

Wisconsin Undergraduate Idea Fellowship

Submitted by:

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Biocore Outreach Ambassadors: Reaching out to Improve Rural Science Education

Abstract

The goal of the Biocore Outreach Ambassador program is to sustain and expand current efforts to improve science education in rural communities in the Madison area. As an extension of the Biology Core Curriculum, the Outreach Ambassadors were founded to promote scientific investigation and exploration in elementary, middle, and high school students. Outreach in the Wisconsin Heights School District, just 22 miles west of Madison, has thus far included in-classroom tutorials and experimentation as well as a successful Family Fun Science Night. The Wisconsin Heights School District has extremely limited funding for active, hands-on science instruction, and it currently faces a financial crisis that prevents it from providing additional resources to science education. With funding from the WIF fellowship, the Biocore Outreach Ambassador program will continue and strengthen efforts already in progress in the Wisconsin Heights School district as well as expand efforts to three additional rural communities.

Background and Purpose

The purpose of this project is to maintain and increase the efforts of the Biocore Outreach Ambassador Program through science outreach and education. Our project focuses on the Wisconsin Heights Schools, a rural district just 22 miles west of Madison, and three additional rural districts. Funding from a Wisconsin Idea Fellowship grant will enable the Biocore Ambassadors to continue and expand successful education in the Wisconsin Heights School District and to extend similar efforts to three additional rural school districts in the Madison area.

The Biology Core Curriculum (Biocore) is a comprehensive honors biology program that emphasizes group collaboration, communication, and problem solving in a variety of biological arenas.¹ Students enrolled in this four-semester sequence are encouraged to solve problems using scientific logic and synthesis and to do authentic science through laboratory independent research projects. The Biocore Outreach Ambassadors were founded in 2004 to extend this approach and promote science exploration in rural elementary, middle, and high school students. In 2004, Biocore Ambassadors Annika Swenson and Allison Bichler focused on science outreach in Wisconsin Heights and Hayward High Schools. In November 2006, ambassadors Caitlin Iverson and Joel Miesfeld organized and executed a Family Fun Science Night in the Wisconsin Heights School District that drew over 150 students, teachers, and parents. Iverson and Miesfeld also pioneered classroom collaboration in Black Earth and Mazomanie elementary schools. Our goal is to maintain and expand these in-class efforts at Wisconsin Heights, repeat the success of earlier science nights in this district during the spring and fall semester of the 2007-2008 academic year, and offer similar science nights to three additional rural school districts in need of assistance. We will also recruit another cohort of Biocore Outreach Ambassadors to ensure sustained efforts in rural schools in the Madison area.

The Wisconsin Heights School district educates approximately 1000 K-12 students in the Mazomanie and Black Earth communities.² Currently, the district faces a difficult financial situation

¹ Biology Core Curriculum. University of Wisconsin-Madison. <http://www.biocore.wisc.edu/biocore/index.html>.

² Wisconsin Heights School District. <http://www.wisheights.k12.wi.us/>.

that severely threatens the quality of the programs available to students.³ Due to continued budget cuts, declining enrollment, and increased costs, the district projects a \$1.2 million shortfall for the next school year.³ In spite of yearly fee increases, staffing reductions, and other cost-effective strategies, the district still faces deficits predicted to total over \$5.6 million over the next four years.³ The pressure to decrease spending has severely affected education opportunities available to teachers and students.³ For example, professional development funds for teachers will be reduced by 25% if an operating referendum on Feb. 20th, 2007 does not pass.³

Current Biocore Ambassador efforts in the district include an after school science club for middle school students. Ambassadors also visit fourth and fifth grade classes in Black Earth and Mazomanie biweekly to incorporate hands-on activities into classroom curriculum. Ambassadors work with these teachers to plan and teach hands-on, engaging science activities. For example, in a lesson on genetics, Ambassadors helped students to extract the DNA from wheat germ. This hands-on experience enabled students to visualize and understand a difficult scientific topic. Studies show that techniques that engage students are more effective than passive techniques such as reading or listening to a lecture.⁴ Most of the materials used are provided through the Biocore program and through a \$1000 grant from BioTrek Science Outreach program of the UW-Madison Biotechnology Center. We would like to expand this financial support, however, so that each cooperating teacher could receive additional funds for teaching science.

Additional outreach to this district included a Family Fun Science Night, at which parents and children participated in 17 interactive science exploration stations. This event involved collaboration between the Biocore Ambassador program and numerous other science-based programs on campus, including WISE (Women in Science and Engineering) and Chemistry professor Bassam Shakhshiri's Science is Fun program. Furthermore, accelerated science students from Wisconsin Heights High

³ Black, Larry, and Avery, Bob. February 2007. "WHY? The Reasons the Wisconsin Heights School District is Going to Referendum." Wisconsin Heights School District. Mazomanie, WI. <http://www.wisheights.k12.wi.us/>.

⁴ Hollingsworth, P., Johnson, D., Smith, S. June 1998. An Evaluation Study of Interdisciplinary Active Learning. *Roeper Review* 20 (4).

School led by teacher Dan Jergens assisted UW-Madison students at several stations. After the event, Wisconsin Heights school board president Sue Beil wrote, "It was great to watch all the kids taking part in the experiments. Fun and messy, a great combination.....What a great community connection."

