

Marsh White Award Final Report on "Fiziks is Phun"

Ball State University

2003-2004

The Ball State University Chapter of the Society of Physics Students received a Marsh White Award from the National Office in January 2004 to assist them in the outreach program, "Fiziks is Phun." This program involves middle school students learning about physics phenomena through hands-on experience with supervised demonstrations. Several science kits were purchased for use in the demonstrations, and additional equipment was borrowed from the Department of Physics and Astronomy at Ball State University. The participants in this program from Ball State are shown in Fig. 1.

The demonstrations were grouped under three broad topics: (1) static electricity, (2) magnetism and electromagnetism, and (3) sound waves and sound energy. The hands-on demonstrations for static electricity involved the use of a Van de Graaff generator, balloons, Scotch tape, and the standard silk and a glass rod and fur and plastic rod combinations. For magnetism, several kits were used that included simple bar and horseshoe magnets, along with a compass to indicate polarity and to roughly map out the magnetic field patterns. Another kit contained electromagnets and a third provided a demonstration of how a levitating train works. The third category of waves was demonstrated by a Slinky to show both longitudinal and transverse types of waves, and a set of tuning forks demonstrated sound waves. Students involved with these demonstrations are shown in Figs. 2-4. Small toys and pencils were also handed out to the students as fun reminders of the day.

Two middle schools in the area were visited by our SPS students. Contact was made through a local high school teacher who works closely with our physics department. One school was Wilson Middle School, located in Muncie, IN, and the other was Yorktown Middle School, in Yorktown, IN. At Wilson, five eighth-grade classes and six sixth grade classes were visited. At Yorktown, two eighth-grade classes were engaged in the demonstrations. Approximately 25 students were in each class, and a total of over 300 students participated in this hands-on experience. The students in the classes also had a wide range of learning abilities, from honors classes to those classes where about 60% of the students were diagnosed with learning disabilities.

The reaction by the middle school students was very simple: they loved it! The teachers also were involved along with their classes, as shown in Fig. 5. Our SPS students soon became infamous at the schools, with the word of having fun learning physics spreading throughout the day. Many students were disappointed in not being able to participate in this fun experience. The students loved the hands-on aspect of the demonstrations, while actually getting a chance to handle objects and become fully involved with science. Our SPS students were thrilled with the look of amazement on the faces of the middle school students, and commented on that being "priceless." The set of demonstrations were also well received by the teachers, who have already invited the SPS students back again next year.

The reactions by our Ball State Society of Physics Students were also extremely positive. They found the interaction with the middle school students to be very enjoyable, and laughed along with them in the fun. The SPS students also found the experience to be a learning one for them as well, where each class was different and they had to adjust the demonstrations accordingly. For example, the attention span of the younger students was much less than those of the older students. Perhaps in the future our SPS students who plan to go into science teaching can use this type of outreach program as a field experience.

The middle school students were very inquisitive and asked many questions, as seen in Fig. 6. Most of the questions were not directly related to the demonstrations themselves. Some examples are: "What is the event horizon of a black hole? Can we go through a black hole?"_ "How does a roller coaster work? Why does it work?" or "What kind of research do you do?" Our SPS students were quite surprised by the depth and breadth of the questions posed by the middle school students, and realized how much knowledge is required to answer these questions, and also how to answer them at a level understandable by the middle school students.

In conclusion, the physics outreach program to middle school students sponsored by the Marsh White Award and from departmental funds was very successful. Both the middle school students and the SPS students benefited greatly from their mutual interaction. The SPS students had the opportunity to experience the thrill of seeing learning in action, and the middle school students could experience that indeed "Fisiks is Phun." We hope that this mutual beneficial experience will continue to grow in the future.

Budget for "Fisiks is Phun"

Equipment purchased and used for the demonstrations: (electromagnet kit, sound lab kit, static electricity kit, magnet levitation kit, photovoltaic kit, other equipment)	\$220
Handouts for students	30
Transportation expenses	25
Office supplies and mailing	<u>25</u>
\$300	

Note: The Department of Physics and Astronomy at Ball State University contributed funds and other supplies and equipment that were in addition to that listed above.



Fig. 1 Back row (L to R): Bob Hill, Dr. David Grosnick (advisor), Luke Kanuchok, Alicia Kalafut, Fred Hill, Craig Hendrickson (treasurer). Middle row: Chris Banser, James Klep, Lucas Snyder, Ryan Castor. Front row: Gabriel Anduwan, Melissa Hendrichsen (president), and Courtney Rowe-Bultinck (vice-president).



Fig. 2. Demonstrating sound waves with tuning forks.



Fig. 3. Checking out the hair-raising side of physics.



Fig. 4. Inquiring about magnetism.



Fig. 5. Not only students loved the demonstrations.



Fig. 6. Lots of interesting questions were asked about physics.