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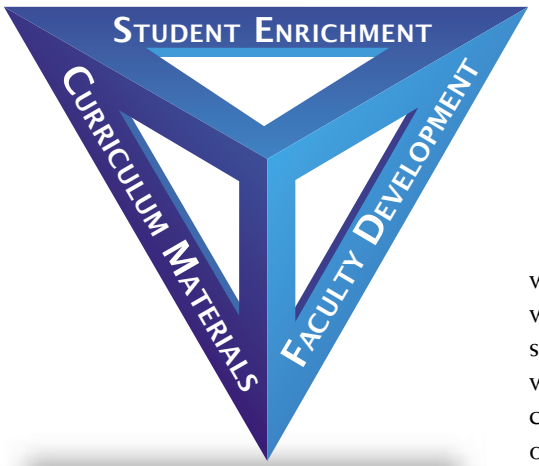

LOOK INSIDE:

Shodor Excels at Helping Teach "Other People's Workshops"

By Joel Feiner, Computational Science Intern

One of the key programs at Shodor is holding workshops in computational science. Some workshops aim to spark middle and high school students' excitement in science, math, and technology while others help train existing teachers how to use computational science in the classroom. In the past, our workshops have been led by a small group of staff and interns, usually at Shodor's base in downtown Durham, but now the focus is moving towards **"Other People's Workshops"** (OPWs). This new program applies what we have learned in our local summer workshops to other organizations beyond Shodor and the Durham area. So far, it has been highly successful and, over the past few years, the number of OPWs has steadily increased. The focus of these workshops, like most workshops done by Shodor, is computational science. The goal is to use computers to excite students' interest in science and math and to show how computational tools can be used effectively to elucidate math and science concepts. This year, we held several OPWs in **Durham**, as well as in upstate **New York** and **Tennessee**.

One of the **Durham** OPWs took place at the **W.D. Hill Community Center**, near North Carolina Central University. The workshop was part of a program called **CI-TEAM**, or "CyberInfrastructure Training, Education, Advancement, and Mentoring." The classes took place every Tuesday for 10 weeks and accommodated 19 students from grades 5-7. The students had a chance to learn about what computational science is, how pattern recognition works, and how to analyze graphs and data among related topics. Our own staff member, Patricia Jacobs, led the workshop with help from interns Thomas Maxwell, Lateasha Shirer, and Antwan Robinson. Another CI-TEAM workshop took place at the **Antioch Builds Community** center with 23 students in grades 3-8. Students had a chance to participate in hands-on activities like using straws and pins to build bridges able to withhold the weight of marbles. Such designs were developed and simulated on computers but tested in real life.

Shodor intern Antwan Robinson teaches a workshop for students at Antioch Builds Community as part of the CI-TEAM project.

Shodor taught another local OPW in partnership with the City of Durham and Durham County, as part of the **Restoration Institute for Leaders** (RIL) program at **Durham School of the Arts**. The workshop's topic was graphic design, which is using computers to develop artwork for use in products, advertisements, presentations, and anything else that needs to communicate an idea visually. Middle and high school students were taught how to use software programs such as Inkscape and GIMPshop to develop projects where they demonstrated their graphical skills. Towards the end of the class, students made up logos and business plans in groups. Actual clients presented jobs to the students, returning at the end of the course to choose their favorite finished products.

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Great Developments

New Staff Members at Shodor – After saying farewell this summer to **Robert Gotwals**, Senior Computational Science Educator, and **Molly Seggerman**, NCSI Coordinator, Shodor welcomes new staff members **Ismael Torres**, Web Developer, and **Jeff Krause**, Computational Biology Educator.
Ismael Torres has worked as an intern at Shodor since December 2005, helping to maintain and develop Shodor's web infrastructure and design websites, brochures, and t-shirts. After graduating from ECPI College of Technology in Raleigh, he began working full time at Shodor and mentoring his own interns and apprentices.
Jeff Krause has past experience not only in research using computational biology, but also in developing interactive resources for science education. He will work to develop resources for Shodor's workshops, apprenticeship programs and online curriculum collections.

Shodor Board Member Named Associate Dean for Graduate Studies at Appalachian State – **Holly P. Hirst**, a Shodor board member and one of the most active members of Shodor's national faculty development program, the National Computational Science Institute, was named **Associate Dean for Graduate Studies** at Appalachian State University this past April.

