



SOCIETY OF PHYSICS STUDENTS

An organization of the American Institute of Physics

Marsh W. White Award Proposal

Project Proposal Title	Stimulating Minds by Simulating Physics
Name of School	New Jersey Institute of Technology
SPS Chapter Number	4733
Total Amount Requested	\$499.00

Abstract

The New Jersey Institute of Technology Society of Physics Students chapter's "Stimulating Minds by Simulating Physics" is an outreach program that targets underprivileged students in K-12 in the Greater Newark Community to teach them physics in an idealized environment by using virtual reality in conjunction with hands-on demonstrations.

Proposal Statement

Overview of Proposed Project/Activity/Event

“Stimulating Minds by Simulating Physics” is an extension of our regular outreach efforts to engage underprivileged students in the Newark community, primarily Black and Hispanic, about physics and college. Our chapter has been slowly and steadily growing out outreach efforts to the Newark Public School system and beyond and have had a successful turnout. We targeted students K-12 and have had a good reception to our current efforts and plant to expand our reach to other towns.

The project involves simulating idealized physical environments in virtual reality to help students, from each grade, understand the physical phenomena around them. We will visit them weekly to cover new topics appropriate for their current understanding and to act as mentors. We will also use physical demonstrations that we currently have and hands-on experiments to see what the phenomena looks like in real life. The topics covered will be age-appropriate and will be discussed with the teacher beforehand to see what the students level of knowledge is at.

We want students to be able to learn physics in a way that many people have not been able to. To be able to grasp concepts that are tricky and to experiment in this virtual reality. We want to cultivate their natural curiosity and mentor them to become future scientists and scholars.

In the future, we hope to expand our outreach to other parts of New Jersey and to have special seasonal lectures at the New Jersey Institute of Technology for both parents and students to learn more about physics and be in awe of how fantastic the world around us is. We will also try to work with other organizations at our college to help run a physics day competition for multiple elementary schools.

How Proposed Activity Promotes Interest in Physics

By granting the New Jersey Institute of Technology the Marsh W. White award, we would use it to allow students from underprivileged circumstances a new way to view the world around them using physics. Typically, many students have trouble visualizing some topics, like collisions, torque, electromagnetism, and planetary motion, but with the use of virtual reality we hope to engage the students in an exciting way and let them see these topics in an ideal environment. We will use the virtual reality headset in conjunction with our physical demonstrations to give them hands-on activities in our program. With our weekly visits to the classroom, we can see their growth and act as mentors to these students as well. We will inspire all the students to participate and learn more about the world around them.

The Marsh W. White grant will help our chapter establish a stronger foothold in our outreach efforts and help us reach out to schools outside of Newark. We will continually improve this program to make sure we fulfill the expectations put onto us by the parents, students, teachers, the grant committee, and ourselves.

Plan for Carrying Out Proposed Project/Activity/Event

This section should tell reviewers HOW the proposed activity will come to fruition. Please include adequate details so that reviewers see evidence of thoughtful planning.

Our chapter will be planning all aspects of the program within our Outreach Coordinator Committee, head by our Outreach Coordinator Brandon Daniels, and assisted by other committees as needed. Advertising for additional volunteers from the New Jersey Institute of Technology student body and other organizations will be conducted by our Public Relations Committee, headed by our Public Relations Officer Nazeem Patel. The club advisor, Dr. Andrei Sirenko will make sure we are on track and that we follow all regulations and expectations set forth and necessary for such a project. We will be training our volunteers on Engagement with Minors to make sure they are knowledgeable about the etiquette of such a program. We will be using our already established connections with the Greater Newark Community public school system to market our project and do trial runs if the teacher wants to see what such a program is like. We will begin with the Sussex Avenue Renew School and specialize our project for ages K-5 as our “pilot” school. We will then work out any issues and streamline our program and move onto more schools, as well as broadening our target age demographics to K-12 when we go to Science Park High School and other such schools. We will continue to expand as much as we can while keeping in mind the availability of our volunteers. Our long-term goal is to establish extremely strong connections with the Newark Community and eventually have programs at the New Jersey Institute of Technology to engage both parents and students. Overall, this will help with our outreach efforts and have a positive impact on the disadvantaged community.

We already have strong relations with both Sussex Avenue Renew School and Science Park High School with our current outreach activities. Our chapter is comprised of physics, computer science, and engineering majors which will help with the design and execution of such a project. Our outreach events typically secure 4-8 people to help with them, which will be sufficient for this current project. Many of our members are tutors, who have worked with students K-12 and we have a member who interned for Liberty Science Center’s Planetarium Department, who can assist with the creation of educational programs and give tips on how to engage a wide array of people.

Project/Activity/Event Timeline

We will be contacting schools in January to see which of the already established connections would like this supplemental program and other, non-established connected schools to see if they would like us to do a preliminary run to see the interest of the students for a program like this and our own abilities to conduct such a thing. We will contact both the principal of the schools and the teachers in order to make sure all parties are in the loop about the proposal and would allow us to have multiple people at the same school to follow-up with in case, one contact is busy. The proposed times and dates will be given by the teachers in January and we will find times where members of our chapter and other volunteers can go to conduct the program by the end of that month.

The program will begin in February and continue until the last week of April, meeting every week on the day and time chosen by the teacher. As the program takes place, we will be collecting data using survey, discussed further below. Once the program is completed, we will take a final survey and use funds from our Student Senate and Physics Department to give the classroom a physics demonstration of their own for use for many years. We will continue to conduct this project using the virtual reality headset for the foreseeable future.

Activity Evaluation Plan

Our chapter will evaluate the success of this program by the number of students that participate in the visits that we conduct as well as the general atmosphere and interests of the student body while we are conducting the program. We will be working closely with the students and document the growth, in both knowledge and enthusiasm, of the students as the weeks progress. We will also be collecting data from the students, teachers, and parents through surveys after every week in order to make sure we are meeting their and our own expectations and find ways to improve the program. We will provide both a paper form and an online form for them to fill out and will see if there are any trends that we can perceive from the data to assist in our execution of the project.

Budget Justification

The product we will be purchasing is the Oculus Quest All-in-one VR Headset - 128GB, which will be used to carry out the project as mentioned above. All the virtual reality physics demonstrations will be using previously created educational demonstrations made by professionals and public educators, which will be supplemented by environments that our chapter will create from scratch. The virtual reality headset is integral to this project and will greatly help our chapter establish a greater foothold in Newark and be used as a steppingstone for future outreach projects.

The physical demonstrations will be using our already established experiments that we have used for our other high school visits. Any additional costs will be covered by our society's budget, given by our Student Senate, and our physics department. Additional costs include, but are not limited to, travel costs to take volunteers to and from NJIT and the public school and supply costs to repair demonstrations or create new ones.