interactions

The Newsletter of the Shodor Education Foundation, Inc.

STUDENT ENRICHMENT

CURRICULUM MATERIALS

FACULTY DEVELOPMENT
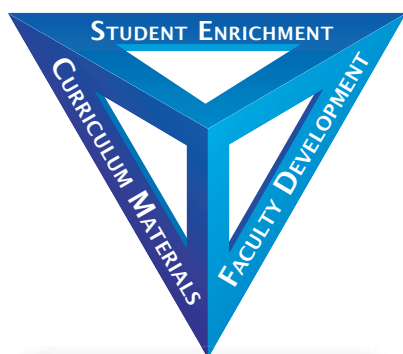
New Beginnings in Downtown Durham

As many faithful readers of *Interactions* know, 2005 marked the end of one Shodor era and the start of a new one. During the summer of 2005, we began our move from the old offices at 923 Broad Street to Class A office space, on the 11th floor of the Durham Centre, Durham's tallest high-rise. As we describe in another article in this edition, we're now settled in, able to get back to paying attention to what we do best: teaching about computational science. The old year also concluded with other successes. We submitted eight new proposals for continuing and new funding, and received seven (!) of them! New grants in force include: a second year of funding for our work on the Computational Science Education Reference Desk (CSERD), a Pathway Portal project of the National Science Digital Library; a three-year award to continue our research and materials development work in computational science for deaf students and their teachers; a large grant to support 100 high school students over three years in a computational science apprenticeship program; a new two year grant to export the "Shodor method" to local and national community centers; new funding for our Mentor Center @ Shodor internship program; a one year grant to help provoke national discussions on the state of computational science education; and a new grant to build and support a research-grade, high-end computer server supporting computational chemistry for North Carolina high school students and teachers. You can read about some of these projects in this issue!

Great Developments

Shodor would like to welcome the following staff members:
Linda Schmalbeck, Ph.D. – Shodor Staff Scientist
Kari Wouk – Program Coordinator
Jonathan Stuart-Moore – Graphics and Web Designer
Beth Flora – Financial Manager
Monte Evans – Computational Scientist

Shodor would like to say goodbye to Garrett Love, now Assistant Professor at North Carolina Central University. Garrett will continue to work on various projects at Shodor.

Shodor staff members participated at the following conferences and events:
• SC (Supercomputing) 2005 Conference: Seattle, WA -Bob Gotwals gave a presentation on free educational tools for high school teachers
• Sally Ride Science Festival at Duke University: Durham, NC - Linda Schmalbeck, Patricia Jacobs, and Kari Wouk demonstrated science software for middle school girls interested in science
• Emerson Waldorf High School: Chapel Hill, NC - Bob Gotwals and Linda Schmalbeck taught a 12th grade chemistry block on DNA chemistry and bioinformatics
• North Carolina Area Health Education Center: Raleigh, NC -   Bob Gotwals gave a bioinformatics presentation for underrepresented students in the health sciences
• North Carolina Science Teachers Association, NC - Bob Gotwals demonstrated the North Carolina High School Computational Chemistry Server to teachers

Shodor Staff

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Interactions is a regular publication of the Shodor Education Foundation, Inc. To be added (or removed) from our mailing list call (919) 530-1911 or email moreinfo@shodor.org

Shodor Continues Programs in Disabilities, Science Research and Outreach
By Kent Robertson, Computational Science Educator

DEAF STEM (Deaf Educational Access For Science, Technology, Engineering, and Mathematics) is one of Shodor's new 3-year National Science Foundation research projects. DEAF STEM will investigate strategies to overcome some of the hurdles that deaf students encounter.

Our research will focus on two areas. First we will extend our SUCCEED-HI work to provide sign language support for Shodor's online lessons. A second component is to develop resources to help educational interpreters improve their sign language skills. Deaf students do not have access to the same instructional materials as their hearing peers if their interpreters are not able to communicate a teacher's lessons effectively. We have begun working with the North Carolina Department of Public Instruction to develop online materials to show educational interpreters proper ways to sign the state mandated End of Course and End of Class tests. We will ask interpreters to send us passages that they encounter and are unable to sign. Using

our expertise at American Sign Language, math, and science, we will turn these passages into an online support blog for interpreters.

We have also begun reaching out to the undergraduate education majors at Barton College in Wilson, NC, to help them learn how to use Shodor's materials to improve their future teaching.

Check out our web pages at **https://www.shodor.org/succeedhi**.