Shodor Interns and Staff to attend Supercomputing Conference – **Francine Stefan** and **Jenna Ingersoll** have been selected to be student participants at SC06, the nation's premier conference on supercomputing and its applications. **Kent Robertson** will present his work to develop ASL-assisted materials for the deaf community and **Bob Panoff** will present an invited talk on computational science. NCSI will also be recognized at SC06 as the 2006 UCES Award winner (see the article on this page).

SUCCEED Workshops Spring 2007 – Although Shodor is not offering the SUCCEED Saturday Explorations workshops this fall due to the start of the second year of the apprentice program (see article), we do plan to offer workshops this spring. You can check online at www.shodor.org/succeed/calendar at any time to see our current workshop offerings.

Chemistry Educators' Guide to Molecular Modeling – **Robert Gotwals**, a Senior Computational Science Educator at Shodor for many years, is now teaching chemistry at the NC School of Science and Math. However, he continues to partner with Shodor to develop a teachers' guide on computational chemistry this fall. The project is funded by the Burroughs Wellcome Fund and will be demonstrated at the NC Science Teachers' Association conference in November.

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Several interns, along with staff member Monte Evans, traveled to **Brockport, New York**, located just west of Rochester. For two weeks, they helped teach a program called the **Computational Math, Science, and Technology Summer Institute at SUNY Brockport**. The program was geared towards middle school and high school teachers, with the goal of helping them to understand the tools available when teaching computational science-related topics in the classroom. The classes had about 45 participants, mainly teachers from surrounding middle and high schools in New York. This is the third year Shodor has held a workshop in Brockport.

Another exciting OPW was held in **Tennessee**, where former staff member Bob Gotwals taught a modified version of the **Shodor Scholars Program**, an academically intensive workshop normally offered each summer at Shodor for high school students. The goal of the program is to excite students' interest by giving them a taste of many different aspects and fields of computational science. The University of Tennessee Space Institute in Tullahoma hosted this workshop.

Ben Philbrick, a Shodor intern, answers questions at Shodor's graphics workshop for the RIL program.

Overall, this was a successful summer for Shodor. In addition to our plentiful workshops in-house, we had another banner year for OPWs, with the highest number yet. We hope to continue this trend, involving more students and teachers in Shodor's workshop model and the effective use of computational science tools for education.

The NCSI Report

By Samuel Gass, Computational Science Intern, and Bob Panoff, Executive Director

Since 2001, with significant support from the National Science Foundation (NSF), the Burroughs Wellcome Fund, and various computing vendors, the **National Computational Science Institute** (NCSI) has provided expert training and support for more than 1000 college and university faculty across the country. While the **Shodor Center for Computational Science Education** provides workshops, apprentice training, and internships primarily in the Triangle area of North Carolina, NCSI extends the good work of Shodor to a national scale. The Institute primarily assists faculty of undergraduate institutions, minority-serving institutions and community colleges to learn how to do and how to teach computational science. These energized faculty then help both their fellow faculty and their students, who are emerging scientists and teachers.

In summer 2006, interdisciplinary workshops were held at Western Kentucky University and San Diego State University, while more specialized workshops were conducted at Houston Community College (Parallel and Cluster Computing), Sweetbriar College in Virginia (Computational Biology), and the University of Illinois at Urbana-Champaign (Computational Chemistry). NCSI staff and alumni are now providing the content and instruction for **"Other People's Workshops,"** including an introductory workshop co-sponsored by Wittenberg University in Ohio, a parallel and cluster computing workshop in Georgetown, TX, sponsored by NITLE, and a computational physics workshop at UNC-Pembroke funded by their NASA Space Grant.

One sign that the NCSI effort is "winning" is that several new programs at the National Science Foundation are now providing funds to schools to ensure computational science has an impact across the whole undergraduate curriculum. This fall, NCSI will partner with a number of institutions to assist with their workshops, with a growing list of schools asking for such help.

In recognition of this national impact, the U.S. Department of Energy has selected NCSI as one of the winners of the **2006 Undergraduate Computational Engineering and Science Award** to be presented at the Supercomputing Conference in November.

