



# SOCIETY OF PHYSICS STUDENTS

An organization of the American Institute of Physics

## Marsh White Award Report Template

*Instructions: Please complete each section after reading the purple text describing what should be in that section. Then delete the purple text.*

Project Proposal Title	TU-SPS-K-12 Outreach Demonstration Program on Renewable Energy
Name of School	Tuskegee University
SPS Chapter Number	7446
Project Lead (name then email address)	Timothy T. Powell, <a href="mailto:powelltt2010@gmail.com">powelltt2010@gmail.com</a>
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SPS Chapter Advisor	Dr. Sessa Srinivasan, Dr. P.C. Sharma, Dr. A. Kumar, Dr. M. Ntam, Dr. Z. Chen
Total Amount Received from SPS	\$300.00
Total Amount Expended from SPS	\$300.00

## Summary of Award Activities

An outreach demonstration activity was conducted by the Tuskegee University SPS chapter on the banner of Marsh W White Award in spring 2014. More than 50 high school students from Science discipline and their teachers participated from Booker T. Washington High School of City of Tuskegee, Macon County, Alabama. SPS-MWW project students with their faculty mentors have demonstrated number of renewable energy modules that enable the high school students to understand the fundamental clean energy conversion concepts with hands-on experience leading to their practical applications. The school administration was very much pleased and invited the TU-SPS chapter for future K-12 outreach events.

## Statement of Activity

The Marsh W White Outreach Award from SPS was efficiently utilized by the Tuskegee University Physics Majors to organize one day outreach program at the Booker T Washington High School, Tuskegee on April 10, 2014. The School Principal Mr. A.J. Nelson was overwhelmed in receiving the Tuskegee University Physics project investigators to his campus and provided all the necessary facilities for the demonstrations of Renewable Energy concepts and their applications. Some of the modules displayed and discussed to the high school students and their teachers are,

- a) How the photovoltaic solar cells used to convert sunlight energy electricity and then to to produce hydrogen from water
- b) How the hydrogen can be stored in a metal hydride for future on-board fuel cell cars
- c) How to produce electrical energy from mechanical or wind mill motion
- d) How to produce bio-fuel from 10% of ethanol in DI H<sub>2</sub>O
- e) How the fuel cell car runs without external electrochemical batteries
- f) The principle of dye-sensitized solar cells for direct conversion of electricity from sunlight and
- g) A practical knowledge about electro-magnetic induction, wave motion and Newton's third law of motion.

## Overview of Award Activity

The SPS-MWW award enabled the project activities as planned to implement outreach demonstration program as detailed in the following sections.

- Brief description – A day outreach activity was successfully completed at the Booker T. Washington high school at Tuskegee. Number of renewable energy modules were demonstrated to student participants by the SPS chapter physics students and their faculty mentors. There was an active dialogue followed by hands-on activities exhibited by the SPS chapter. At the end of the demonstration program, each individual physics major students shared their research and education experiences with the high school students to let them know prior the hurdles and advantages of getting in to undergraduate studies.
- Outcomes – It was successfully accomplished through the visual and hands-on projects, cultivated the high school participants to appreciate Science and Engineering. This not only nurture their minds to choose for STEM based education once out of the schools, but also enabled them to know the beauty of Physics and Science in general. Small groups of students at the end of the outreach activity showed their interest to go for summer internship at Tuskegee University on the subject topics on Renewable Energy and Sustainable Technologies.
- Audience – High school students especially from Science background were selected as audience of this MWW outreach activity. To surprise, an overwhelming student population (more than 50 students) participated in the day activity, listen faculty mentor lectures and student's demonstrations.

## 2013-2014 Marsh White Award Final Report Template

- Context of the Project – The outreach activities executed via this MWW award was seamlessly impact on the contexts on our SPS undergraduate research projects. The research implemented by the SPS chapter and its outcome will then be outreached to our network public schools of Tuskegee. The continuation of our future outreach programs will undoubtedly become a vehicle to recruit summer interns and provide springboard for retention of college enrollments.
- Highlights and stories – Few volunteers from the student participants of the high school were invited to perform hands-on renewable energy education modules. The students commended the SPS chapter and showed interests to continue involve in research projects in Physics during their summer months.

