



SOCIETY OF PHYSICS STUDENTS

An organization of the American Institute of Physics

Future Faces of Physics Award Report

Project Proposal Title	"I CAN Science"
Name of School	The George Washington University
SPS Chapter Number	2319
Project Lead (name and email address)	Jason Starita – jtstarita@gwu.edu
Total Amount Received from SPS	\$340.63
Total Amount Expended from SPS	\$340.63

Summary of Award Activity

"I CAN Science" is an outreach collaboration between The George Washington University's SPS chapter and Life Pieces to Masterpieces afterschool program. The program promoted hands-on physics learning through demonstrations for African American boys ages 7-12 from lower socioeconomic statuses. Members of GWU's SPS chapter traveled to Drew Elementary School seven times throughout the semester, each time focusing on a different physical phenomenon including astronomy, light, motion, and phase changes.

Statement of Activity

Overview of Award Activity

Our chapter prepared seven lessons that each included two to three different lab stations for the boys in Life Pieces to Masterpieces. Seven times throughout the Spring Semester, 3-5 SPS members and the advisor traveled to Drew Elementary School in Northeast Washington D.C. where LPTM is hosted. SPS members prepared and ran 2-4 different lab stations for students to interact with and learn about different physical phenomena. This year our seven major lesson topics focused on the theme “Physics is Everywhere” to show the boys that they can find different physical phenomena everywhere in their daily life. Each week focused on one buzzword the boys would learn about, and these words were ‘Physics’, ‘Astronomy’, ‘Motors and Vehicles’, ‘Motion and Rotation’, ‘Fluid’, ‘Light’, and ‘Phase Change’.

Each week we visited two different classrooms for forty-five minutes to an hour each. One classroom had twenty boys ages ten to twelve and the other had sixteen boys ages seven to nine. The concepts that the SPS members taught while demonstrating each station varies depending on the age of boys. For example, during the vehicles lesson, the younger students learned about lift vs. gravity by making, testing, and revisiting paper airplane designs, and the older students learned about the function of motor by making simple robots.

Each lesson was designed for students, so they are to inquire about different physical concepts in a hands-on learning environment. SPS members taught the physical concepts, rather than complicated mathematics driving these ideas, in order make the material as accessible as possible. Students are able to construct their understanding and knowledge of the topic each week using the ideas and concepts they have learned from previous weeks or while in school. For example, students learned about momentum in a cart collision experiment and then learned about angular momentum the next week, building on the lesson on momentum. We also established a ‘portable science station’ where students were able to take home certain items, such as diffraction glasses and slinkys, which could be used by the boys even when our SPS chapter is not there. Students could then feel more connected to the topics they learn and be more eager to share their science experience with peers, family, and other mentors.

During the Spring Semester, the outreach program is the main focus of our SPS chapter. Because we have worked with Life Pieces to Masterpieces for the past five years, it is a very important aspect of our chapter. Students are encouraged to not only attend weekly meetings with such topics like “How to Get Involved in Research” or “Grad School: Conquer Your Fears”, but to also make the visits to LPTM. Of the sixteen members in our SPS chapter, ten students had come to at least one outreach session.

In future years, we hope to continue our relationship with LPTM for not only the growth of scientific curiosity within students but to also give SPS members hand-on experience teaching physics. By fostering our chapter’s relationship with the I CAN Science program of we hope to contribute to one just one aspect of the multifaceted mission of Life Pieces to Masterpieces, which aims to develop character, self-resilience, and integrity in the young African American men while fostering mentorship relationships with positive role models.

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

Life Pieces to Masterpieces provides a holistic approach to character building by creating support systems, and hosting learning promoting workshops, such as our “I CAN Science” program. The boys who are a part of this program are from Washington D.C.’s more poverty- stricken areas. By engaging these students with physics demonstrations, we hoped to invoke a passion for science that inspires students to pursue education or career options in physics, or general science. By giving students hands-on experiences in science, we hoped to inspire students to take the world of scientific inquiry into their own hands.

Engaging with these students in the “I CAN Science” project, and working with them for seven sessions throughout the semester, students learn that they can do and recognize science in their everyday life. By helping

shape students as scientific learners, we hope to impact their future attitudes towards scientific discovery. By promoting students from marginalized community with the opportunity to engage in science, we hope to strengthen the diversity in the scientific community.

The goals for our program were to introduce students to the wonders of STEM and scientific curiosity. We wanted to do this by making learning fun, and put the power of learning into the students' hands. By strengthening African-American youth, by first acknowledging cultural differences, and then empowering them to explore and achieve inquiry, we hope to make an impact in their scientific learning now and in the future. By increasing diversity in science, we gain new perspectives on issues due to a wider range of background and outlooks and each individual bringing their ideas and experiences to the table. Learners such as the students in LPTM are the future of our scientific communities.

When we first walk into the classroom, students are eager to learn, telling us about their weeks and even places where they themselves saw implications of our previous lesson. Jason remembers one week one student, Aaron, talk about how he saw a rainbow outside the window while in school and remembered that light is a wave! The students are eager to learn! This is how we assess the success of student learning; not by tests or formal assessments, but by the engagement of students in lessons, group activities, and individualized journals. Each lesson is comprised of stations, and at each station students are able to engage in a way that builds on concepts they have learned in school or from previous weeks in the program. The hands-on demonstrations and engaging, young, and fun SPS members try to create an atmosphere where not knowing the answer right away is an opportunity to learn and asking questions is a vital step in discovery. Each lesson concludes with time to reflect on what students have learned. Students will circle up and share the exciting new facts, such as "Saturn's rings are really just tiny rocks around the planet" or "collisions depend on an objects mass and speed". Here, students are interacting with not only SPS members, but each other. They have the opportunity to hear something that they might have missed and engage like true scientists in a collaborative community.