Summer at Shodor

Interns take the lead on SUCCEED

By Tiffany Chen, Computational Science Intern

This summer, Shodor's team of interns and apprentices worked hard, not only to further their own learning, but also to develop educational software models, manage state-of-the art modeling and computational tools, and utilize these resources to produce innovative interactive lessons for the SUCCEED workshops. Shodor interns also helped develop the curriculum for and run these workshops.

Interns helped teach a diverse number of workshops for **a total of 179, 6-11th graders** over the course of the summer. Workshops ranged from week-long, half-day workshops to full-day, two-week workshops.

A variety of topics were offered for 6th-8th grade students of different curiosities, including **Modeling Your World, Forensic Science, Math Explorations, Environmental Science**, and **Engineers in Training**. Students were exposed to current research concepts and approaches in these fields and were able to conduct their own inquiries through hands-on modeling in real-life and by using computational software.

In Modeling Your World, students learned the importance of models to science and research, and even used VenSim simulation software to study a model used to predict the number of people who will be infected with a disease over a period of time. Interns **Jenna Ingersoll** and **Ebonee Farrow** helped instructor **Bob Gotwals** teach a number of activities. One such activity showed students how a simple rope could be used to create numerous models, from parallel processing to protein folding.

Forensic Science students became crime scene investigators. With clues given to them by **Samuel Gass** and myself, one group solved a murder that occurred over 5,000 years ago. To solve the murder, they used their gathered knowledge of modern investigative tools, including the study of genetics and DNA. Another group of students discovered and investigated a present-day murder mystery (devised by intern Samuel Gass), following the case through all of its steps, gathering evidence, preparing a prosecution and defense, and arguing them in a simulated courtroom in the Shodor office.

Intern Joel Feiner mentors two students during SSP.

Our Math Explorations workshop taught students advanced mathematics such as probability, algebra, and coordinate geometry through the use of original educational tools from our Java-based courseware website, Interactivate (www.shodor.org/interactivate). Intern **Deborah Hussey**, who also worked on the development of Interactivate, taught much of the workshop.

Students in the Environmental Science workshop were able to perform field research concerning carbon dioxide consumption in trees, performing complex mathematical analysis of different natural effects on the environment and its inhabitants. Intern **Daniel Hostetler** helped students create their own fruit-powered batteries and demonstrated a model fuel cell car. Another intern, **Tyler Swanger**, led students in an exploration of population dynamics through a simulation of rabbits, wolves, and grass.

The Engineers in Training workshop taught essential concepts pertinent to truss design, including designing to accommodate the physics of fast-moving objects. With the help of intern **Warren Myers** and instructor **Garrett Love**, students designed and constructed weight-bearing structures out of plastic straws. At the end of the workshop, students even programmed Lego robots to navigate a maze that was built by interns **Joseph Patrick** and **Jenna Ingersoll**.

Students in grades 8-11 participated in the **Medicine and Biosciences** Workshop, as well as the **Shodor Scholars Program** (SSP). During Medicine and the Biosciences, I taught students advanced topics relevant to current research in computational science. Students learned how to perform differential equation systems modeling in VenSim and how to take pharmacological approaches to rational drug design through modern computational methods. Instructor **Bob Gotwals** also taught students how to extract genomics and proteomics information from modern bioinformatics databases. At the end of the program, we guided students in creating their own presentations that displayed the methods they developed using these tools. In their projects, students built and tested computational models depicting disease and nutrition and even created their own drugs by analyzing molecules with anti-inflammatory properties.

Intern Ebonee Farrow leads a class in programming using the systems dynamics software VenSim.

In working on lesson plans, I have realized that **Shodor allows its interns to invent and test new material** that will push and further engage students. In having this opportunity, I found it amazing to see the amount of creativity that students put into their final projects after only a few days of training. It was especially fun for them to engage in topics that are not even offered at the high school level.

In SSP, a longer, two-week program, students were exposed to a variety of computational scientific approaches. Students started by solving basic modeling problems using computational tools to develop the skills to do more advanced work. In the second week, they broke into groups and chose a real-life problem to which they would apply their newfound knowledge. Groups then carefully created and implemented a computational solution, finally presenting their work in a formal presentation. Intern **Jenna Ingersoll** led the instruction of the program, while a number of other **Shodor interns helped to advise groups** on particular projects. On the final day, the intern advisors were just as proud of the group projects as the students who had completed them.