With the success of previous efforts as a template, we propose to implement a more unified, focused program for science outreach in Wisconsin Heights and offer science night opportunities to three additional school districts. We will continue biweekly in-class activities at Wisconsin Heights for teachers who desire assistance in his or her science curriculum. We intend to organize a Science Night for Black Earth/Mazomanie Elementary in the 2007-2008 academic year. Similarly, we will offer these Science Nights to three other districts using a similar format and methods. Potential target districts include Waunakee, River Valley, and Cambridge. Timing and frequency of outreach activities to these additional schools will be determined through collaboration with teachers, principals and students.

Benefits

Community/School District

When we demonstrate our enthusiasm for learning science in the classroom, we motivate children to investigate and discover. Through our efforts, we hope children will develop an appreciation and excitement for science and learning that will extend through the remainder of their education.

Bi-weekly classroom activities create personal connections between Ambassadors and young students. Additionally, Science Nights provide a rural community like Wisconsin Heights with an enjoyable and educational evening activity at no cost. Parents are encouraged to participate with their children and learn together from a variety of stations that encourage hands-on exploration and appeal to a wide range of ages. Funding would allow the continuation of our Science Nights without asking the school district to contribute financially.

Teachers

Public school teachers also benefit from the Biocore Ambassador program. Our program allows teachers to collaborate with students who provide a fresh, knowledgeable outlook on scientific education. Many teachers do not have enough science coursework and/or experience to teach elementary science with confidence. For these teachers, we Ambassadors act as a resource for


developing sustainable science curricula. We familiarize teachers with scientific concepts and demystify some complex subjects. Our goal is to empower teachers so that they feel comfortable with a variety of experiments and hands-on activities to enrich science instruction in their classroom in the future.

Students- Biocore Ambassadors


Through science outreach, we Ambassadors will utilize the abilities learned in the Biocore program as well as develop and refine our teaching skills. By collaborating with teachers, parents, and students, we learn to convey complex scientific concepts more effectively to all ages and education levels. We can share our love of science with other people and serve as role models for children who may not have considered science as a potential career focus. Finally, science outreach provides an exciting diversion from campus; the young students we teach bring a fresh perspective to learning.

Michelle Harris, Instructional Staff Advisor

Since 2004, the Biocore Outreach Ambassador program has brought numerous benefits to the Biocore program and to Michelle Harris as an undergraduate instructor. Michelle tremendously enjoys her interactions with the Ambassadors, and reports that their energy, creativity and enthusiasm for science and working with kids are contagious. They have required her to think of better ways to communicate biological principles to a very different audience, and she feels that this ultimately has improved her teaching approach in Biocore labs. The Ambassador's work also allows the Biocore program to share its innovative teaching methods with a wider audience, and provides the public with a very positive view of the work done here at the University.

 Teaching and children have always been interests of mine, but were difficult to pursue as a science major at UW-Madison. The Biocore Outreach Ambassador Program has allowed me to combine two passions and continue to learn about science, education, collaboration and communication. Starting a science club at Wisconsin Heights Middle School has been a project that I have enjoyed from the start. I learn more about science by teaching. Additionally, I feel so proud to be able to contribute to a

community that is grateful for my help. A fellow ambassador told me once that the feeling that outreach gives you is the “best high.” I couldn’t agree more.

 I grew up and attended school in a small town in rural Wisconsin. Now in my third year pursuing a degree in Biochemistry, I realize my closely-knit community molded my work habits, morals, and aspirations. I am proud of my rural roots and thrilled to be involved in the Wisconsin Heights district. I have always deeply loved science, and even as a young student found every opportunity to learn about the subject. However, sometimes I sensed my teachers did not share my enthusiasm. Though my instructors provided an excellent education, it was clear that some considered science unfamiliar and frightening territory. Therefore, many of my curious questions went unanswered. As a Biocore Outreach Ambassador, I have the opportunity to instill my passion for science in others—not only in young students, but also in teachers that may not have extensive scientific background. Science is not something to be feared; it can be enjoyed and explored by anyone—regardless of age, education, or experience.

Timeline

- ◇ **Spring 2007** - Recruit new cohort of Outreach Ambassadors
- ◇ **July/August 2007**- Set dates for fall science night and middle school science club in Wisconsin Heights. Contact administrators and teachers in additional rural school districts regarding science outreach
- ◇ **September 2007**- Contact Wisconsin Heights teachers regarding in-classroom help
- ◇ **October/November 2007**- Fall Science Nights
- ◇ **December 2007**- Program assessment, including teacher/administrator questionnaires; brainstorm improvements for Spring semester. Contact rural school districts regarding Spring Science Nights
- ◇ **Spring 2008**- Recruit new cohort of Outreach Ambassadors
- ◇ **February/March 2008**- Spring Science Nights, begin program writeup
- ◇ **April 2008**- Program assessment, writeup and poster presentation

Budget:

Description	Amount	Total
Fleet car (transportation to classroom visits)	\$35 per use 4 classroom visits per week, 12 weeks per semester	\$1680
Classroom materials	4 classrooms for one year \$188 per classroom	\$750
Science night advertisements (flyers, posters)	500 flyers @ \$0.50 200 posters @ \$1.00	\$450
Final poster	\$100	\$100
Science night station materials	\$200 per science night 4 science nights	\$800
Contributions from BioTrek and Biocore Laboratory (reusable activity materials)	In kind	\$0
Volunteer T-shirts	\$11 per t-shirt 10 Biocore Ambassadors	\$110
Fleet van (transportation to science nights)	\$35 per use 6 science nights	\$210
Volunteer meals for science nights	\$300	\$300
Community center rental space	\$600	\$600
Total		\$5,000