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

The successful institution of the outreach program via the Marsh White award have impacted the large audience of high school students to appreciate Science and overall STEM education. This will enable them to decide for their undergraduate education at Tuskegee University, Physics department in the coming semesters.

Following lists narrates the proposed project goals and the associated assessment plans

- The overarching goals of introducing STEM based education and outreach demonstration activities were facilitated via SPS Marsh White Award received by the Tuskegee University SPS chapter. During the course of the outreach activity, an overwhelming response was shown from both the administration and the high school students which clearly meet or exceeds the goals set forth in this initial meeting. Many future events are planned for continuation of Marsh White outreach activity at the under-represented Macon County schools of State of Alabama.
- Assessment of the successful implementation of the outreach activity was adjudged based on the students cum teacher's feedback, group discussion and debates and overall participation roster throughout the entirety of the program. It is planned to prepare a questionnaire and send out a survey via online tools will be the future assessment methods to understand the effectiveness of the MWW outreach program.
- Results from the project assessments:
  - Booker T. Washington High School Principal Mr. A.J. Nelson commended the SPS TU Chapter team for extending their day activities at the school introducing the renewable energy and sustainable technologies which are must for 21<sup>st</sup> century STEM education and curriculum.
  - Science and Aerospace Engineering Teacher Ms. Ellen Tolbert, invited the SPS TU Chapter team to visit her class room for future demonstration and presentation which is planned for Fall'14.
  - Students of BTW excitingly commended the teams initiative and also promised that they will take part in summer research or outreach activities at Tuskegee University.
  - SPS TU Chapter physics students out of which two were the graduates of BTW and this potentially shows the bondages between Tuskegee University SPS chapter and the high school.

## Key Metrics and Reflection

Please answer the questions below. Please indicate if a question is not applicable to your project.

Who was the target audience of your project?	<b>High School Students at Booker T. Washington High School, Tuskegee, AL</b>
How many attendees/participants were directly impacted by your project? Please describe them (for example “50 third grade students” or “25 families”).	<b>More than 50 High school students and 5 Science/Math teachers</b>
How many students from your SPS chapter were involved in the activity, and in what capacity?	<b>10 SPS Physics Major students + 3 faculty instructors + 1 Research Scientist + 1 Physics Lab Manager (All students were involved in the capacity of organizing the outreach activity with their demonstration projects.</b>
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?	<b>YES, the amount was sufficient to carry out the outreach program with necessary budgeted items as appropriate for the amount received.</b>
Do you anticipate repeating this project/activity/event in the future, or having a follow-up project/activity/event? If yes, please describe.	<b>YES, it is planned to carry out the executed outreach activity to other schools and junior colleges of Macon County, provide more hands-on to STEM education and curriculum.</b>
What new relationships did you build through this project?	<b>The Principal of the high school was pleased and invited the SPS TU Chapter for future outreach as part of the regular school activity. One of the teachers of Aerospace department showed interest for the activity and invited to her classroom demonstration,</b>
If you were to do your project again, what would you do differently?	<b>Conduct the one day workshop at Tuskegee University campus where students around all the elementary and high schools will be selected for hands on experience on the renewable energy and sustainable technologies pertinent to STEM education and curriculum.</b>

## Press Coverage (if applicable)

[http://www.tuskegee.edu/academics/colleges/clae/physics/students\\_news.aspx](http://www.tuskegee.edu/academics/colleges/clae/physics/students_news.aspx)

Tuskegee University local chapter of Society for Physics Students, (eight students member team) have been awarded with Marsh W. White Award (\$300 cash prize) for an outreach education proposal on "Renewable Energy Technologies" by The American Institute of Physics (AIP- $\Sigma\Pi\Sigma$ -SPS) for the one calendar year (Jan. 01, 2014 – Dec. 31, 2014). Faculty advisors of this proposal: Dr. P.C. Sharma, Dr. Sesa Srinivasan, Dr. Akshaya Kumar. Marsh W White award cash prize will be used by the SPS TU Chapter to introduce Renewable Energy Demonstration projects to the Tuskegee Public School systems. List of SPS TU Chapter Research Award Winners (Physics Majors): Timothy T. Powell, Lamont Henderson, Jeremiah F. Wilson, Leah M. Sanks, Alejandra Sandoval, Joanie Keel, Kumasi Salimu and Steven Gailard.

