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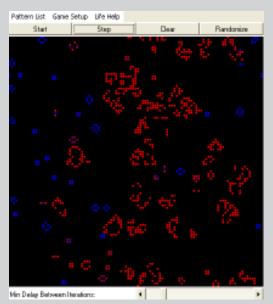
If you want up-to-date information, visit our website at www.shodor.org or e-mail: info@shodor.org

Looking for an Internship?

Take a look inside this issue for some of the projects we are currently working on! Shodor staff are always willing to work with individuals interested in science, math and computing. Contact the Mentor Center @ Shodor for more details: cvmsimons@shodor.org

Activities for Kids Science & Math Explorations for Students

Play the Game of Life!

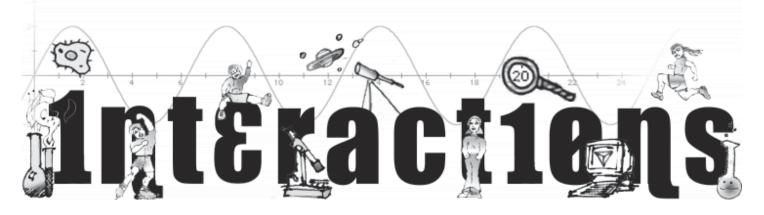


Play a simulation called the Game of Life, originally conceived by the mathematician John Horton Conway, and explore the fine line between order and chaos! In this simulation, the screen is divided into a grid. If a cell has the right number of neighbors, a new cell is born, but if it has too many or too few then the cell dies.

This type of simulation exemplifies a common type of modeling system known as cellular automata. Cellular automata models give cells individual rules for interacting with other cells. When the overall system is examined over time a pattern often develops.

There are many fun patterns to experiment with that develop from placing cells in particular places on the grid. Many of these patterns are included and can be dropped onto the screen. See if you can build one of your own!

Find it online at: http://www.shodor.org/interactivate/activities/life/



A newsletter for students, parents, educators, and friends

Summer 2003



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Fall Workshops Begin Soon!

Schedule and application now available online

Page 5

Apply Online: http://www.shodor.org/succeed/application/

Meredith College Partnership Begins

By Kerry Shaw and Meredith Fitzgerald, Mentor Center Interns, Meredith College

Shodor and Meredith College in Raleigh have formed a new partnership to share experience and resources to improve math and science education. These efforts will provide Meredith students with access to Shodor's curriculum resources, customized for use at the undergraduate level, while creating internship opportunities at Shodor for students from the all-female college.

The infusion of science and math into the curriculum at Meredith is a part of the Meredith College Technology Initiative, started in 2000. The purpose of the Technology Initiative is to enhance the student's learning experience by combining traditional courses with computer literacy development. Since its inception, professors had been looking for ways to bring technology into the classroom. Meredith professors learned of the Shodor Education Foundation through assistant professor Dr. Tim Hendrix of Meredith's Department of Math and Computer Science.

Dr. Hendrix arranged a workshop on Meredith's campus this past January for professors in the math and science departments during which they were introduced to Project Interactivate and the Shodor staff, which was Continued on Page 6

Shodor Prepares to Launch New Website

Shodor's website will take on an entirely new look in the coming months as the new design is launched. A team of Mentor Center interns working with staff scientists spent much of the summer planning, designing, testing, and implementing the new look and feel.

The goals of the project are to update the design of the Shodor site and to make our resources more easily accessible to both new and frequent users. In this issue of *Interactions*, we are previewing the new features that will be available on the site.



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Preview of the new Shodor home page See page 7 for a screen shot and explanation of one of our main section portals.

Continued on Page 7

Project Updates SUCCEED-HI

SUCCEED-HI has a new look. Visit the site at: http://www.shodor.org/succeed-hi/ and you will see Cindy, a deaf person ready to sign for you. Clicking the ASL icon prompts Cindy to sign the paragraph. Clicking on the "For Students!" link gives you a list of the lessons available. The Pre-Computational Science section is signed and will give you a background lesson on computational science. The Featured Activity, "The Effect of Medications on Daphnia" is also signed. The medications we take are passing through sewage treatment plants and are showing up in our rivers and lakes. This lesson explores current research into the effects of these chemicals on aquatic life.

Over the coming months additional SUCCEED-HI lessons will be signed. SUCCEED-HI is also expanding its scope to include the Project Interactivate tools and discussions. As these materials become signed these nationally recognized materials will become accessible to deaf students. CDs containing the

signed lessons are being distributed to teachers of deaf students where slow internet connections do not allow effective access to these signed materials.

