



SOCIETY OF PHYSICS STUDENTS

An organization of the American Institute of Physics

Future Faces of Physics Award Report

Project Proposal Title	Uplifting Students with Hovercrafts: A Smooth Introduction to Physics
Name of School	Rhodes College
SPS Chapter Number	5940
Project Lead (name and email address)	Evan Main evannormanmain@gmail.com
Total Amount Received from SPS	\$446.00
Total Amount Expended from SPS	\$446.00

Summary of Award Activity

The Rhodes College SPS chapter created an outreach initiative focused on engaging underprivileged elementary students in the Memphis area. In an effort to inspire future physicists that may not have previously considered pursuing physics, we built hovercrafts with students and let them ride around on a large hovercraft to demonstrate a fun application of physics.

Statement of Activity

Overview of Award Activity

Description of Project

With this award, we set out to build some hovercrafts to get kids excited about physics. We began by building a large, leaf blower-powered hovercraft that could lift four kids at once. Then, we worked on getting supplies for the students to build their own small hovercrafts to take home. We initially wanted to make battery powered crafts, but the tiny propeller motors were never able to be ordered from Alibaba. We now know that we should either contact Alibaba far in advance or look for alternatives! So, we switched to our backup plan for the small hovercrafts: balloon-powered ones. These crafts, pictured below, actually ended up being perfect for the students to build and play with.

We were able to schedule a whole day of outreach with Idlewild Elementary School. This school, although not one of our original options, is similarly majority-minority and around half of its students come from low-income families. We got to work with their entire 5th grade class, one class at a time. We started each session with a PowerPoint to teach the students about how the hovercrafts work, introducing them to concepts like pressure and buoyancy. Then, we surprised them with building their own balloon hovercrafts! They seemed to really enjoy this activity, and it was a lot of fun to watch them get creative with their designs and use their hovercrafts. Then, we surprised them again with riding the big hovercraft! Although some students were apprehensive at first, once they saw kids zooming around like an air hockey puck they were sold. We had so much fun sharing the hovercrafts with the kids, and we hope they never forget it!

- **Outcomes:** We successfully created a hovercraft outreach initiative and established a great relationship with a new elementary school.
- **Audience:** Our audience was around 90 students, all in the 5th grade. This group was very diverse both culturally and economically, which was exactly who we wanted to reach out to.
- **Context:** Our SPS chapter is known for its wild demonstrations, and these hovercrafts fit right in. We look forward to using the big hovercraft in future SPS activities and outreach!
- **Highlights:** Our favorite parts were watching the students' faces light up when we told them they'd get to ride around on a huge hovercraft during school, and then watching them do just that! We hope that their enjoyment of this activity inspires them to pursue physics in the future.

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

Goals

- Construct a fully functional and safe hovercraft that can support multiple people at once
We fully accomplished this goal, and we are very pleased with our hovercraft. It can carry 4 children at once and it is entirely electric, making it very safe and not too loud!
- Help students make their own smaller hovercrafts to keep
Although we had to change designs, we did successfully help the kids create their own hovercrafts. These crafts were simple, elegant, and physically analogous to our larger craft.
- Introduce students to the physical concepts that describe hovercrafts
Through our introductory PowerPoint, we taught the students about pressure, buoyancy, and Archimedes' principle. We worked through a real example of a physics problem with them, and they did not seem too intimidated!
- Get underprivileged students excited about physics!

We definitely think we accomplished this goal, judging by all the smiles and laughter from the students throughout our events. We hope that their excitement about science stays with them into middle school and beyond!

- Make new connections with local schools

We successfully made a new connection with Idlewild Elementary, which we will continue. We had hoped to work with more schools on this project, but we still attained our goal of reaching around 100 students.

Assessment

- Our main assessment of this project was the response of the students as the events took place. We wanted to see how much they were paying attention, engaging, and most importantly having fun. While working with the students, we could see that many of them had an active interest in science and creating. We enjoyed seeing how much fun the students had making their crafts and riding the big hovercraft. Some students were so excited about their crafts that they modified them over lunch, using lunch trays to increase their surface area. Genius!
- We also made sure to pay attention to the response of the teachers and administrators, all of which was very encouraging. The teachers we worked with were grateful for the science outreach, because the students' standardized test in science was a couple days away and these events helped keep them engaged. One of the teachers thanked us for coming and welcomed us to her classroom whenever we'd like to come back! The principal of the school was also very welcoming, helping us coordinate the events and thanking us for giving the students a fun and educational day.
- Logistically, we know that we should start communicating with schools much earlier next time; teachers are quite busy, and they don't always have time to answer emails from random physics students. Aside from that, these events went very smoothly and we look forward to putting on more of them!

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

The SPS members that helped make this possible gained many skills, and became better friends along the way. We improved our skills in event organizing, communicating, working with young students, and constructing hovercrafts. Through this experience, we got to know each other and the faculty of Idlewild much better. Our SPS chapter as a whole was strengthened by this outreach opportunity, and we are looking forward to including more SPS members next year. Our thorough documentation of this process will also help our chapter plan future outreach events. The most obvious impact on our SPS chapter is the addition of an awesome, uplifting demo!