Facilities Update
By Jonathan Stuart-Moore, Graphics and Web Designer

Most people know Shodor by its old office. Our Broad Street building housed a dim space with low ceilings, narrow corridors, and many tiny rooms where staff, student interns, and all kinds of computers were packed like sardines. The last *Interactions* newsletter discussed the possibility that Shodor would move to downtown Durham, into a larger space that would allow our student internship programs to grow, that would reflect the quality of the foundation's work, and that would be safe and appropriate. This possibility is now a reality, and the difference between the two offices could not be greater. Shodor is now located in the Durham Centre, which offers three times as much space, a beautiful view of the city, and spacious workspaces to staff and students alike.

The list of improvements does not stop with the new space. The office is filled with new furniture. Using some of its grant money, and with a substantial discount and financing from Apple, Shodor has also been able to purchase brand new computers -- 20 laptops and 22 desktops -- specifically for its student interns and apprentices. With the new technology, Shodor is prepared for the start of

its SUCCEED Apprenticeship Program, in which students use these machines to learn computational science (see related article).

Taking advantage of its new space, Shodor has already hosted a number of special events. The Durham Public Education Network recently had its fundraiser kickoff breakfast at Shodor's office. The Durham Chamber of Commerce organized a luncheon in Shodor's space for area non-profits. And the Duke Institute for Learning in Retirement has made excellent use of Shodor's classroom and computers to teach a class in bioinformatics.

Those who know the old office are shocked when they see the new one. If you have not been by yet, please visit!

SUCCEED Apprenticeship Program Off to an Exciting Start

By Kari Wouk, Shodor Program Coordinator

On September 6, 2005, Shodor launched the SUCCEED Apprenticeship Program with a stirring ceremony featuring many influential advocates of computational science education, including Congressman David Price. Shodor is very proud to have received a $900,000 National Science Foundation grant for this project. We were heartened to see so many people in our community attend this event and show their support for developing our youth's skills to better prepare them for future careers rich in science, technology, engineering, and mathematics.

The SUCCEED Apprenticeship Program seeks to bridge the gap between a child's excitement in computational science, gained from a Project SUCCEED workshop or other source, and the expertise needed to serve as an intern in the Shodor Mentor Center. The experience children receive in this "middle ground" by serving as apprentices helps them develop the competence and confidence in computational work that will give them the skills they need to seek either a paid internship with Shodor or confidently apply for internships with local corporations and organizations.

Interested students must first take a SUCCEED workshop, like Saturday Explorations in Math and Science or the Shodor Scholars Program, to ascertain their desire to continue with computational science education. Once students have taken the workshop and decide they want to continue here at Shodor, they fill out an online application. When we receive the application, we set up interviews during which students meet several of our staff to learn about all of the different projects that they can work on. The students are evaluated on their interviews and their performance (not necessarily academic) in the workshops, and, if the evaluations are positive, they are offered an apprenticeship.

Each apprentice is mentored by members of Shodor's staff. Apprentices are paid stipends depending upon their mastery of certain, pre-determined sets of skills. Stipends are paid upon the completion of each skill set and the amount increases with each level. Once the first three skill sets are mastered, the apprentice will have the opportunity to start choosing a "major" and the last three skill sets will be individualized depending on the apprentice's choice of specialization. The program can take up to two years to complete all six levels, but if apprentices truly excel, they can be pulled out to become interns and start earning hourly wages (a higher pay rate than the apprentice stipends).

If you, your child or your student is interested in learning more about the SUCCEED Apprenticeship Program, please contact Kari Wouk, Program Coordinator at (919) 530-1911 or kari@shodor.org.

Above: Shodor Scholars prepare for their first formal presentation activity.

Left: Congressman David Price announces the apprenticeship program, joined by Dr. Robert McMahan, Governor's Science Advisor (center) and Dr. Robert Panoff, Shodor Executive Director (far left).

SUCCEED Spring and Summer 2006 Calendar:

| Event	Dates	Times	Grade Levels	Workshop Fee*
Explorations in Computer Graphics and Visualization	February 18, 25 March 4, 11, 18	9am-Noon	8-12	$150
Shodor Scholars Program, Session A	June 12-23	9am-4pm	Rising 8-9	$700
Modeling Your World, Session A	June 26-30	9am-Noon	Rising 6-8	$175
Forensics, Session A	June 26-30	1pm-4pm	Rising 6-8	$175
Biomedical Sciences	July 10-14	9am-4pm	Rising 8-9	$350
Forensics, Session B	July 17-21	9am-Noon	Rising 6-8	$175
Modeling Your World, Session B	July 17-21	1pm-4pm	Rising 6-8	$175
Math Explorations, Session A	July 24-28	9am-Noon	Rising 6-8	$175
Environmental Science	July 24-28	1pm-4pm	Rising 6-8	$175
Engineers in Training	July 31 - August 4	9am-Noon	Rising 6-8	$175
Math Explorations, Session B	July 31 - August 4	1pm-4pm	Rising 6-8	$175
Shodor Scholars Program, Session B	August 7-18	9am-4pm	Rising 8-9	$700

Need based financial assistance is available: no qualified student will be turned away for financial reasons.