WEAVE

Shodor's participation in development of the Web-based Educational framework for Analysis, Visualization, and Experimentation (WEAVE) continued this summer as several interns worked to finish the first module of the program and start a second module.

WEAVE, a program headed by several scientists in the Duke Department for Civil and Environmental Engineering, provides online engineering tutorials for college students. These tutorials cover topics such as earthquake modeling and the Mars Lander. The curricula are developed by Duke professors and then Shodor develops the web interface and the interactive materials.

The end goal of the project is to develop eight online modules that will be available to students at Duke as well as at other colleges around the country.

Shodor Staff President & Director

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Bethany Snyder Hudnutt

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NCSI Staff Associate

Kim McDonald

NCSI Staff Associate

Diana Tanase

Interactions is a regularly published newsletter of the Shodor Education Foundation, Inc. To unsubscribe from this publication, contact 286 - 1911 or email newsletter@shodor.org

Exciting Developments!

Shodor would like to welcome **new staff members** Diana Tanase and former research apprentice Kim McDonald. Kim graduated this spring from Wofford College with a bachelor's degree in biology with an emphasis in computational science, and Diana, a native of Romania, received her master's degree in August from the University of Northern Iowa where she worked with Paul Gray, a NCSI alumni and Fellow. Both will be working closely with NCSI to assist in workshops and to develop integrated computational science curricular materials.

A new partnership with the Durham Literacy Center will bring its GED program into Shodor's training facilities. Shodor will also provide mentorship opportunities for interested GED students in science, math, and technology through its newly funded Mentor Center program. Shodor has also formed a partnership with The Emily Krzyzewski Family Life Center, a new local organization named in honor of Duke basketball coach Mike Krzyzewski's mother. Students from the center will have the opportunity to take SUCCEED workshops and Shodor will help educators at the center develop their curricula.

Bethany Hudnutt, Math Education Specialist, had an article published in the **National Council of Teachers of Mathematics online journal**, *On-Math*. The article demonstrates examples of appropriate uses of technology using several Interactivate applets.

Cornelia Simons has published a co-authored paper entitled "The axial skeleton of primates: How does genus *Tarsius* fit in?" that appears in the edited volume *Tarsiers: Past, Present, and Future* (Wright, P.C., Simons, E.L. & Gursky, S. (eds.) Rutgers University Press, 2003).

A Sneak Peek at the New Shodor Website



INTERN OPPORTUNITIES

Mentor Center @ Shodor

Internship Opportunities

Work side-by-side with Computational Scientists

Learn Modeling and Visualization

Summer and Year-long Internships

Since many of the basic skills that are necessary for our interns to possess are taught in our workshops, we recommend that interested students participate in these programs first. More information about the Project SUCCEED summer, fall, and spring workshops is available online at:



Some interns teach computational science in SUCCEED workshops

Students who are prepared to be a part of the Mentor Center can apply for internships by filling out the application available on our website:

http://www.shodor.org/succeed/

http://www.shodor.org/mentorcenter/

For more information: contact Bob Panoff at 286 - 1911 or rpanoff@shodor.org, Cornelia Simons at cvmsimons@shodor.org, or Matt Lathrop at mlathrop@shodor.org

Mentor Center Interns work to update Interactivate

By Leigh Phillips, Mentor Center Intern, Enloe High School

In order to keep Project Interactivate up to date and take advantage of new features, Shodor programmers worked through the summer to update all the applets from the Java compiler 1.0 to the newer and less antiquated Java compiler 1.1. This was not an easy task as it consisted of recoding, testing, checking, and recompiling in excess of one hundred applets. To accomplish this mission, well over fifteen programmers at Shodor converted several applets each week throughout the summer in order to get the entire project ready for testing by the end of the summer. With a little ingenuity and hard work, the programming team made Project Interactivate ready to test before the summer was over. The lead programmer at Shodor, Matt

DesVoigne, spent countless hours to create resources to help transfer the project team's goals from converting to testing.

At the end of July, the testing cycle was put into motion. This consists of several programmers thoroughly testing each and every applet that is ready to be put on the live site for typos, bugs, and improvements. After a programmer has checked through every applet, and the kinks have been smoothed out, a different programmer must perform a second round of testing for every applet. By double testing every applet, Shodor is hoping to have Project Interactivate run flawlessly on the Java 1.1 compiler before it is switched over to the live website.

Check out Project Interactivate on the web at: http://www.shodor.org/interactivate/

Interactivate-Meredith Partnership Continued from Page 1

represented by Bethany Hudnutt and Dr. Bob Panoff. This workshop introduced resources that are available for use in the classroom. After this workshop, further discussion led to the new partnership. As a result, incoming freshmen will have Shodor's Project Interactivate preloaded on the laptop computers that all students receive as a part of the Initiative.

