MySci brings “outdoor” exploration to K-2 students

What do Jane Goodall, Neil deGrasse Tyson, and Stephen Jay Gould have in common? These renowned scientists got excited about exploring the world when they were very young children.

In St. Louis, future scientists are getting inspired through MySci hands-on science for elementary students. The K-2 enhancement program provides teachers with curriculum and interactive learning experiences. The highlight is a visit from the MySci Investigation Station, a custom-built trailer featuring a woodlands exhibit, a specimen room, and a replica of a Missouri limestone cave.

MySci launched in 2005, after more than a year of planning between the Monsanto Fund, Washington University Science Outreach, the Missouri Botanical Garden, the Saint Louis Science Center, and local educators.

Deborah Patterson, president of the Monsanto Fund, explains that from the beginning, MySci was driven by proven needs.

“Research indicating that kids lose interest in science by third grade coupled with the big void in programming for this age group were factors that led us to develop MySci,” says Patterson. “We asked teachers the organization they would choose for professional development, and Washington University Science Outreach was consistently at the top of the list.”

Entering its fourth school year, the program has already more than doubled in size. Last year, MySci reached more than 375 teachers and 9,400 students.

“MySci’s growth is exciting because it allows us to encourage even more children to pursue science in school and, ultimately, as a career,” says Ann McMahon, program director.

Darcy Ellette teaches first grade at Glasgow Elementary in Riverview Gardens. Like other teachers at her school, Ellette uses MySci-provided hands-on curriculum and materials for several weeks. Then, the Investigation Station arrives to enhance the learning experience.

“The Investigation Station brings it all together,” says Ellette, a district teacher of the year who used MySci last year. “It gets kids excited about science. My students were more interested for the rest of the year.”

The professional development program that prepares teachers for MySci is “really good and engaging,” says Rhonda Bishop, primary teacher at Mullany Botanical Garden Investigative Learning Center in the St. Louis Public Schools. “It was a collaborative from the beginning and today is an integral part of how MySci plans and conducts its programming,” says Patterson.

All schools in the St. Louis area are eligible for the MySci. The program is now accepting reservations for the 2009-10 school year.

Teacher PD is intensive, tailored, and curriculum-specific

Professional development in schools used to be as simple as inviting a speaker in to share teaching tools. Teachers could attend—or not. They could choose to use some of the ideas presented—or not. But in the last decade, as schools have come under increasing pressure, teacher PD has transformed radically.

Now, PD is tailored to match district curriculum and state standards. Instead of being a chance to hear a “sage on the stage,” it’s an opportunity for teachers to break out of the classroom’s isolation. For districts with new curriculum, summer provides a block of time that allows teachers to delve into new science kits or explore new texts.

See Teacher PD, page 4


“Anytime I had questions at my own school, she was there to help,” says Chojnacki.
Physics concepts.

Science Outreach: building understanding of physical science concepts.

For Jack Wiegers, instructor, and Patrick Gibbons, professor of physics, these ideas are a key part of science for students from kindergarten to their senior year. The pair instructs four Science Outreach graduate courses in physical science designed for K-8 teachers. They’ve also worked with high school teachers in short workshops and in year-long professional learning communities. And in spring 2009, they’re adding their first graduate credit course for high school teachers to their repertoire, Edu 7000 Mechanics and Thermodynamics.

Gibbons’s and Wiegers’s move into high school physics curriculum has been prompted by some local districts adopting the “physics first” curriculum order. First suggested in the 1980s, then championed in the 1990s by Nobel laureate physicist Leon Lederman, the movement recommends teaching physics to high school freshmen, then chemistry, and then biology.

“The foundational idea is that physics supports learning of chemistry and that since 1980 at least knowledge of chemistry is needed to understand modern molecular biology,” says Gibbons. “So teaching physics at an appropriate level to ninth-graders, followed by chemistry adapted for sophomores and then molecular biology for juniors is educationally sound.”

Many local districts have moved to teaching physics in the ninth grade, including several that have done so with support from a University of Missouri–Columbia and Missouri DESE program called A TIME for Physics First.

Teachers of grades 7-12 from across the area participated in workshops and professional learning opportunities in physical science this summer through Science Outreach. Steve Burgess, physics teacher from McCluer North in Ferguson-Florissant, says his district switched to ninth-grade physics three years ago.

“We found problems in math,” he says, referring to students’ readiness to tackle more difficult physics. “But reaching students still young enough to develop good science and math habits has been great,” he adds.

Teachers and districts have developed a variety of solutions to the math readiness problem and in creating visual demonstrations. Melinda McElligott, seventh-grade science teacher at Montgomery County Middle School, visited Washington University in July for a workshop on using CPO Science materials for physics. “We do Newton’s laws, weather, and climate because they’re in the Missouri GLEs [grade level expectations],” she explains.

For teachers of physics and physical science across grades, the rules are creativity and adaptability. And watch out for flying marbles.

High school students take ecology research tools to the field

Leaving Facebook behind and text messages unanswered, 46 area high school students took to the streams, fields, and forests of Shaw Nature Reserve this summer to learn the basics of ecological field research.