The many opportunities during the summer for workshop participants, apprentices, and interns to collaborate inspired everyone to set amazing goals and to do exceptional work. At the end of this summer, **25 workshop students were accepted into our apprentice program**. Apprentices who began last year have moved on to more advanced projects or have even become interns at Shodor. Having advanced in their knowledge of computational science, they are, in turn, beginning to contribute back to the SUCCEED workshops.

Interns Speak Out

For a full list of Shodor's 2006 interns, visit shodor.org/about/interns/

Brian Block

Junior, North Carolina State University

When I started working at Shodor, the only programming experience I had was in a classroom setting; I was nervous about writing code that actually needed to do something useful. For the first few weeks, I was given small programming tasks that helped me get better acquainted with the office environment and boost my confidence. Then one day Monte stopped by and asked if I would work on something called VenSim 2 Java. After seeing what was involved, I regretted taking the assignment; suddenly I had to use languages I'd never seen and concepts I'd never learned. Luckily, the staff and interns were all very helpful and things started to come together. Since then, I have learned so many new skills and been exposed to so many different computing concepts that I can't imagine a better learning environment. The programs I'd written for school were great for explaining computer science fundamentals, but nothing can beat real-world experience.

Lateasha Shirer

Senior, Middle College High School

Lateasha leads a class at the W.D. Hill center.

This summer I had a wonderful experience helping create the new Interactivate website. I helped other people get testing done when they had many other things to do. I was able to test applets and change features about their accompanying curriculum pages.

I also had a great experience teaching children at W.D. Hill and Antioch Baptist community centers. I taught forensic science and reviewed materials from all the computational science classes the students had over the summer.

While working at Shodor, I discovered new things about me that I didn't know before. I found out how great I am at working with little children and teaching them. I am considering going into a teaching field in school, maybe teaching younger children or even high school students. I was a great helper and assisted other interns, especially when it came down to preparing lessons and materials for the classes ahead of time. Besides the classes, I did a lot of planning for a group called the CI-TEAM so that we could be organized for the following week. Documenting was one of the many tasks that I had to complete along with keeping the children under control behavior-wise. I would do it again and again. I can truly say I've had a great summer at Shodor.

Francine Stefan

Freshman, North Carolina Central University
Graduate of NC School of Science and Math

Francine mentors a workshop student.

The internship program at Shodor encourages its interns to work on projects under the mentorship of staff members. While working at Shodor this summer, I was assigned to work on upgrading the Interactivate website (www.shodor.org/interactivate) under the mentorship of Patricia Jacobs.

Interactivate is a collection of courseware materials, developed by Shodor in collaboration with scientists and content experts, for the use of mathematics teachers throughout the world. The interactive activities found on the Interactivate website are also accompanied by other helpful materials such as lesson plans, worksheets, and discussions.

The process of upgrading Interactivate was divided among a group of seven editors. As part of this group, I was expected to read through the material and make any needed corrections to the Lessons, Discussions, and Activities pages. These corrections varied from adjusting the page format to activating broken links to creating new worksheets.

At the end of the summer, after working on improving the site for a couple of months, the site went live. Several days later, I was able to see that my work was being accessed daily by thousands of teachers from around the world. That was the best professional recognition I have had so far.

Joseph Patrick

Junior, North Carolina State University

Robots?! Robots may very well be the work force of the future and this summer I helped Shodor introduce workshop students to the world of robotics. I worked with intern Jenna Ingersoll and Shodor engineer Ron Broadnax as we taught robotics to the Engineers in Training (EIT) workshop participants in August.

We started off by introducing the idea of robots performing basic human tasks, such as vacuuming and mowing the lawn. Then, we had the students break off into teams and build their own robots using Lego kits.

The students were given the challenge of programming these robots to navigate through a maze autonomously. Autonomously means that the robot isn't controlled by any remote controls or outside commands. Instead, the robot's program makes all the decisions and tells the robot what to do next.

At first, we let the students develop their own method of navigating the maze. None of the teams, however, were able to escape the maze, although a few came very close. So, we presented the students with a common maze-solving algorithm. An algorithm is a set of rules for solving a problem in a finite number of steps, and is an important concept in computer programming. Our algorithm, sometimes called "the wall follower rule," required the robot to follow along one of the walls. After being given time to implement their own versions of the algorithm, most of the team's robots were able to escape the maze easily.