Using Interactivate applets in the classroom will allow Meredith professors to relate applets to the concepts discussed in lecture. While some applets are already being utilized in the Meredith classrooms, interns are working to modify or create additional applets to be used in math and science courses. Since most of the existing applets in Interactivate are geared towards middle and high school students, professors have asked that modifications be made in order to raise the content of the material covered to an undergraduate level.

In addition, the partnership with Shodor has provided Meredith College students with the chance to apply what they have learned in the classroom setting to real life situations by providing three of their computer science students with summer internships. These women also have the option to continue their internship with Shodor throughout the school year, which will allow for additional working experience that in turn will prepare them to enter into the work force after graduating from Meredith College.

Another goal in the partnership is to promote

computational science at Meredith. Dr. Hendrix, along with four Meredith students, has been working on Project DAQUIRI (Data Acquisition for Quantitative Understanding, Investigation, Research, and Implementation), a project that has resulted from Meredith's partnership with Shodor. Dr. Hendrix's goals for Project DAQUIRI are:

(1) to coordinate and organize a database of equipment and resources within the School of Natural and Mathematical Sciences; and (2) to develop a growing body of datasets that can be used as examples in mathematics, statistics, and science classes and that can be used in interactive java applets.

The students who have been working all summer will continue their work in the fall through an independent study and Dr. Hendrix anticipates that the "dataset website, along with the Meredith-Shodor partnership, will grow over time."

Project DAQUIRI is only one way out of many possible ways that Meredith College hopes to contribute back to Shodor. Meredith professor Dr. Cammey Cole hopes that "this partnership will also benefit the Shodor Foundation by providing a site where new applets can be tested as well as students who can do work for Shodor." As the relationship between Shodor and Meredith College continues to develop, both organizations stand to benefit and the resulting work will contribute to the educational advancement of students everywhere.

NCSI Increases Workshop Enrollment, Offerings

By Kim McDonald, NCSI Staff Associate

Push, Pull, and Permeate. This catchy alliterative phrase encompasses the mission of the Shodor Education Foundation's 2003 NCSI (National Computational Science Institute) summer workshops. The purpose of the intense weeklong study of computational science, numerical modeling, and data visualization is to encourage and convince educators that modeling tools and technology can and should play an extremely important role in the classroom. Tripling last year's attendance, this summer over 300 college-level educators have attended one or more of these workshops.

'Push' describes NCSI's objective to 'sell' the notion of utilizing technology in an appropriate way to improve both academic content as well as educational methods. This sort of computational science evangelism is primarily funded by the NSF (National Science Foundation) with additional funding from the Burroughs Wellcome Fund and EOT-PACI (the Education, Outreach, and Training Partnership for Advanced Computational Science Infrastructure). Throughout the summer Shodor staff and other faculty have traveled to 15 workshops at various partner sites. These partner sites include small colleges, community colleges, historically black colleges, and large universities alike.

'Pull' conveys the concept that conducting the workshops will create a community that wants to be served by the resources available at Shodor. Part of NCSI grant money allows the workshop participants to bring home copies of some of the software used during



the week, thus facilitating the faculty's implementa-

tion of what they learned from the workshop in their own classrooms. The hope is that NCSI summer workshop graduates will not only integrate computational science into their own classrooms, but also join a group of educators that is focused on further developing the role of modeling in science and math education. The success of this method is in fact evident this summer. Currently, nearly two-thirds of all NCSI instructors are graduates of a previous NCSI workshop.

'Permeate' describes the goal of the community created by NCSI summer workshop graduates. National dissemination of NCSI takes the cooperation and collaboration of this community. Not only are the educators learning how to best use modeling software and teaching it to their undergraduate students, these workshops also affect high school and middle school

NCSI "By the Numbers"

15: Workshops held this summer

17: Days Bob was in Durham between May 11 and September 25

140: Institutions represented by this summer's workshop participants

300: Faculty who attended workshops

3,000: Straws used in error demonstrations

30,000: Documents distributed to faculty at NCSI

\$146,110: Value of software distributed to NCSI participants

levels of education. NCSI graduates who teach future teachers are instructing their students on the use of modeling tools as well. Another key feature of 'permeate' is that tools, on-line courses, and other resources developed by the NCSI community will be available on the web in order to reach an even larger portion of the education community.