Key Metrics and Reflection

<p>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.)</p>	<p>We wanted to bring together underprivileged students in the Memphis area and physics majors. Through this, we wanted to introduce students to physics and show them that physics is interesting, fun, and for people of all demographics!</p>
<p>How many attendees/participants were directly impacted by your project? Please describe them (for example "50 third grade students" or "10 high school volunteers").</p>	<p>We got to work with around 90 students in the 5th grade, as well as their teachers and some 4th graders that watched the big hovercraft!</p>
<p>How many students from your SPS chapter were involved in the activity, and in what capacity?</p>	<p>We had 4 students work on building the big hovercraft, and 3 students that led the outreach.</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? How would the additional funding have augmented your activity?	The money we received ended up being just as much as we needed, and luckily allowed us to purchase supplies for the backup small hovercrafts when the first design fell through.
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 definitely hope to continue this project! It is very fun, educational, and easily repeatable. The big hovercraft is still fully operational, and the supplies for the smaller ones are easily bought. The teachers and principal of Idlewild said they would love for us to come back, so we will certainly return and hopefully visit other schools as well in the future.
What new relationships did you build through this project?	We got to know our machine shop's leaders well through building the big hovercraft, and they will be very helpful in building future outreach. We also developed a great relationship with Idlewild that we hope to continue!
If you were to do your project again, what would you do differently?	We would start contacting schools as early as possible, to make sure we can work with them. We would also focus on the balloon hovercrafts from the start.

Expenditures

Expenditure Table

Item	Please explain how this expense relates to your project as outlined in your proposal.	Cost
84V Lithium-ion Battery Cordless Leaf Blower, 125MPH 500CFM	This massive leaf blower powered our large hovercraft, and worked even better than we thought it would!	270.00
4 Handles	These were put around the edge of the big hovercraft so kids could hold on.	12.00
100 Bottle Tops	These were part of our smaller hovercrafts.	2.00
100 Balloons	These powered the small hovercrafts.	9.00
100 CDs	These were the bodies of the small hovercrafts.	17.00
100 AA Performance Alkaline Batteries	These were meant to power the small hovercrafts.	23.00
6 Single AA Battery Holders	These were meant to be on the small hovercrafts.	102.00
Star String Lights	These decorated the big hovercraft.	11.00
Total of Expenses		446.00

Activity Photos



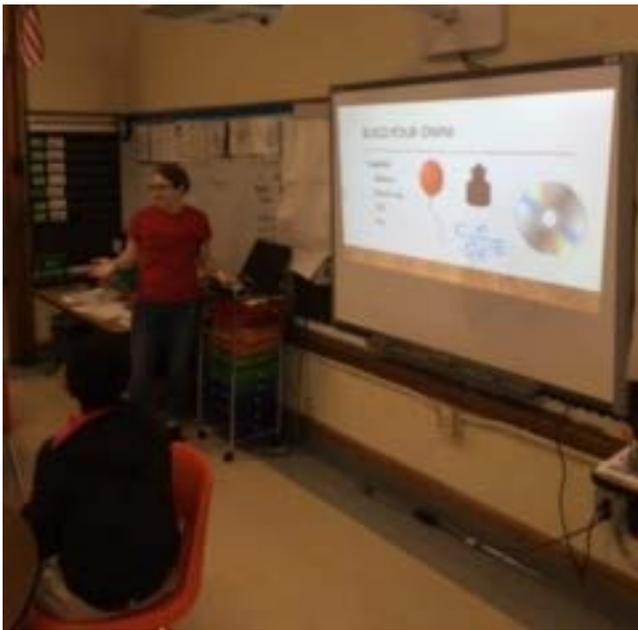
Joe McPherson, one of our machine shop teachers, testing out the big hovercraft.
Photo by Anna Murphree.



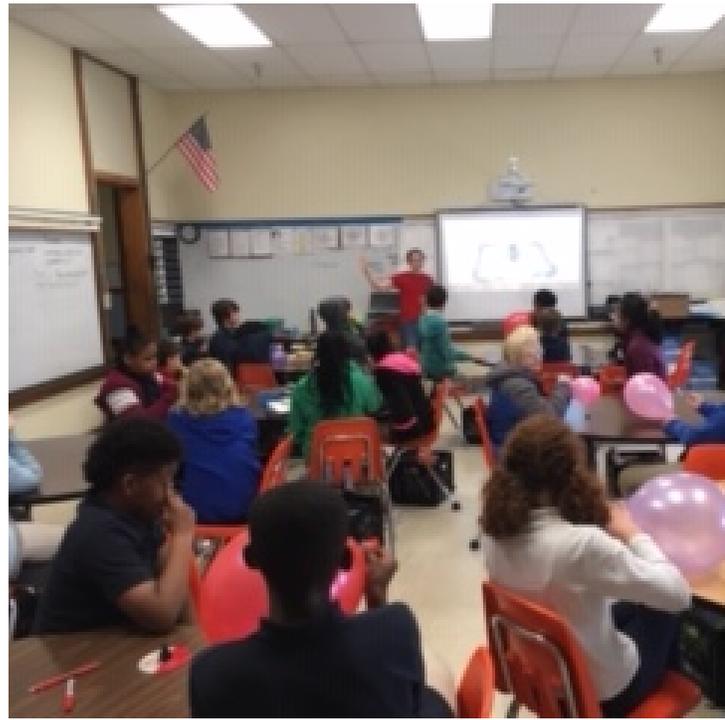
The completed big hovercraft! Photo by Anna Murphree.



Evan Main having a great time testing out the big hovercraft. Photo by Anna Murphree.



Anna Murphree presenting the hovercraft powerpoint to students. Photos by Evan Main.



ncy, pressure, and hovercrafts.



Students decorating and assembling their own hovercrafts! Photo by Anna Murphree.



A cool rocket design on one student's hovercraft!
Photo by Anna Murphree.



Happy 5th graders posing with their hovercrafts! Photo by Anna Murphree.

Evan Main '19 pushes four kids around on the big hovercraft while other students and teachers watch in awe.
Photo by Anna Murphree.



Students watch as their classmates zoom around on a hovecraft! Photo by Anna Murphree.



Students being surprised by how powerful the leaf blower was! Photo by Anna Murphree.



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