Finally, to wrap up the day students have the opportunity to write their new scientific facts in their individualized science journals that were made and decorated on the first week of the program. Here students wrote down the buzzword of the day at the top of that day's page and were able to write things they learned in that day's lesson. At the end of the program, students were able to take these journals home with their 'portable science station, and refer back to the things they learned through the weeks of the I CAN Science Program.

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?</p>	<p>Typically, African-American students are under-represented in the field of physics. Our project, by working with Life Pieces to Masterpieces, hoped to get African-American boys ages 7-12 interested and excited about physics. This years theme "Physics is Everywhere", we hoped that the boys would begin noticing physics concepts in their every day life.</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>16 boys ages 7-9 20 boys ages 10-12</p>
<p>How many students from your SPS chapter were involved in the activity, and in what capacity?</p>	<p>Outreach Chair Jason Starita had planned each weeks lesson theme and stations. Each week, he deligated which SPS members would be at which stations and lead a station himself. The weeks Jason could not attend, our chapter's SPS co-president Jackie Veatch was the one to</p>

	<p>delegate tasks. Each lesson we had 3–5 SPS members attend and by the end, 10 of our 16 members had attended at least one lesson at LPTM.</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? How would the additional funding have augmented your activity?</p>	<p>While we did purchase some of the original items we listed on the original award proposal, we did not purchase some of these items. The reason is because we found a Pendulum in the department office, one of our SPS members donated an “Astro Blaster” they had, and the Ice Melting Set was sold out. Because of this, Jason designed new lessons around new materials and was able to spend all the money. The funding we received from this award was sufficient to add to the materials in our chapters outreach supply. While we did go over-budget, it was by an amount less than \$9.00 and we were able to cover this with other 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>This is our SPS chapters 6th year apart of the I CAN Science Program through Life Pieces to Masterpieces. We anticipate that next year LPTM will invite us back to participate in this program again.</p>
<p>What new relationships did you build through this project?</p>	<p>This year, our chapters relationship with Life Pieces to Masterpieces was strengthened. Not only did we participate in the I CAN Science program, but we also participated in other LPTM activities that we have not in years past. This includes joining their Peace Circles at the end of the day, where we had the time to reflect on the day. Individual relationships with students were strengthened as well, where SPS members were able to cultivate lasting relationships with the boys we were serving.</p>
<p>If you were to do your project again, what would you do differently?</p>	<p>In future years, we hope to have a set sign up list for SPS members to sign up in advanced for the days/lessons/stations they want to be apart of. This gives students more freedom in choosing topics to teach they are more passionate about/know more about. It also helps planning to know far in advanced how many SPS members are able to come each week.</p>

Press Coverage

<https://gwtoday.gwu.edu/not-just-another-science-class>

Expenditures

1. Free Fall Vacuum Chamber: Lesson on “Motion and Rotation” to teach how gravity effects all objects and objects will fall at the same rate
2. Wind Tunnel: Lesson on “Motors and Vehicles” to teach Bernoulli’s principle and demonstrate lift
3. Happy and Sad Balls: Lesson on “Motion and Rotation” to teach how impulse can change an objects momentum
4. Bicycle Wheel Gyroscope: Lesson on “Motion and Rotation” to teach conservation of angular momentum...also used the Rotating Swivel Platform
5. Prisms: Lesson on “Light” to show its wave-like nature
6. Slinkys, Diffraction Glasses, Poppers: Materials apart of the “Portable Science Station” students were able to take home at the conclusion of the I CAN Science Program
7. Boomwackers Set: Lesson on “Fluids” to demonstrate how sounds travel through the air and how size effects pitch
8. Balloons: Lesson on “Light” to teach about electrostatics with the use of a van der Graff machine
9. Copper Tape, Button Cell Batteries, Set of LED Lights, Construction Paper: Lesson on “Light” to teach how circuits work. Students were able to make their own circuit cards

Expenditure Table

Item	Cost
Free Fall Vacuum Chamber	\$39.50
Wind Tunnel	\$43.25
Happy and Sad Balls	\$5.40
Bicycle Wheel Gyroscope	\$56.32
Prisms (set of 2)	\$12.00
Slinkys (set of 50)	\$13.39
Diffraction Glasses (set of 50)	\$16.49
Poppers (set of 144)	\$8.31
Rotating Swivel Platform	\$20.95
Boomwackers Set	\$20.86
Balloons (set of 100)	\$10.99
Copper Tape	\$6.95
Button Cell Batteries (set of 40)	\$6.97
Set of LED Lights	\$13.85
Construction Paper	\$18.82
Total shipping and taxes for all materials above	\$54.94
Total of Expenses	\$349.00

The extra \$8.37 spent on materials was taken from other SPS chapter funding that we had left over from fundraisers (including bakesales and profit shares) throughout the semester.

Activity Photos



SPS Members Jason, Danny, and Jose discussing phase changes before making liquid nitrogen ice cream for the boys of Life Pieces to Masterpieces. Taken by SPS Adviser Dr. Gary White.



The boys of Life Pieces to Masterpieces creating robots to learn about the functions of motors. Taken by the Artistic Coordinator of Life Pieces to Masterpieces Seneca Wells.



SPS Member Elias and SPS Adviser Dr. Gary White helping the boys of Life Pieces to Masterpieces create paper airplanes to learn about lift. Taken by the Artistic Coordinator of Life Pieces to Masterpieces Seneca Wells.



SPS Member Miya discussing conservation of momentum to the boys of Life Pieces to Masterpieces. Taken by SPS Outreach Chair Jason Starita



SPS Adviser Dr. Gary White demonstrating conservation of angular momentum. Taken by SPS Outreach Chair Jason Starita



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