They learned sampling and census taking techniques, plus how to use handheld global positioning system (GPS) and geographical information system (GIS) units. For the students involved, the Environmental Biology Field Research Experience program was an opportunity to preview careers in ecological research or organizational biology.

Lydia Toth, manager of educational programs at Shaw, says the program came about through an established research collaboration with Washington University. “Several graduate students are involved in monitoring projects here,” she says.

Jon Chase, professor of biology and director of Tyson Research Center, leads the program. “We were wanting to take our collaboration a step further, engaging high school students and encouraging them to look at biology as a career possibility. At the same time, we also wanted to provide an authentic experience,” he explains.

Students spent five days in the field, learning different research techniques, then practicing each method. On the evening before the last day the group stayed overnight in the cabins at the Dana Brown Center, located in a secluded glade at Shaw. For the students, the program was an opportunity to pursue varied interests.

“I wanted to learn about ways to preserve the ecosystem,” says Danni Habtu, junior at Parkway West.

“We wanted to give the interns an understanding of the techniques that field ecologists use,” says Susan Flowers, program director. “And we also organized time for graduate students to talk with the interns about why they got interested in the field and what their educational path has been.”

Habtu and his colleagues will get an opportunity to use what they learned this school year when they participate in sessions at Washington University and in field experiences at sites like Tyson, Forest Park, and local state parks. It’s all part of a project funded by the National Science Foundation, aimed at getting students involved in non-traditional education settings. The $1.7 million project brings together Washington University and Tyson Research Center with the Missouri Botanical Garden and Shaw Nature Reserve.

Students who decide they are interested in learning more about field ecology after their first year can apply to join field research teams working for Chase or other ecology researchers beginning in summer 2009.

ExxonMobil Bernard Harris Science Camp returns to WUSTL Cheris Black, seventh-grade student at Wirth-Parks Middle, Cahokia, Ill.; Tamika Smith, eighth-grade student at Berkeley Middle, Ferguson-Florissant; and Dan Combest, graduate student in chemical engineering, create an “underwater volcano” to demonstrate how convection occurs. Faculty and graduate students volunteered to create interactive experiences for the 48 campers, who represented 10 school districts in Missouri and Illinois. Physics graduate student Ben Burch was impressed by the campers’ abilities. “Lots of kids’ questions are something you’d hear from an undergraduate physics student!”
Research experiences benefit undergraduates and investigators

While many undergraduates take the summer for R&R, a group of life science and medically minded students are working in research labs across Washington University’s Danforth and medical campuses. Science Outreach and the Office of Undergraduate Research help students and faculty make connections that benefit both the undergraduates’ careers and the faculty mentors’ research.

It’s an experience that can have long-term benefits, explains Patrick Jay, assistant professor of pediatrics and genetics. “I tell students that really what they should look for is the experience and the bond with the professor who can help promote their career later on,” he says.

The Howard Hughes Medical Institute, the Children’s Discovery Institute, an Imaging Sciences Training grant, and the Hoopes Foundation support this program.

Thank you to the faculty mentors for 2008:

- Anatomy and Neurobiology James Cheverud, Karen O’Malley, Paul Shaw
- Anesthesiology Yu-Qing Cao, Gina Story
- Biochemistry and Molecular Biophysics Nathan Baker
- Biology Jean Burna, Doug Chalker, Jon Chase, Erik Herzog, Peter Hoch, Tiffany Knight, Allan Larson, Petra Levin, Eric Richards, Nicole Riddle, Robert Blankenship, Sally Elgin, Kathryn Miller (project director), Amy O’Brien (coordinator)
- Biomedical Engineering Dennis Barbour, Igor Efimov, Younan Xia
- Cell Biology Sheila Stewart
- Chemistry Joshua Maurer, Amy Walker
- Developmental Biology Jeanne Nerbom
- Genetics Susan Dutcher, Tim Schedl
- Immunology Skip Virgin
- Internal Medicine Daniel Link, Peter Crawford, Greg Lanza, Anthony Muslin, Jean Schaffer, Nicholas Davidson, Deborah Ruhin, J. Evan Sadler, Lee Ratner, Steven Brody Wayne Yokoyama
- Molecular Microbiology Maria Hadjifrangiskou, Scott Hultgren
- Neurology Jin-Moo Lee, Joel Perlmutter
- Neuropathology Joseph Corbo
- Neurosurgery Jeff Gidday, Jeffrey Leonard
- Obstetrics and Gynecology Kelle Moley
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- Otolaryngology Jianxin Bao
- Pediatrics Patrick Jay, Allan Doctor, Matthew Goldsmith, David Hunstad
- Psychiatry Steven Mennerick, Krista Moulder
- Radiology Samuel Achilefu
- Surgery Craig Coopersmith

Biology teachers as graduate students Mesha Pillay-Morris, biology teacher at Central Visual and Performing Arts High, St. Louis Public Schools, left, and Jack Henderson, biology teacher at LaSalle High, Yakima, Wash., center, prepare a test sample with Brad Postier, postdoctoral researcher in biochemistry, right. Teachers from across the country took graduate courses in-residence at Washington University this summer.