For everyone involved, the EIT workshop was both fun and educational. I was able to teach the students some of the programming concepts I've learned, and at the same time show them how those concepts could be applied to a real problem. I also learned a few things myself, mostly about teaching, and now, I feel much more confident in my teaching ability.

Warren Myers

Senior, Elon University

This summer I assisted teaching a couple workshops and mentored students in research and learning projects. I also built a tool to save Shodor time, money, and effort when going to off-site locations to hold teacher workshops.

With Shodor's new Apprenticeship program, I had an opportunity to work as a mentor more than in previous years. I assisted several new students with their learning and research challenges - how to find information, how to find errors in their projects, etc. Mentoring is both a challenging and a rewarding experience. It is challenging because you need to guide students without doing their work, and rewarding because you can see the students start to grasp concepts, and then shoot ahead of you in some areas – dreaming of applications for the ideas you've helped them to understand.

My big project this summer was to create an easier process for providing computational science software to the off-site workshops that we lead at schools around the country. Historically, when holding such off-site workshops, Shodor has had to take our 'portable lab' of traveling laptops to the site. Traveling with one or two laptops per person isn't too bad, but when the location needs 20 or 30 machines, getting them all there on time and unharmed is a challenge. So this summer I developed a custom Linux CD that we can use at any off-site location that has a computer lab. The self-contained CD contains the modeling, teaching, and simulation tools we use in the workshops along with its own operating system, eliminating the need to take actual machines.

Overall, it's been a fruitful summer. I've learned a lot, helped others learn, and accomplished a great deal. Shodor is the only place I've ever worked that encourages its employees to learn as much as they can to accomplish their projects. We all then turn that knowledge and learning around and apply it to our projects, and helping others learn. Shodor's dynamic environment has encouraged me to duplicate that approach when possible in school and in any job I have in the future.

Ren Yuan

Freshman, Duke University
Graduate of Chapel Hill High School

This summer I worked under Dr. Bob Gotwals on the Computational Chemistry Server project. I produced eight labs overall this summer, most of which were on common topics in organic chemistry, such as the stability of carbocations, acid and base reactions in organic chemistry, and hydrogen bonding in DNA. In the process, I learned to use the Web MO server, which is a powerful tool in creating chemical molecules and producing various computational data about them. I learned to look at chemistry from the computational point of view and began to understand the computational language. I learned the differences between various engines, theories, and basis sets. I used the server to model a lot of concepts that I found hard to visualize before. And most important of all, I learned to put my knowledge down in formal writing, which could help other people gain a better understanding of the concept. I feel like I consolidated what I already knew about chemistry and explored areas that I did not fully understand more deeply. It has been a very enjoyable summer.

Tyler Swanger

Senior, State University of New York at Brockport

Tyler assists three SSP students on their final project.

This was my first summer working for Shodor and I had a blast. Everyone that works there, interns and staff, are wonderful people. I spent most of the summer working on different Java programming projects. I learned some HTML. One of the things I did at Shodor was I started to develop a new version of a Shodor program called GalaxSee. The program was written for an older version of the Mac operating system that is no longer supported. I began to re-write it in Java so it could run on any operating system. Teaching in the SUCCEED workshops was another activity that I did. At first I was skeptical about teaching, but once I did it, I thought it was great, and since this summer, I have even been considering getting into teaching. Even though Shodor was work, and I came all the way from New York to work there, it was the most fun I have had since I was a young kid. I learned a lot about programming, I feel more directed in what I want to do after college, and I made tons of new friends.

Apprentices Speak Out

For a full list of Shodor's 2006 apprentices, visit shodor.org/about/apprentices/

Kristen Bohannon

Senior, Middle College High School

Normally during my summers, I'll pay and take a summer school course in something like math. But this summer I spent my time at Shodor learning more than just one thing for the course of six weeks. Working at Shodor over the summer was a great way to spend my time. I enjoyed coming in and feeling like I was actually doing something. I especially loved how much I accomplished by the end of the summer: I learned programming languages (Perl), spreadsheets in Excel, and I got my feet wet in modeling programs like VenSim and Agent Sheets. Best of all is the staff here at Shodor, always willing to help if you don't understand something and a fun bunch to be around. I'm ecstatic that I got to spend my summer doing something productive and fun.

