Science Outreach

NSF Grant Expands Brown Collaboration with Providence Schools

Brown University has received $3 million from the National Science Foundation to help enrich science programs in Providence schools. The grant will support fellowships for physics, geology and engineering graduate students to lead after-school activities in six area high schools and classroom activities in three elementary schools. The hands-on, inquiry-based lessons will supplement the existing curriculum.

PROVIDENCE, R.I. [Brown University] — The National Science Foundation has awarded Brown University a five-year, $3 million grant to support the involvement of graduate students in K-12 science education. Each week, graduate students in geology, physics and engineering will bring hands-on experiments and activities into several elementary and high schools in the Providence Public School system. The funding supports fellowships for Brown graduate students, giving them time to prepare and present the activities. It also will support training for students and teachers and paid summer internships for Providence Public School teachers and students to participate in research projects alongside Brown graduate students and faculty.

Graduate students and Brown faculty members will collaborate closely with educators in three elementary schools, five area high schools and the nearby East Bay Education Collaborative, which supplies science modules and training to eastern Rhode Island schools. Activities will supplement and expand the existing science curriculum, introduce young students to working scientists, and engage children in proposing and testing their own ideas – the essence of science.

“Many of the national guidelines say they want the students to appreciate science as intellectual inquiry, problem solving, and as an exciting discipline, not something that’s just facts,” says Tim Herbert, a Brown geology professor and the lead investigator on the grant. “Grad students come in with all this energy. They connect the content with the ex-
citement of learning. They show students that we figure things out, we don’t just memo-

The project grows out of several existing collaborations between Brown researchers and Providence public school teachers. For the past three years, physics professor Greg Tucker has coordinated graduate and undergraduate students in physics to help lead after-school science activities in Central and Cooley high schools. The young scientists they mentor experiment with water rockets, explore the principles of optics, and prepare for the Science Olympiad, a national contest that brings the excitement of a sporting event to science and engineering competition.

In Providence elementary schools, budget cuts eliminated science specialists in 2005. To help fill the gap, Holly Polhemus, a fourth grade teacher at Vartan Gregorian Elementary School, wanted to bring a few classes of students to the nearby Brown campus to see some fossils and minerals. She called Herbert, who she had met a school event. Herbert happily agreed to put a short lesson together, but the graduate students that he enlisted to help him were so taken with the young students’ curiosity and enthusiasm that they just kept coming back for more.

Within a few weeks, Laura Cleaveland, then a second year graduate student, had put together a rotating team of 20 geology students to come into Gregorian’s two fourth-grade classrooms each week and lead science-related activities. Polhemus and fellow fourth-grade teacher, Eileen Afonso embraced the opportunity and, two years later, the graduate students still show up every week. In addition to learning scientific principles, the fourth-graders learn to think like scientists: asking testable questions, keeping records of their experiments, and searching for alternate explanations. They also learn that scientists are real, approachable men and women who enjoy their work and who have interests beyond the laboratory.

Throughout the semester, the activities build on prior learning, moving from topics such keeping a research notebook and concepts of scale to understanding plate tectonics and the structure of crystals. Rather than books and lectures, the lessons are active and engaging. For instance, in a lesson on plate tectonics, students explore the collision of harder oceanic crust segments and softer continental crust by ramming a plastic tray into a towel. Later in the same lesson, students construct their own planets, complete with tectonic plate interactions.

Polhemus, who regularly seeks out enrichment activities for her students, is excited about the effect the program has on youngsters. “I see girls, for the first time, so taken with science. I have little girls who say, ‘I’m going to be a volcanologist and I’m going to study
volcanos in Alaska.’ I see my girls answering questions. I see them raising their hands. I see them jumping in.”

For their part, the graduate students often discover that they are knowledgeable and capable teachers – and are reminded of what is exciting about their chosen work.

With several programs underway and other interest growing on campus, all the pieces were in place when assistant professor of engineering and Director of Science, Technology, Engineering and Math Outreach Karen Haberstroh, who will coordinate the program, arrived at Brown last year, eager to work on outreach and education in addition to her research in biomedical engineering. The NSF’s Graduate Students in K-12 Education (GK-12) program turned out to be a perfect fit. Sonia Ortega, NSF program officer says, “Brown has an excellent reputation for conducting high quality research in science, technology, engineering and mathematics. The GK-12 project will give Brown graduate students an incredible opportunity to bring their research to the classrooms and by doing so gain a deeper understanding of their own research. Through this fellowship, graduate students will also acquire other skills, such as communication, teaching, collaboration, and team building, not normally emphasized in more traditional graduate programs.”

Many individuals at Brown, in the schools, and at the East Bay Education Collaborative contributed to building the relationships and the ongoing connections that made the proposal successful. For now, the program is limited to a handful of schools near the Brown campus, making logistics much more manageable than they would be for a city-wide program. Herbert and Haberstroh expect that the strength of the relationships they are building and the careful design of the program will make it sustainable beyond the five-year term of the grant.

Investigators on the grant include principal investigators Professor Tim Herbert and Assistant Professor Karen Haberstroh, as well as Dean of Engineering Gregory Crawford, Associate Professor Ian Dell’Antonio, Dean for Science Programs David Targan, and Associate Professor Gregory Tucker.

Editors: Brown University has a fiber link television studio available for domestic and international live and taped interviews, and maintains an ISDN line for radio interviews. For more information, call 401-863-2476.

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