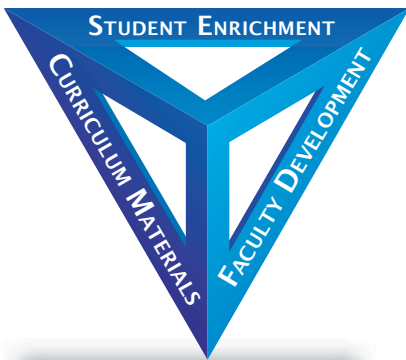


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The Newsletter of the Shodor Education Foundation, Inc.



The Shodor Vision: National Leadership with Strong Carolina Roots

By Robert M. Panoff, Ph.D., Executive Director

LOOK INSIDE:

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Time and again, Shodor has been recognized as a leader and resource in the effective use of computers to improve both math and science education. The source for our well of experience and expertise has been what we have learned in our local efforts in the Triangle area of North Carolina. Through our workshops and classes for kids, parents, students and teachers, along with expanded work opportunities for apprentices and interns, we have the benefit of a dynamic "educational laboratory" to develop and test the best teaching resources that others can adapt and adopt for their own use.

We have been fully incorporated as a Pathway to the National Science Digital Library, and our materials on the Shodor website receive more than **3 million page views per month**. The lessons, activities, and computational explorations are of the highest quality and among the best materials available, as evidenced by recent recognition from the International Society for Technology in Education as one of the "Best 101 Websites for Teachers." Clearly, we have something very special at Shodor that is producing



future leaders, great students, and outstanding teaching materials.

The National Science Foundation and others have invested significant funds for the next two years to help Shodor expand its opportunities for students and teachers in North Carolina. Shodor will use these experiences to develop "best practices" that can be shared with teachers and communities nationally. We hope many others will share our vision: a strong and vibrant center based in Durham serving as a learning lab and training resource in support of our national institute. Through a network of partnerships, we want every teacher and student in every state to benefit from using computational approaches through Shodor-certified math and science curricula.



Great Developments

By Ismael Torres, Computational Science Intern

Shodor would like to welcome the following staff members:
 Ron Brodnax - Engineering Education Consultant
 Molly Seggerman - National Computational Science Institute Coordinator

Shodor staff members participated at the following conferences and events:

Expand Your Horizons Conference 2006:

Raleigh, NC – Patricia Jacobs taught a workshop on encoding and decoding messages using modular arithmetic at the *Expand Your Horizons* Conference. The goal of the conference is to increase young women’s interest in mathematics, science, and engineering, as well as to expose them to female role models in these fields.

Rogers-Herr Workshop: Durham, NC—Jonathan Stuart-Moore and Bob Gotwals taught the basics of computer graphics to an 8th grade geometry class from Rogers-Herr Middle School on March 8, 2006. The workshop included visualization as well as 3D modeling and rendering. At the end of the class the students were able to create their own 3D images and present them to the class.

Americus, GA—Shodor staff will be visiting Americus, GA in April to help the local school district plan a new middle school program integrating science, technology, engineering, and mathematics.

All Patents Initiative: Durham, NC—Monte Evans has been working as part of a large project with other organizations and universities to build tools that would enable researchers to navigate patent data in a variety of different ways and to explore innovation as an evolutionary process.

Alaska Society for Technology in Education: Anchorage, AK—At the invitation of a NCSI alumna, Bob Panoff traveled “north by northwest” in February to be a featured presenter and workshop leader in Anchorage for more than 300 teachers from across Alaska. CSERD and *Interactivate* were considered among the conference “best practices.”

Shodor Staff

- | | |
|--|--|
| President & Director
Robert M. Panoff, PhD | Graphics and Web Designer
Jonathan Stuart-Moore |
| Senior Computational Science Educator
Robert R. Gotwals, MS Ed | Program Coordinator
Kari Wouk |
| Project Interactivate Manager
Bethany Hudnutt | System Administrator
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Patricia Jacobs, MS | Financial Support
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SUCCEED Workshops on Tap for Summer 2006

By Bob Gotwals, Senior Science Educator

Once again, Shodor will offer a full slate of half-day summer workshops for beginning computational science students. As in previous summers, a variety of **full-week, half-day workshops** will be available to summer students in a wide variety of areas, including **engineering** (“Engineers in Training”), introductory **scientific computing** (“Modeling Your World”), **forensics, mathematics, and the environmental sciences**. One full-week, full program – **Biomedical Sciences** – will also be on the schedule for the summer.

The goal of these workshops is to provide mostly younger students with their first exposure to how scientists use computer models, modify computer models, and create computer models from scratch. Students have the opportunity to investigate challenging scientific concepts and events through the lens of the computational scientist. In workshops such as “Modeling



Your world, students will explore molecules, design a wing using a wind tunnel model, and create a model to explore the spread of diseases. In the environmental workshop, participants will use an Environmental Protection Agency air quality model to study the formation of ozone in the Triangle. In the Biomedical Sciences workshop, students will use a variety of international supercomputers to explore a wide

variety of genetic diseases. Summer workshops are taught by Shodor’s experienced computational science staff, which includes high school and college interns and full-time computational scientists and educators. Located in Shodor’s new training facility, students will have access to a number of state-of-the-art computing resources and technologies. We hope to see you all this summer!

