Passing On Knowledge

The following is the second in a series of three focusing on the education and outreach programs of LA EPSCoR's National Science Foundation EPSCoR-funded CyberTools project.

Got Knowledge? If you're a researcher, you pass it on.

That's why teaching and familiarizing a diverse population with the broad range of opportunities available through the sciences is at the root of all LA EPSCoR education and outreach (E&O) activities.

The E&O projects supported through the RII CyberTools grant are structured to nurture and develop participants' understanding and skills of science, technology, engineering and mathematics (STEM) disciplines. These activities meaningfully connect the community and K-12 education to the university and encourage undergraduates, particularly those from underrepresented groups, to pursue STEM graduate studies.

The following are highlights of some of the education and outreach programs related to the EPSCoR project, either through direct funding or researcher participation.

New Interdisciplinary Courses introduced at participating RII institutions include:

• computational modeling of biomedical systems at Tulane, cross-listed with biomedical engineering and computational science, provides graduate students with the skills and knowledge necessary for computational modeling of biological and physiological systems and interpretation and analysis of biological data;

• an introductory mathematical modeling in ecology and evolution course at Tulane, also cross-listed, is a mixture of lecture and hands-on computer use in which students explore models, perform simulations and solve problems;

• a UNO course that teaches computer science and chemistry students how to apply computational tools across the sciences;

• an LSU video game design course taught jointly with the University of Chicago encompasses both computer science and College of Arts and Design;

Students attending the LSU host site of the Great Lakes Consortium Petascale Workshop.

• an LSU bioanalysis course for graduate students from engineering, chemistry and biology;

• a high-performance computing course developed at LSU for biology, chemistry and engineering students that is broadcast in real time to sites at LA Tech, the University of Arkansas-Fayetteville and Little Rock campuses, North Carolina and Masaryk University in the Czech Republic.

A **Professional Development Seminar Series** offered at LSU for three consecutive years served as an effective resource for graduate students and postdoctoral fellows who heard 25 diverse speakers and topics in such areas as chemistry, biology, physics, mechanical engineering, high performance computing, and lectures on topics ranging from "Integrated Microfluidic Systems" to "How to Give an Effective Presentation."

A **partnership** was established between an LSU professor and the LIGO (Laser Interferometer Gravitational Wave Observatory) in Livingston, Louisiana to develop a series of interactive kiosks incorporating new hardware and visualization technology for space science education. They are to be deployed at the NSF-funded LIGO Science Education Center (SEC) and a series of middle schools across the state.

A working prototype kiosk has been installed at the LIGO Science Education Center in November 2009. The development team was composed of nine graduate students from disciplines such as computer science, graphic design, physics and education.

Comprehensive Training Sessions were held to train both project participants and all Louisiana Optical Network Initiative

Education and Outreach Goals

The seven education and outreach goals of the LA EPSCoR CyberTools project funded by the National Science Foundation's EPSCoR program are to educate, recruit and mentor undergraduates; provide more comprehensive training for graduate students and post doctoral researchers; stimulate K-12 students to advance their STEM (science, technology, engineering and mathematics) education; outreach to the general public; stimulate competitiveness of junior faculty; and increase the numbers of minorities and underrepresented groups in STEM.

Knowledge Continued

(LONI) users on all CyberTools software developed for the project. This was to ensure the tools are used across the State for other projects involving computation or data for the broadest impact available.

Short Takes

An **interdisciplinary project** that links faculty and students from Louisiana Tech, UNO, Xavier and Tulane's School of Science and Engineering and School of Medicine provide students with numerous opportunities to interact on translational research.

Over 1,000 students and their parents participate in LSU's annual **Super Science Saturday** where they participate in a wide range of hands-on activities and experiments.

LSU's Center for Computation and Technology (CCT) has offered a **workshop** for undergraduate faculty from a variety of disciplines interested in adding parallel computing to their teaching and research. The hands-on program includes exercises in both programming and curriculum development. Undergraduate and graduate students are also invited to attend alongside a sponsoring faculty member .

In the summer 2009, LSU was a host site for the **Great Lakes Consortium (GLC) Petascale Workshop** run by the National Center for Supercomputing Applications.

Computational Science Curriculum Summer Workshop A team of instructors from the National Computational Science Institute, facilitated through LSU, teamed up with Louisiana personnel to teach "Introduction to Parallel Programming" to undergraduate faculty.

An RII faculty member and team of graduate students mentored three high school students in three different science projects related to, among other things,

Participants networking at a Professional Development Seminar.

high performance computing resources. The students participated in the 2008 International Sustainable World, Energy, Engineering and Environment Project, which took place in Houston.

Examples of summer pipelines for high school students include a senior who, as a part of the **Summer Pipeline Research Initiative**, spent the summer of 2008 in a Tulane biochemistry lab where her studies related to the overall goal of sensor development in the CyberTools project. She met with counselors once a week to discuss a career in biomedical/environmental sciences. An LSU professor developed **high school science projects** with high school students from Abramson Science and Technology Charter School in New Orleans who participated in regional and international science fairs .

A team of 13 researchers and students from Louisiana State University Center for Computation and Technology was the top winner in an **international competition.** The winning project was for the production of a blackhole simulation involving equations written by Albert Einstein that are so complex they can't be written down on paper.

About CyberTools

The National Science Foundation EPSCoR program awarded the Board of Regents' LA EPSCoR program a $9 million Research Infrastructure Improvement (RII) Grant in 2007. With matching funds of $3 million from the Board of Regents Support Fund and $3.2 million from the nine participating institutions, the total of the three-year grant is over $15.2 million.

The focus of the LA EPSCoR CyberTools grant is on cyberinfrastructure — the technology and network systems that have infiltrated every aspect of today's modern world — specifically on the development of Cyber Tools to help investigators effectively utilize cyberinfrastructure at a level that would not otherwise be possible.

The participating institutions are: Louisiana State University*, LSU Health Sciences Center-New Orleans, Louisiana Tech University*, Southern University-Baton Rouge*, Tulane University*, Tulane Health Sciences Center, University of Louisiana-Lafayette*, University of New Orleans* and Xavier University. (*Members of LONI, the Louisiana Optical Network Institute)

Graduate students developed **research modules** directed at general audiences to help both the researcher in developing communication skills, and the public in gaining awareness and knowledge of the research. As of the third year, 11 research modules were under development.