

Hidden Gems for Helping Science Educators

By Zach Constan

At one time or another, most science educators have probably fancied themselves a would-be Don Herbert, whose pioneering “Watch Mr. Wizard” program featured a steady stream of spectacular experiments that captivated kids and ultimately produced a generation of enthusiastic scientists. Though Herbert’s heyday was in the 1960s, his recent passing generated an outpouring of tributes and obituaries. “Herbert’s techniques and performances helped create the United States’ first generation of homegrown rocket scientists just in time to respond to Sputnik,” wrote Bill Nye, the host of the Emmy-winning PBS series “Bill Nye the Science Guy,” in the *Los Angeles Times*. “He sent us to the moon. He changed the world.”

Much has changed since Herbert and his frothing beakers were fixtures on Saturday morning television. But today’s science educators are still inspired to bring the wonder of the universe to students of all ages. We want to share our love of science and enjoy the thrill of discovery when a student “gets it” for the first time. But today’s classroom also presents challenges: limited budgets, time constraints, and testing associated with state and national standards. And, of course, contemporary students are accustomed to the outrageous scale of spectacle that’s now standard fare in entertainment, from films to video games.

How do we overcome these challenges and help lead students to a fascination with science that can foster their desire to learn new things throughout their lives, an imperative survival skill in the 21st century? At least one part of the answer may be closer at hand than many educators may think, tucked away at nearby universities and, perhaps, national laboratories located in their areas. Though most of us know these institutions for their advanced education and research efforts, they also are rich, relatively untapped sources for public education and outreach, including for K-12 students.

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Sure, there are probably lots of reasons why seeking out connections at these institutions seems impractical. They can't improve your students' test scores and won't necessarily help align your curriculum with relevant standards. Good intentions aside, between classes and grading there's no time to spend chasing after something that will probably generate more work. Besides, there is no money for field trips.

As the outreach manager for the **National Superconducting Cyclotron Laboratory**, I'm used to hearing these sorts of objections. But I also am fortunate enough to spend much time with teachers who have found ways to overcome them. Our basic nuclear science and rare-isotope research laboratory, located at Michigan State University, in East Lansing, Mich., is visited by several thousand students annually, many of whom seem happy to return year after year. Similar outreach activities take place around the country at other large and midsize public laboratories and universities.

Most of us who lead these types of outreach activities know the challenges of today's schools and want to do what we can to make life easier for teachers. One way we try to do this is by showing the relevance of classroom ideas to cool applications.

Millions about our lobby waiting for the tour to begin, many students initially wear guarded, even jaded, expressions. Some of this skepticism begins to dissipate, however, as they start to engage with the technologies and concepts on display in our laboratory—superconducting cyclotrons that speed atomic nuclei up to half the speed of light, and nuclear reactions that mimic, albeit on a small scale, what happens inside stars. More interest is piqued during the Mr. Wizard-like, hands-on portion of the tour, which includes demonstrations of radioactive dinner plates, using superconductors to levitate a magnet, and freezing a leaf in liquid nitrogen. Thawing at least a modest amount of science aversion in this way seems worth the cost of taking students out of the classroom and arranging transportation for their visit.

There is a groundswell of support for linking young people to universities and laboratories. In February, I attended an event in Michigan called the Math + Science Education Summit, where representatives from K-12 schools, colleges and universities, businesses, and government agencies discussed how to improve the state's economic (and overall) future by promoting science education in schools. Two areas of agreement emerged: first, that teachers need more professional-

development time; and second, that students need to spend time with scientists at work, to see what research and discovery are all about.

More support for these ideas comes from an [Educational Testing Service poll last year](#) indicating that more than 90 percent of Americans believe the way to improve science skills in students is to provide more training for teachers. Similarly, the National Governors Association, which says that a well-trained workforce is the key to competitiveness in the global marketplace, has recommended that schools find more ways both to encourage students to consider science careers and to help them succeed in these fields.

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Seeking to extend learning beyond the classroom can be challenging, but this is where local universities and labs can step in. As Arden L. Bement Jr., the director of the National Science Foundation, told K-12 teachers in [the October 2006 issue of *The Physics Teacher*](#), “You are supported by a nationwide network of NSF-funded research professionals who are eager to offer hands-on experience.” Outreach programs throughout this network can not only help teachers advance science education in the classroom, but can also save them money and time in the process. In addition to our year-round tour program, for example, I coordinate a two-week summer boot camp to help teachers become familiar with nuclear science and give them tools to teach it in their classrooms. In the second week of the program, they are joined by high school students from around the country, which gives them a chance to practice their new skills and share in the behind-the-scenes exploration of a world-class research lab. Similar opportunities can be found in Arizona, Colorado, Indiana, New Mexico, West Virginia, and other states.

Many of us who do outreach are stewards of programs that are not quite at full capacity and that have untapped potential to reach K-12 students in our communities. Sometimes, I push so hard to sing the virtues of such outreach activities that it feels as if I’m selling used cars. In reality, I’m anxious to give things away. Our programs are mostly free, having already been paid for through a portion of our NSF Experimental Nuclear Physics Program grant that has been dedicated for

outreach. Grants around the country have similar earmarks, and there are outreach dollars at every university waiting to be used.

Our efforts are not entirely altruistic, I'll admit. Every time a young visitor seeks me out after a tour to ask, "How do I get to work here?," I know that we've perhaps helped recruit the next generation of scientists who will carry our work into the future.

Without question, both K-12 educators and scientists benefit from working together. As the NSF director suggests, "An exciting relationship may be no further away than a phone call to a nearby university, laboratory, or science museum." These institutions stand ready to offer a wealth of information, tours, and maybe even hands-on opportunities. Field trips to these locations may expose students to an experience that could change the course of their lives—and make their teachers modern-day Mr. Wizards.