SUCCEED Summer 2006 Calendar:

Event	Dates	Times	Grade Levels	Workshop Fee*
Shodor Scholars Program, Session A	June 12-23	9am-4pm	Rising 8-10	\$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 8-10	\$700

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

For more information on SUCCEED Workshops, visit www.shodor.org/summer

Scholars Program Ready for Summer 2006

By Donovan Gromet, Computational Science Intern

Once again, Shodor will offer its "Shodor Scholars Program," a **two-week, full-day program** that centers around computational science and its application to real world problems, incorporating **all areas of science**—specifically mathematics, physics, and chemistry. Students will be working in small teams to solve a variety of real world problems using computational science. Students will spend their first week learning various aspects of computational science, such as analyzing and modifying preexisting

computational models, and learning the technologies, techniques, and tools of computational science. Students who participate in the Scholars program also have a significant edge toward being accepted as an apprentice, due to their increased knowledge about the same materials that Shodor apprentices are required to master. This in turn opens the door for a later position as an intern at Shodor.

The second week continues with the students learning more advanced techniques of computational sci-

ence, such as programming and research methods. The two-week session culminates with the students being divided into small groups and **identifying a larger, more detailed problem**, designing and **implementing a computational solution** to this problem, and then **presenting the results to the class**. Previous students have worked on a variety of projects from simulating the pollution caused by automobiles to modeling the effects of a nuclear spill.

This highly competitive opportunity is open only to twenty rising

8-10 graders. There are two sessions of the Scholars program, one of which runs from June 12-23, and the second that runs from August 7-18.

The cost of the program is \$700, and there is a non-refundable registration fee of \$50 for students who are accepted as Shodor Scholars.

Need-based scholarships are available in increments of \$200, \$400, and \$600. A teacher or other authorized school official must nominate students. Application and nomination forms are available online at www.shodor.org/succeed/ssp.

Pathways to Cyberinfrastructure

By Donovan Gromet, Computational Science Intern

One of the most important grants Shodor has received this year from the National Science Foundation supports our new project: Pathways to Cyberinfrastructure. The funds come from a new program at NSF called CI-TEAM (CyberInfrastructure-Training, Education, Advancement, Mentoring). The success of our SUCCEED workshops, funded by the Burroughs Wellcome Fund,

provided strong evidence that we should be chosen as **one of only 10 demonstration projects nationwide**. CI-TEAM gives us the opportunity to scale and reproduce our SUCCEED curricula at various public and faith-based community centers, first in the surrounding Durham area and then nationwide. "We are thrilled to be working with Shodor on this project," said Joy Mickle at W.D Hill Center near NC Central University, "and to be able to provide these kids with an opportunity to explore math and science in a way that is not normally available to them."

Centers such as W.D. Hill and Antioch Builds Community will be provided with the materials needed to offer the workshops, such as curriculum materials and software, and these centers will eventually become independent centers where Shodor's workshops will be taught. In a partnership with Cameron Seay and Shawn Sendlinger at NCCU, Shodor will help train local college

students and teachers to teach the workshops. The goal is to eventually extend these workshops beyond the Durham area to places such as Clemson, SC; Kansas City, KS; and San Diego, CA.

These workshops will include monthly science explorations called CybAdventures which will bring together teachers and students involved in different workshops with scientists at Shodor and NCCU to explore the most exciting technological innovations in computational science and to promote careers in this and related fields.

The major benefit of the CI-TEAM project is that it will create

new educational alternatives for students in informal science environments, as the new centers will offer these workshops as after school programs, during the weekend, and throughout the summer. This will hopefully attract underrepresented youth to the workshops and promote computational science education among economically challenged communities. As Patricia Jacobs, a computational scientist and mentor at Shodor said, "We are excited about our partnership with NCCU and hopefully, we can better prepare and encourage the students to pursue careers in science, math, and engineering."



Antioch Baptist Church, supporting Antioch Builds Community



The W.D. Hill Center

Then and Now - Anne Thissen-Roe

An Interview by Sakina Smith, Computational Science Intern

It is always great to catch up with interns who have worked at Shodor and are now in "the real world." Anne Thissen-Roe was one of the first interns at Shodor working during the summers of 1997 and 1998, after graduating from the NC School of Science and Mathematics and while majoring in Psychology at the University of Illinois at Urbana-Champaign. At Shodor, she learned programming languages, helped develop and teach some of the first SUCCEED workshops, and led teams on different tasks.

