SIGMA PI SIGMA
The physics honor society

Sigma Pi Sigma Chapter Project Award Final Report

Project Title	Enlightening our Future
Name of School	Utah State University
Sigma Pi Sigma Chapter Number	7579
Total Amount Awarded	$500.00
Project Leader	Phil Lundgreen

Summary of Award Activity

Each year USU hosts an event at a local amusement park, inviting students and teachers from all over of Utah and neighboring states. Contests involving new ride designs, smart phone apps, egg drops, homemade accelerometers, and many similar activities are provided for the students. In an effort to help teachers develop simple demonstrations the Society of Physics Students created grab bag demonstrations to distribute to educators to take back to their classrooms, and demonstrate some simple physics principles. All of the educators we talked to were enthusiastic about the kits, and were excited to take them back to their classes to show their students.

Statement of Activity

The entire Statement of Activity should be no more than three pages, and organized as follows.

Overview of Award Activity

Our project consisted of writing up a clear simple lesson plan that detailed the science behind two simple demonstrations. We gathered all of the materials required to perform the demonstrations, and provided a list of other simple demonstrations that teachers could perform in their classrooms, and what supplies are required to do those demonstrations. Included in each of the lesson plans was a reference to the required core curriculum and which obectives are accomplished for which grades. For example:

Lightbulb kit :	Kindergarten: light
	Third grade: electricity
	Fourth grade: scientific method
	Fifth Grade: current, resistance,
Motor kit:	Third Grade electricity
	Fourth Grade: scientific method
	Fifth Grade: magnetism, current

We assembled the kits and collected enough materials to make 100 kits. For each demonstration we required:

Lightbulb:

- Baby food jars
- Alligator clips
- Batteries
- Tungsten filament
- Wire
- Plastic bag (to hold everything)

Motor

- Magnet
- Battery
- Thin Magentic coil wire
- Wire (to make stand)
- Cardboard

- Wire (for electrodes)

Some of these materials required preparation. Two weeks before the event we began to assemble the kits. The first thing we began to do was to cut the cardboard. We took a cardboard box out of the recycle bin, and using a band-saw in the department's machine shop we were able to quickly cut 100 2" by 3" squares.
Initially we had planned to distribute pencil lead (graphite) as a filament to the teachers, however we learned that in order to have enough current to make pencil lead glow it would require a greater quantity of batteries. To accommodate this we switched to a tungsten wire; while it was a more expensive filament it allowed for fewer batteries, and thus allowed us to create more kits to distribute to the teachers.

Each of the wires that our kits called for required individual cutting. That is over 700 individual wires which were required to be cut. In addition to that for the motor stands we had to completely strip off the outer wire insulation.

In addition to all of these preparation steps we also had to write up instructions for each demonstration as well as instructions for additional demonstrations which teachers could perform in their class.

Our initial goals were to provide teachers with demonstration kits Similar to the SOCK kits that they could use in their classrooms to demonstrate simple physics principles and bring some hands on learning into classrooms where teachers didn't feel comfortable enough before to perform these demonstrations. From the overall reactions of the teachers I feel like we are on the right track to achieve these goals. While it is very difficult to measure the effectiveness of our plan, from the excitement of the teachers I feel that overall our objective will be accomplished.

For example, one teacher that came to our booth said that she was being moved from the 3rd grade to the 5th grade, and was very nervous about the change in curriculum. As we spoke with her and explained how our two simple demonstrations accomplished 5 of her curriculum objectives (Direct current, Conservation of matter, Physical/Chemical reactions, Magnetism, and Circuits) she got really excited and it was easy to tell that our excitement for the subjects she would be teaching was being transferred into her.

From our Chapter we had 10 participants. The reason why we had so few was because many of our SPS members were needed to run other booths at the amusement park, and so we were left

with just ten members. That was enough, however, to run our normal demonstration table as well as run our light bulb/motor kit table.

It seemed that this project was slightly more difficult to implement than it was to come up with. Part of the reason for that was because in our initial write up we assumed that a lantern 6 V battery would have enough voltage to light up some graphite pencil lead. In practice, however, we found this to be incorrect. To overcome this we had to modify our kits slightly by including some tungsten wire for a filament. Through the use of this wire we were able to continue with the kits.

Impact Assement: How the Project/Activity/Event Met the Purpose of the Award

This section should be a detailed description of how the project met one or more of the stated purposes of the award:

- Raise awareness of Sigma Pi Sigma in the local community and the physics community.
- Build community among local alumni and new Sigma Pi Sigma members.
- Add greater distinction to induction ceremonies and other chapter events.
- Increase the induction of new members.
- Encourage fundraisers for chapters and scholarship funds.
- Encourage more inter-chapter activities.
- Recognize outstanding achievement at the chapter level.

Through the use of this award we were able to bring a strong Sigma Pi Sigma presence into the community, and show students what it is like to be a college physics student. Hopefully bringing these kits into the classroom will allow some teacher to inspire one of his/her students to pursue a degree in physics. If just one student were to choose physics because of a simple light bulb demonstration then this activity could very easily be called a fantastic success.

Because we invited two of our newest Sigma Pi Sigma inductees to the activity they were able to see the dedication that Sigma Pi Sigma has towards the community as well as strengthen the bonds of friendship that they have with other members of the group. They both seemed to really enjoy themselves, especially when they had the chance to go and ride the roller coasters.

Key Metrics and Reflection

Who was the target audience of your project?	Educators from Utah and surrounding states
How many attendees/participants were directly impacted by your project? Please describe them (for example "3 alumni" or "10 physics majors").	We gave kits to 100 teachers; it is hard to measure how many of them will be used in classrooms, and how many students will be affected by them.
How many students from your ΣΠΣ chapter were involved in the activity, and in what capacity?	From our Sigma Pi Sigma chapter we had 4 members distributing and explaining the kits. To assist with numbers we pulled in 6 SPS members
Was the amount of money you received from ΣΠΣ 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?	The Money from ΣΠΣ was just right; we had enough to pay for all of our supplies with about $50 left over
Do you anticipate repeating this project/activity/event in the future, or having a follow-up project/activity/event? If yes, please describe.	I think it would be nice to distribute kits each year at physics day, but it depends on our funding.
What new relationships did you build through this project?	I met and talked with so many educators; many of them asked for information on their local Sigma Pi Sigma chapters to have them come visit.
If you were to do your project again, what would you do differently?	I would try to have the kits completed far in advance of the day of distribution.

Expenditures

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

Expenditure Table

Item	Cost
Alligator clips	$64
Batteries	$110
Baby food Jars	$80.00
Magnets	$17.00
Tungsten Wire	$110
Wire	$45.00
Total of Expenses	$426

Activity Photos

Showing off light bulbs in series. SPS members demonstrate for teachers the difference between series and parallel.

Rebecca and Ryan Patrick demonstrate our light bulb kits for local teachers

Local educator looking through our lesson plan booklet as his students play with physics toys in the background.