The traditional 'first look' workshop serves as an interdisciplinary introduction to the modeling tools available to science and math educators such as Stella, AgentSheets, and Mathematica. 'Second look' workshops offer returning NCSI participants, or others with computational science experience, a chance to go deeper into the pedagogy of computational science education to further integrate these tools into their own teaching. In both of these workshops, participants are encouraged to adapt an existing model or to create their own model and supporting materials and present it to the other participants at the end of the week. This assignment provides the teachers with a module that they can use in their classrooms immediately.

Although only in its second year, the NCSI workshops have evolved to meet the specific needs of participants. As the NCSI community grows, there is a greater and greater demand for more specialized workshops. Workshops that focus on Parallel Computing and Computational Chemistry were offered for the first time. This trend will continue next year with the addition of workshops that will focus on Computational Biology, Computational Social Science, Dealing With Data, and Computational Physics. Heading into the school year, NCSI plans on offering workshops at Sigma Xi partner sites around the country.

SUCCEED Summer Workshops

REAL kids working with REAL scientists! That is the main focus of The Shodor Education Foundation's Project SUCCEED. By offering workshops in math and science throughout the year, Shodor gives students the opportunity to work with professional scientists using real computer models.

All SUCCEED workshops focus on introducing students to computational science. Computational science is the newest method of scientific research. Sometimes referred to as "modeling and simulation," it involves the combination of science, mathematics, and computing. It is used to study scientific events that are difficult to study using "traditional" research methods because the problems are too big or too small, too fast or too slow, too far away, too dangerous, or too expensive.

This past summer, a total of 57 middle and high school students from the Triangle region of North Carolina participated in weeklong workshops, learning how to use computer models to study math and science. Working side-by-side with Shodor scientists, they used computer models to study the



Students work in pairs in order to emphasize collaboration and teamwork.

spread of a disease through a community, the revolution of the earth around the sun, balance and stability in physical structures, non-Euclidian geometry, and how information is transferred via the Internet, among other topics.



Classes, such as this Math Connections group, are small in order to facilitate interaction with the instructors.

Computers are not the only tools that SUCCEED students use to model the world around them.



Shodor Mentor Center - A Firsthand Account

By Michael Reckhow, Mentor Center Intern, Harvard University

As I walk into the second floor door at 8:30 on a Tuesday in July, the building is already alive. Interns move from room to room, conferring with the staff scientists on their projects or searching for the local expert in PHP programming. Eager SUCCEED children fill the building, ready to start their modeling projects or learn about how the Internet works. As I move to my work area and set up my computer, I am greeted by the interns who were able to pull themselves out of bed more efficiently than I was.

The first item on my agenda everyday is to check my email. Email keeps me up to date on important office information such as who is out for the day, when internal programming classes occur, and who's turn it is to take out the trash.

After I am caught up on the office announcements, I begin to work on one of my summer projects – the redesign of the Shodor website. It involves some programming techniques that I am not completely familiar with yet, so I direct several questions toward one of my friends who shares an office with me and is a whiz at the programming language. From time to

time, she fires back questions about the goals of the website project to make sure that her piece of the puzzle will conform to them.

These sorts of communications occur frequently throughout the day because, as interns in the Mentor Center, we understand that we each have skills that we can help others to master and if we take advantage of the resources around us, we will be able to solve the problems that we come across more quickly.

Not all of our time spent at Shodor is passed in front of a computer or teaching a SUCCEED workshops. Whether it is in the lunchroom around noontime or playing volleyball on the newly erected net behind the building, plenty of opportunities exist for us to relax and interact with our fellow interns and with the staff. In addition, the staff plans several outings throughout the summer to places like baseball games and amusement parks.

The office finally begins to quiet down around 4:00 P.M. when the SUCCEED workshops end for the day. I head towards the door just after 5:00 having spent another enjoyable and enriching day at Shodor.

SUCCEED Fall Workshops

Saturday Explorations in Science and Mathematics for middle school students is a series of computer-enhanced science and mathematics workshops. Each week a different topic in science and math forms the basis for a morning of hands-on and computer exploration. These workshops can be thought of as a "sampler" of the summer activities, offering students an initial exposure into the applications of computer modeling in a variety of scientific fields.

This fall, students will cover topics in forensic science, geometry, medicine and the biosciences, environmental science, engineering and more. Each Saturday morning topic has a corresponding summer workshop, allowing students to further explore a particular topic.

When: October 4, 11, 18, 25, and November 1 and 8 from 9 am to 12 noon

Where: Shodor's training facilities in Durham at 923 Broad Street, Durham

How to find out more:

Visit the fall workshops website:

http://www.shodor.org/succeed/programs/sef2003/

Apply Online

http://www.shodor.org/succeed/application/