What was her proudest moment at Shodor? Anne said that it was easily, "...[generating our first] online chat with one of our SUCCEED classes and research scientists from NASA and JPL." JPL is the Jet Propulsion Laboratory, the leading U.S. center for robotic exploration of the solar system. Anne had contacted scientists from around the country to participate in an internet chat session with students in the Internet Science Exploration class at Shodor. Students asked questions of scientists and

astronauts, and the interactive discussion was an exciting feature many students still remember. In fact, it was one of the first discussions with students about the robot crawlers that NASA would later send to Mars.

When asked, Anne said that the experience and the skills acquired at Shodor had an impact on what she has been able to accomplish in school and in her career. "The combination of having math/social science training and programming helped me get four jobs post-Shodor," said Anne, "social scientists often do not have those skills."

Anne earned her Ph. D. in Psychology from the University of Illinois at Urbana-Champaign. She worked on Diagnoser, a web-based formative assessment system for high school physics students. It has become a semi-commercial product, and she no longer plays a role in its development. Anne currently works at Unicru, which is responsible for many of the hiring kiosks that are replacing the paper job application. She works with a team that trains neural networks, a kind of artificial intelligence, to predict suitability of the applicant for a hiring company.

As for advice for those of us who are now working at Shodor, or considering becoming an intern, Anne had a clear recommendation. "I'd suggest they use the opportunity to learn skills outside [their] chosen specialty. Shodor is better than many professional or even academic settings in terms of the freedom you have to 'cross-train.' Flexibility is highly underrated of a technical professional – employers don't dare ask for it, but they're thrilled when they get it."



Anne assists students during a SUCCEED workshop in the summer of '98.

Website and Graphics Projects Gain Speed

By Michael Hall, Computational Science Intern

Shodor has undergone a number of changes within the last year. An upcoming and exciting change will be the revitalization of the Shodor website. The new website's standardized look and feel will include an array of options that make navigating Shodor's online curriculum materials quicker and easier.

The most important new feature will be **the ability to search and browse through all pages and projects**. The search feature is provided for users who would like to pinpoint the exact resource they are looking for on the Shodor site by using a specific keyword or identifier. Browsing, on the other hand, is for site visitors who would like to explore the different categories of resources on the Shodor site. The browse and search options can be found at the top of all of Shodor's newly revised pages. To allow these new user interface features, web pages will be moved into a new database system that will also allow future changes to the site to take place more efficiently.

Also this year, Shodor is proud to have offered its **first ever workshop on computer graphics and visualization**. Five Saturday sessions introduced a group of 11 students in grades 8-12 to a number of different graphics programs and concepts. The students began by learning vector- and bitmap-based graphics using programs such as Gimpshop. Next, they plotted 2D and 3D scientific datasets using Gnuplot. Finally, they learned 3D modeling and animation with advanced graphics programs. The workshop was taught by Shodor's Graphics and Web designer, Jonathan Stuart-Moore and Senior Science Educator, Bob Gotwals. A number of interns, including Donovan Gromet, Francine Stefan, Andre Clark, Calandra McNeill, Ismael Torres, Daniel Hostetler, and myself, mentored students during the course of the class.

Activities for Kids

By Calandra McNeill,
Computational Science Intern

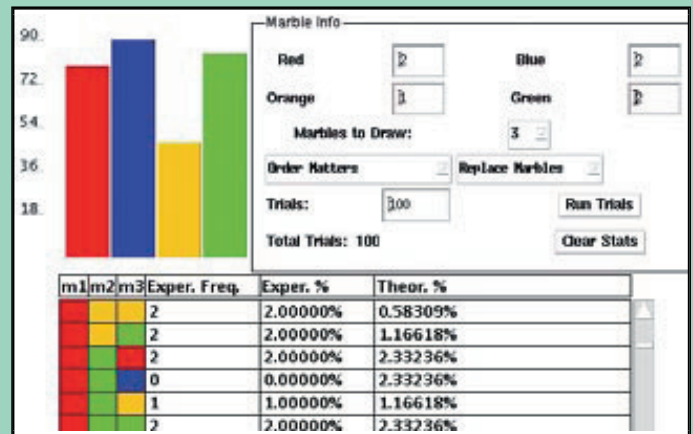
Probability

Many board games have a degree of uncertainty or chance. Mathematically speaking this chance is called "probability" and is the measure of how likely it is for an event to occur.

The Interactivate activity "Marbles" allows you to explore the mathematics of probability and randomness by selecting one or more marbles from a 'bag.' You can control how many marbles to choose and how many marbles of a particular color are in the bag. An important learning feature of this activity is that the user can display the results as a table, a bar graph, or a pie chart. This gives the user the chance to explore how to present data in different formats.

This activity can be found at:

www.shodor.org/interactivate/activities/marbles. Shodor is introducing new enhancements to the Interactivate website. These changes affect both the underlying technology and how you browse and navigate through the site to locate materials that you will find useful.



Check us out at <http://www.shodor.org/interactivate> and become one of the first to take a "Sneak Preview" of the beta version of Interactivate 2.0. Please provide us with your comments by completing the online survey.