Creating the next generation of researchers

Cybereducation helps bridge the gap between research and education. Towards that end, NCSA’s Cybereducation Division conducts a wide variety of activities and programs, including activities that disseminate advanced technologies to new and established communities, encouraging them to adopt innovative computational technologies as learning tools in pre-college settings, colleges, universities, and the workplace. The division is currently working on undergraduate and K-12 projects in the areas of astronomy and cosmology, biology, chemistry, humanities, public health, and the geosciences.

Plug into chemistry

Funded by a $5 million dollar grant from the National Science Foundation, NCSA, the College of Medicine and the Department of Chemistry at the University of Illinois at Urbana-Champaign, A-C Central Community Unit School District 262 in Chandlerville, Illinois, and the Illinois Regional Office of Education #38 in Lincoln are joining forces to develop a statewide Institute for Chemistry Literacy and Computational Science. The intensive, multi-year summer institute is providing professional development for 120 rural high school chemistry teachers who will become intellectual teacher-leaders and accomplished practitioners for the 21st century. This project uses the tools of computational chemistry to illuminate four large themes that among them comprise all of modern chemistry: molecular structures, covalent interactions, non-covalent interactions, and kinetics and thermodynamics. Within each of these themes, computational tools for the task of enriching high school chemistry will be made accessible to teachers.

The first group of 60 teachers will begin their institute participation in June 2007. In addition to the summer institute, teachers will receive extensive online communication during the following school year.

The goals for the institute are to strengthen teachers’ understanding of chemistry in the context of the most up-to-date research and practice; to increase teachers’ comfort with and use of computational and visualization tools in the classroom; and to train teacher-leaders who can support their colleagues and advocate for excellence in science education.

NCSA has extensive experience with communication and collaboration technologies and will aid participating schools in effectively using tools like the Access Grid. The virtual community aspects of the institute are particularly important for rural teachers at small schools, who are often the only science (and math) teacher in their district.

“We intend to make teachers competent and confident in using computational resources to both excite students and prepare them for the workforce,” says Edie Norman Wiziecki, coordinator of education programs for NCSA and one of the co-principal investigators for the project.

The next generation

Creating the next generation of researchers in science and engineering is a focus of the cybereducation staff. Wiziecki says they are using summer workshops to show colleges and universities how to incorporate computational biology and computational chemistry into their courses. And they are working with grades K-12, as well, with the creation of programs such as GEMS—Girls Engaged in Math and Science.

The GEMS program for girls in grades 6-8 has been active in the local community since 1994. GEMS was created as a way to encourage girls to consider mathematics-oriented and science-oriented careers, to gain confidence in doing mathematics and science, and to take advanced level mathematics and science courses in high school. The GEMS program has provided participants with visits to research laboratories, guest speakers, after-school activities, a network of female role models, and opportunities to work side-by-side with a mentor in laboratories across the community.

One of the very first GEMS activities was creating a website for the program. The site was created by a team of eighth-grade girls using NCSA Mosaic, the world’s first graphical web browser. Over the years, as the GEMS program has grown, so have its activities, including the use of emerging technologies and communication tools. The Girls on the Grid component of GEMS utilizes Access Grid technology to link girls to peers, scientists, and leading women in science and mathematics worldwide.