Vishal Rao

Freshman, University of North Carolina at Chapel Hill
Graduate of East Chapel Hill High School

Working at Shodor has been both an enlightening and gratifying experience. I initially joined the Shodor Scholars Program with very little experience in computational science but then I was exposed to a wide range of resources and opportunities that improved my comprehension of computational modeling and its benefits to scientific theories. One of the most important aspects of my education at Shodor is that I was introduced to various programming languages, including Perl, HTML, and Java, each consisting of unique elements. This allowed me to view problems from multiple perspectives and proceed in tackling the challenges presented. These techniques have aided my assignments during my participation in the Apprenticeship Program, as I was given a starting point and a goal with the task of creating a link between the two using various combinations of the knowledge I have gained. Now a student at The University of North Carolina at Chapel Hill, I use this knowledge to build upon my understanding of computer science and excel above others in the field of computational science.

Liliana Marquez

Senior, Middle College High School

Liliana Marquez (at right) and Sydney Williams work together during their apprenticeship at Shodor.

My experience at Shodor has been awesome. I am glad that I had the opportunity to participate in this program. As an apprentice, I have learned many new things from the computer world and much more. Overall, the program is fantastic. I feel like the first year was a little bit unorganized, but I see that it is getting better. The interns and workers here are great. They are very helpful and nice to all the apprentices. There are many things that I am learning from this apprenticeship. I have worked with Excel, entering and graphing complicated data. I've done a little bit of web designing with HTML. I learned how to do better searches on the Internet, using shortcuts and better wording, and how to use the keyboard instead of the mouse to do certain things on the computer. The thing about Shodor is that it not only focuses on the computer world, it focuses on everything. What I mean is that we learned about everything, even about how to write better. These are only some of the projects that I have worked on, there are many more. All I can say right now is that I'm staying for the second year because I like it, and I want to discover what else there is to learn.

Michael Nelson

Junior, Green Hope High School

This summer in the Apprenticeship Program, I accomplished my goal of finishing the first level of challenges, which are small tasks one needs to finish to be "certified" as having completed a section of the program. During this process, I created web pages from scratch, coded a login system for a small office, gathered information on chemicals, organized data on Durham's history, and much more. After I had completed my first level, I began the second level but spent more of my time for the rest of the summer as an intern, the next level up from apprentice, doing actual work for Shodor. I also practiced the knowledge gained in the Apprenticeship Program by helping other apprentices with their challenges. My knowledge of computers, and science in general, has increased tenfold, and I have made many great new friends within the program.

What's Next for Shodor?

By Alex Kesling, Systems Administration Intern and Apprentice and Jonathan Stuart-Moore, Shodor Staff

Over the past few years, Shodor has transformed in many ways: it has moved from a small, cramped building on Broad Street to a spacious downtown office where facilities exist to accommodate workshop students, apprentices, interns, and staff working simultaneously during the busy summer; it has received extensive funding not only to continue developing and cataloging educational resources in **partnership with the National Science Digital Library**, but also to test new teaching and outreach programs, such as the SUCCEED **Apprenticeship Program** and the **CI-TEAM**; finally, it has expanded greatly its push to spread the successful Shodor model of teaching using computational science out into **"Other People's Workshops"** around both the city and the country. Of course, Shodor is continuing all of these existing programs—but what new projects are in line for Shodor's future?

The next big thing at Shodor is the **SUCCEED Apprenticeship Program, Phase Two**. The first phase of the experimental program began in January 2006 with 33 high school-aged apprentices. Those students worked over the course of the spring and summer to master **computer, information technology**, and **science skills** in fifteen "certification areas." In August, the program went on a break. During this time, staff perused the large amount of data on the effectiveness of the program in order to develop a better curriculum for Phase Two.

One of the main concerns was the amount of flexibility allowed in apprentices' scheduling and commitment during Phase One. Due to a "come in when you can" schedule for the first year, many apprentices only came on a minimal basis, creating a wide spread between the numbers of challenges that different apprentices had completed. Those who committed the time progressed at a proper pace, but those who did not were left behind. Because of this, the program has been revised to encourage more consistent participation. Apprentices are required to spend a minimum of eighteen hours per month in the office during the school year, which is split into once a week after school and six hours every other Saturday. Saturdays include a half-day of instructional time and a half-day of group work time.