Biology teachers nationwide seek MS in biology at WUSTL

Most graduate students take out loans or act as teaching assistants as they work toward their degrees. But that’s not realistic for K-12 teachers. So Barbara Schaal, Spencer T. Olin professor of biology and vice president of the National Academy of Sciences, worked with Victoria May, assistant dean of Arts & Sciences and director of Science Outreach, to create a solution.

The result is Life Sciences for a Global Community, a program that brings Washington University biology faculty together with Science Outreach teacher professional development experts. Funded through a $3.9 million grant from the National Science Foundation, the LSGC is an opportunity for 90 teachers from across the country to earn a master of science in biology: tuition, travel expenses, and room and board for two-three week summer institutes are all supported by NSF.

“The summer institute is highly intensive,” says Phyllis Balcerzak, director of professional development who directs the program. “Then combined with online courses during the school year, we’re creating a support system for the teachers’ learning and for helping to reach their high school students.”

Biology faculty and graduate students volunteered their time out of their summer schedules to teach in the institute. Schaal taught a plant course, which included a behind-the-scenes tour of the Missouri Botanical Garden. Ken Olsen, assistant professor of biology, taught a course on evolutionary biology. Jon Chase, associate professor of biology, took the group to Tyson Research Center for a course in ecological research. Robert Blankenship, Lucille P. Markey Distinguished Professor of Biology and Chemistry, taught a course in biochemistry. Erik Herzog, associate professor of biology, taught a course in neuroscience, and Sarah C.R. Elgin, professor of biology, taught genetics and genomics.

“One of the most interesting aspects of the class was the wide geographic distribution of the students, from California to Maine to North Dakota to St. Louis,” says Blankenship. “That made discussion of the regional aspects of the energy situation very productive as each student could provide perspective based on their home environment.”

David Eller, biology and environmental science teacher at Cleveland NJROTC School in St. Louis Public Schools, says it’s not only the courses that are valuable. “It’s good for me to be around a bunch of teachers and get advice and learn what they’re doing,” he says.

“At our school, we have one teacher per grade level and course, so this is great.”

UPCOMING COURSES

Spring 2009

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<tr>
<th>Edu 7000 Mechanics and Thermodynamics <em>NEW</em></th>
<th>Edu 6008 Teaching the Process of Scientific Investigation</th>
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<tr>
<td>Investigations and pedagogy for 7-12 physical science and physics</td>
<td>Inquiry and investigation for 4-8 science</td>
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<td>Tuesdays, Jan. 13-May 4, 4:30-7 p.m.</td>
<td>Wednesdays, Jan. 14-May 5, 4:30-7 p.m.</td>
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Learn more at so.wustl.edu

Science Outreach

Resources for teaching K-12 math and science through investigation

Edward S. Macias, Provost, Executive Vice-Chancellor for Academic Affairs, Barbara and David Thomas Distinguished Professor in Arts & Sciences

Henry S. Webber, Executive Vice Chancellor for Administration

Victoria L. May, Director of Science Outreach and Assistant Dean of Arts & Sciences

Dana Benedictus, Managing Editor

Julie Kennedy, Editor

Bill Michalski, Designer

David Kilper, Photographer

(314) 935-6846

scienceoutreach@wustl.edu

so.wustl.edu
Teacher PD
*cont. from page 1*

This summer, Science Outreach has worked intensively with Hazelwood School District in a series of PD covering K-12 math and science. **Johanna Strange**, a consultant for Delta, is a former classroom teacher. She worked with Hazelwood elementary teachers as they explored the FOSS science kits. She says, “With all of the bits and pieces for each kit, it’s kind of overwhelming. This week is about getting comfortable, getting teachers to a place where they are comfortable to use the kits.”

**Wanda Jackson**, fifth-grade teacher from Keeven Elementary, explored FOSS Web resources this summer. She says, “I’m finding more effective ways to use the modules. With the time crunch, we don’t always get to everything. We’re learning how to get more done.”

To alleviate the challenge of repacking and refurbishing the science kits, Hazelwood is piloting Science Outreach’s kit warehouse and delivery system. Teachers will be able to make one call to order materials. Then when they are finished, kits will be picked up, replenished, and repacked to deliver to the next class.

As they grapple with new materials and systems for science, Hazelwood teachers are also taking on the challenge of new math curriculum. **Cathy French**, Hazelwood math coordinator, explains how transitioning to the new materials was a district-wide process that has involved extensive work with Science Outreach math specialist **Karen Brannon**.

“It’s so important to have a good plan for support and professional development, not just before school but continually through the school year,” says French. “We worked with principals so they could see how changes would look in the classroom. We also had our math coaches, assistant principals, and teachers attend sessions on student-centered math.”

**Leslie Henderson**, a third-grade teacher at Rusher Elementary, says that the Investigations texts have helped her students become better problem solvers.

“Kids don’t ask me, ‘do I have to plus or minus?’ any more; they know. They have enough number sense to tackle these problems,” she says.