engaged with the material.

Statement of Activity

Overview of Award Activity

We put on an interactive educational science show aimed at elementary and middle school children. The show focused on the properties of sound, vibrations, and waves, with an emphasis on entertainment and participation as well as education. Outreach and education are nothing new for our chapter, however this project was designed to refocus our outreach methods to far more interactive and entertaining. This keeps kids more engaged and creates a memorable lasting impact.

The show was put in at the Salvation Army Kroc Center as part of their afterschool program. We took our demonstrations and presented in front of around 40 elementary and middle schools kids from various backgrounds. The full activity lasted about 45 minutes most of which alternated between lecture style segments where basic concepts were explained using analogies and visual aids, and hands on experiments that would reinforce the material by utilizing what they just learned. Over the course of activity we covered types of waves, hearing and sound, frequency, standing waves, and resonant frequency. The hands on demonstrations included the Ultimate Jump Rope (attempting to creating a standing wave jump rope where people can jump in separate antinodes), singing wine glasses, singing rods, and boom whackers. To wrap up we demonstrated some more complex experiments, including a chladni plate and Rubens tube.

We succeeded in teaching a large group of elementary and middle schoolers about a fundamental science concept, while creating something exciting and memorable. We also created an excellent new outreach contact for Rhodes SPS with the Kroc Center, who invited us to come back and participate in their other afterschool and summer camp programs immediately following the conclusion of the activity. The event was incredibly well-received by both the students and the faculty in charge of the center.

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



Our goal was to create a children’s science show where we explained the nature of sound and vibrations, while maintaining a level of showmanship far beyond what our normal outreach events achieve and servicing the Memphis community.. While the details and flavor of our vision changed over the course of the project development, this fundamental goal remained constant and was met with huge success. In fact, we are happy to say we will be able to continue with this goal throughout the following year, as our activities thanks to the Marsh White grant caught the attention of a member of a public service scholarship program in the Memphis area called the Day Scholars. They will provide us with funding to continue into the upcoming year, expand the scope of our project, and complete some of our original goals that didn’t come to fruition.

One part of our original vision was to create a fire organ using an array of singing tubes as a grand finale for the show. Unfortunately, due to unforeseen issues with the prototyping, the project had to be delayed, and replaced with other demos we bought with the grant and our chapter had on hand. We had also planned to have almost concert style music aspects to the show, and while music was still integrated into the show in several places, this aspect got scaled back as we developed in favor of much higher audience involvement. Luckily, thanks to our new funding from a member of the Day Scholars, both of these original goals can be met in the coming year as we work to create a second iteration of our show. This will also insure that none of the Marsh White money was wasted, as the funding that went towards the fire organ prototyping will continue to be actively used in our future outreach.

One other aspect that changed from our original plan was we were originally going to visit classrooms and do presentations with smaller groups of students, however we instead decided to do a single show to a much larger group of students at an afterschool program. This resulted in a fantastic new outreach contact that we will continue to visit in the following years.

Our assessment plan was to invite feedback from the students, faculty and parents after our event in order to ensure that we were keeping people engaged and interested, as well as judging the audience reception during the presentation itself. This was a resounding success, the students were highly engaged in the event, constantly asking questions and participating in group activities. The faculty of the Kroc Center were very impressed by both the work we presented and our ability to engage and interest the students for nearly 45 minutes. They immediately invited us back to present during summer camps and future afterschool programs. Several parents of the children also came up to us as we were packing up and told us about how excited and interested the children were at our presentation.

Key Metrics and Reflection

Who was the target audience of your project?	Children in the Memphis area
--	------------------------------



SOCIETY OF PHYSICS STUDENTS

An organization of the American Institute of Physics

<p>How many attendees/participants were directly impacted by your project? Please describe them (for example “50 third grade students” or “25 families”).</p>	<p>We engaged a little over 40 elementary and middle school students from a variety of backgrounds plus a handful of parents and Kroc Center employees .</p>
<p>How many students from your SPS chapter were involved in the activity, and in what capacity?</p>	<p>There were six main students spearheading the project. They worked on writing, building demos, and creating contacts. Two students handed the actual presentation and performance.</p>
<p>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?</p>	<p>Yes. However, our new partnership with a member of the Day Scholars (a public service scholarship for students in the Memphis area) will allow us to increase our funding.</p>
<p>Do you anticipate repeating this project/activity/event in the future, or having a follow-up project/activity/event? If yes, please describe.</p>	<p>Yes, we are planning to continue this as an ongoing evolving outreach event. Continued funding thanks to a member of the Day Scholars will continue strong into the coming year.</p>
<p>What new relationships did you build through this project?</p>	<p>We developed a relationship with the Salvation Army Kroc Center in Memphis. We were invited to return to engage with their summer camp programs, as well as their different after school programs next semester. We also caught the attention of a member of the Day Scholars, who will continue to fund this project as it develops and grows through the following year.</p>
<p>If you were to do your project again, what would you do differently?</p>	<p>We would prototype the fire organ much more aggressively and bring in outside, more experienced people to help.</p>



Press Coverage (if applicable)

Expenditures

Our funding was used to buy the hands-on tools we used to reinforce the lessons we taught. An LED light strip and assorted materials in order to compliment the boomwhackers and allow the audience to create actual music. Miscellaneous parts were also purchased to prototype the fire organ.

Expenditure Table

Item	Please explain how this expense relates to your project as outlined in your proposal.	Cost
Full set of boomwhackers	Used to explain standing waves and to play music with the students.	\$127.99
Set of 6 red wine glasses x4	Used to explain resonant frequency and as a tool for child engagement	\$16.03 each, \$64.12 total
LED light strip	Used to direct use of the boomwhackers and help the children create music	\$31.99
Power supply	Powered LED lights	\$19.99



SOCIETY OF PHYSICS STUDENTS

An organization of the American Institute of Physics

Arduino	Controlled LED lights	\$11.86
Arduino case	Protect the Arduino	\$6.56
Hair dryer	One of the heating coil designs we experimented with while prototyping the fire organ	\$17.99
Electric grill starter x2	One of the heating coil designs we experimented with while prototyping the fire organ	one for \$42.74, one for \$12.99, \$55.73
Water heater x2	One of the heating coil designs we experimented with while prototyping the fire organ	\$6.28 each, \$12.56 total
Total of Expenses		\$404.78



Activity Photos



Project lead Josh Ortega and Alden Raymond demonstrating longitudinal waves, wave reflections and standing waves.



Demonstration of the Ruben's Tube. Everybody requested their favorite song!



Projecting the chladni plate via a livestream as a student records.



The “Ultimate Jump Rope” demonstrating harmonic frequency and an engaging, fun activity as students attempted to jump in the antinode portions.



Kids playing with wine glasses to demonstrate resonant frequency.



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