## Expenditures

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

### Expenditure Table

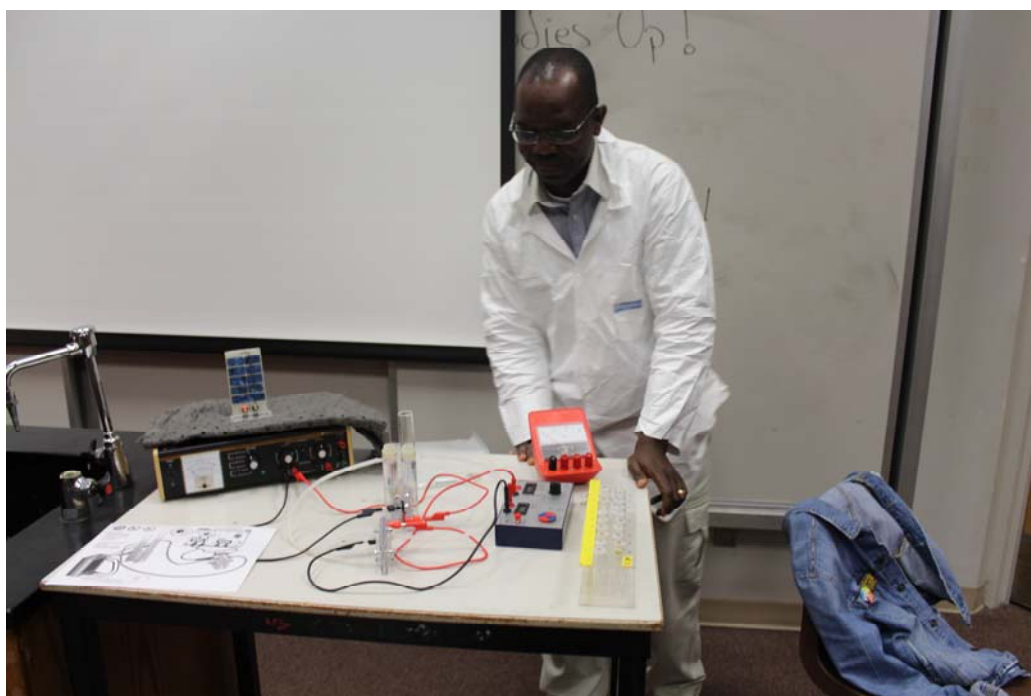
Item	Cost
Splendor Pen with engradved SPS Marsh White Outreach	\$150.00
SPS-TU Department of Physics Flyer Priting	\$50.00
Mateirals and Supplies for Demonstration Acitivity	\$50.00
Certificate of SPS Marsh White Outreach Printing	\$50.00
<b>Total of Expenses</b>	<b>\$300.00</b>

## Activity Photos

Please include captions and credits for each photo. By including photos below, you are giving SPS and the American Institute of Physics permission to use these photos in their online and printed publications.



**Plate 1: Booker T. Washington High School Teachers and Students as audience**



**Plate 2: Dr. David Baah, Post Doc at Tuskegee University setting up demonstration experiment**



Plate 3: TU SPS Chapter students and faculty demonstrating H<sub>2</sub> Fuel Cell Car



Plate 4: TU SPS Chapter students and faculty demonstrating renewable energy and hydrogen fuel cell technologies to BTW high school students





Plate 5: Two out of three SPS students are the graduates of Booker T. Washington High School



Plate 6: TU SPS Chapter faculty and students setting up demonstrations on renewable energy technologies



**Plate 7: TU SPS Chapter students and faculty set up demonstration experiments at the BTW High School**



**Plate 8: TU SPS Chapter Advisor Dr. Sesha Srinivasan thank the BTW High School Principal Mr. A.J. Wilson after the successful Marsh White Outreach Activity on April 10, 2014.**



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