Computational Chemistry Comes to North Carolina

By Robert Gotwals, Computational Science Educator and Kelly Bianco, UNC-CH Science Writer

In 1929, the Nobel Prize winning scientist P.A.M. Dirac wrote "the underlying physical laws necessary for the mathematical theory of a large part of physics and the whole of chemistry are thus completely known, and the difficulty is only that the exact application of these laws leads to equations much too complicated to be soluble." Dirac was correct in this statement; the mathematical principles needed to solve problems in chemistry are known, yet solving these equations proves to be daunting for even the most brilliant members of the scientific community, let alone typical high school chemistry students. However, today, almost 80 years later, computational chemistry provides the tools to solve even the most complicated chemistry equations, placing it at the forefront of many areas of chemistry research.

Shodor has been a leader in computational chemistry education for its entire existence. Its "Computational Chemistry for Chemistry Educators" summer program for university chemistry
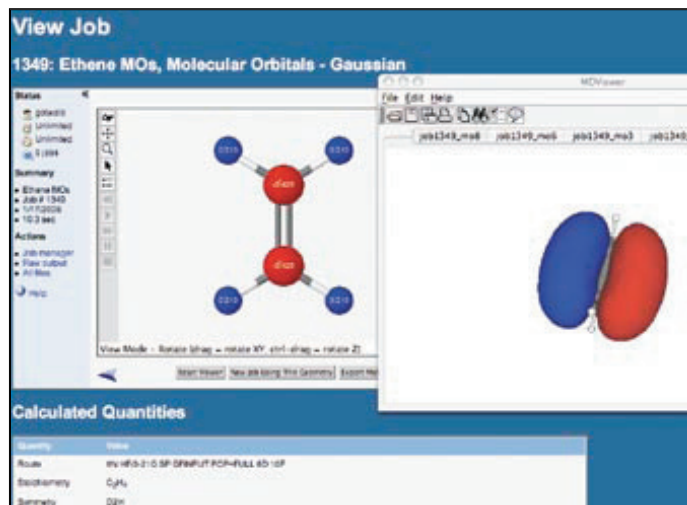
faculty, offered through the National Computational Science Institute (NCSI) is probably the most popular NCSI offering. For a number of years, Shodor has been teaching "Explorations in Computational Chemistry" through the SUCCEED program and as a seminar offering at the North Carolina School of Science and

Mathematics.

Now, thanks in part to a $12,000 grant from the Burroughs Wellcome Fund and the North Carolina Center for Science, Mathematics, and Technology, Shodor is able to provide North Carolina secondary students and teachers with free access to a high performance chemistry

computational laboratory. Shodor has established the "North Carolina High School Computational Chemistry Server," a research-grade computational resource for performing a wide variety of molecular calculations. The resource is available free of charge to all secondary students and teachers in North Carolina, and features three of the most powerful computational chemistry software programs: Gaussian, GAMESS, and MOPAC. Through a Web-based interface known as WebMO, users can build molecules, submit calculation requests, and view their results in a user-friendly Web interface.

This server may be used both as a way of supplementing lectures and laboratory experiments already included in the curriculum, as well as a means for introducing new approaches to chemistry learning and research to students. We encourage students and educators to visit this resource at http://www.shodor.org/chemistry. Guest accounts are available!

Activities for Kids *What Pattern Do You See?*

Pascal's Triangle is a triangle of numbers, each new number being the sum of the two numbers above it. The ancient Chinese originally developed Pascal's Triangle, but Blaise Pascal was the first person to discover and apply the importance of many of the patterns it contained.

Students color numbers in Pascal's Triangle by rolling a number and then clicking on all entries that are multiples of the number rolled, thereby practicing multiplication tables, investigating number patterns, and investigating fractal patterns.

Explore the different patterns you can create using this activity within Interactivate for fun and to learn more about Pascal's Triangle!

This activity can be found at:
www.shodor.org/interactivate/activities/pascal1/indexflash.html
Shodor now has several activities that are available in Macromedia Flash in addition to Java versions.

Visit www.shodor.org/interactivate/activities/#num *for other Pascal's Triangle Activities:*
- *Coloring Multiples in Pascal's Triangle (java version)*
- *Coloring Remainders in Pascal's Triangle*