During the summer, the required time is increased to the equivalent of six forty-hour weeks, to be spread out over the course of the summer as each apprentice chooses. Apprentices will commit to their summer schedules in March.

The way that apprentices will complete work has also been overhauled. While the first group of apprentices worked on many individual challenges by themselves for their first year work, the revised program will be organized around **regular instruction time and group projects**, so as to help keep the apprentices engaged and on track. In their second year of the program, apprentices will still be required to attend the regular classes, but will have more **freedom to explore a subject of interest** through group projects that apply their new information technology skills.

The first classes of the Phase Two program kicked off on October 7th. Shodor looks forward to another year of working with a set of excellent apprentices.

Beyond the immediate goals of the Apprenticeship Program is another ambitious goal. Shodor is planning a **partnership with Durham Public Schools** and other area institutions to provide **after-school science education for middle and high school students**. Partners include the **Greater Durham Chamber of Commerce, Durham County, Duke University, North Carolina Central University**, the **NC Museum of Life and Science**, and the **NC School of Science and Mathematics**.

Shodor's Executive Director, Bob Panoff, welcomes apprentices and their families as the second year of the SUCCEED Apprenticeship Program begins.

The program would run in association with the existing *Encore!* after-school programs at a number of Durham's middle and high schools, replacing the normal after-school recreation time with **hands-on exploration in math and science** with a focus on computational science. Most afternoons, students would stay at their schools to receive instruction from, and to do activities with the help of, interns and staff from the participating institutions. But not all of the program will be instruction, as the NC Museum of Life and Science and Duke's Labs for Learning will donate time and facilities for participants to go on occasional **field trips** that will be the culmination of particular units of study. Another off-site opportunity will be **job-shadowing** opportunities through The Durham Chamber of Commerce. Shodor would also act as a resource for students who wanted to further pursue topics they had begun to learn in the academy. Students could apply for **apprenticeships** at Shodor and develop their skills to become **interns**.

The academy, of course, would benefit more than the students. The organizations contributing to the program recognize the reciprocal benefit of a better trained and motivated future Durham workforce through ensuring better science education and "other than school time (OST) learning" to our next generation of students.

Workshops Coming in Spring and Summer 2007

See this space in our next issue for a full schedule

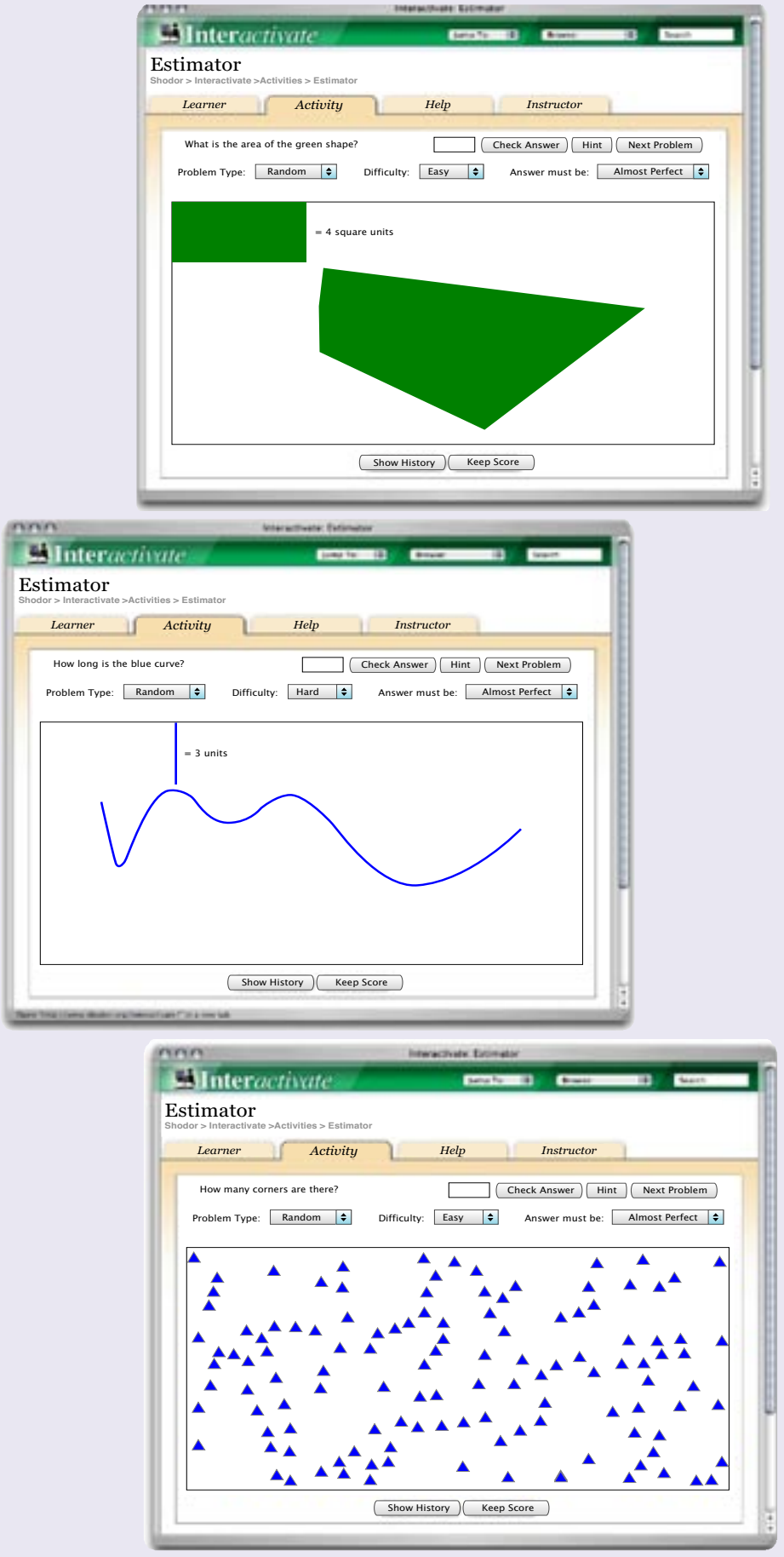
Workshops in the proposed after-school academy would follow Shodor's successful workshop model, involving both experimental and computational science. Here, students build a physical weight-bearing structure, which they compare to computational engineering models.

Activities for Kids

By Deborah Hussey,
Computational Science Intern

Have you ever been to one of those family picnics where you have to guess how many Smarties are in a jar? Or tried to guess the distance of a storm by listening to thunder in comparison to the flash of lightning? Well, what you're doing is estimating. Estimating is educated guessing, or in more scientific terms, approximating a value, based on incomplete or uncertain data. This is something that we use almost every day. It can help you with reading maps, making more economical purchases, calculating tips, etc. The Estimator activity shown here allows you to test out your estimation skills with counting, in both 1 and 2 dimensions. The activity asks you to estimate the number of objects shown, the length of a curve, or the area of a shape. Estimator can be found at www.shodor.org/interactivate/activities/Estimator. This and other estimation activities are part of a larger math activities listing at www.shodor.org/interactivate/activities. For example, look at Comparison Estimator, Estimator Four, and More or Less Estimator.

This applet and many more are part of Shodor's Interactivate website. This past August, Shodor launched an improved version of the site, Interactivate 2.0. The new version includes many new features making it easier to navigate, including the ability to search and browse the site's resources and an overall new look and feel. Interactivate 2.0 is now completely database-driven, which allows for the integration of these new features. If you have visited the new site you may have noticed the new Browse feature. Browsing allows you to sort through the site's activities, lessons, and discussions in many different ways. It allows you to filter those resources by broad subject, narrower topics, grade level, or resource type and continue to pare down the results until you find the resource you seek. The new site also adds a full-site searching option on each page. This feature allows you to search all of Interactivate by keyword instantly. Yet another new feature is the use of Learner, Help, and Instructor tabs that contain additional information about each activity. These tabs equate to the What?, How?, and Why? pages from the previous version. Under the new tabs you will find an improved list of "Associated Interactivate Resources," pointing to related discussions, lessons, and downloadable worksheets in PDF format. These are just some of the new features you will find when you try out the new site. Though the new site may take a little getting used to, we hope that you find it easier to use and that you can find the materials related to the math topics you love more readily than in the older version. Our goal is to allow you to make better use of the numerous resources on our site.



Interactivate's Estimator activity randomly generates problems for the user to solve. As shown above, it may challenge the user to estimate the area of a shape, the length of a line, or the number of small shapes inside a box.