Gettysburg College students design educational programs

By Barbara Phillips Long, Shippensburg Bureau Chief, December 12, 2010   Dec 12, 2010   💬 0

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Barbara Phillips Long/The Sentinel
Gettysburg College students stand around a Smart Table they programmed to offer math lessons for elementary students and display an interactive map of the college.

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A math lesson in matching and fitting shapes together is more than a visual puzzle, said Gettysburg College senior Nate Linsky as he explained the different levels of the lesson "Shape Fit."

Spatial understanding is more than the ability to interpret shapes and make drawings, Linsky continued. "It's a big part of problem solving generally, not just visually. It's important in engineering, computer science, math, physics and more."

Linsky isn't, however, an education major presenting a lesson design. He's studying computer science and is completing a capstone course in programming, where he and his classmates designed three applications for a Smart Table to show how the device could be used and to put the students through the paces of a project design from start to finish.

The students in this story are all seniors at Gettysburg College, taking a course in advanced systems design from Rodney Tosten, vice president of information technology at the college. Tosten also recently helped develop programs about using social media safely and appropriately for the Shippensburg Area School District.

Before the students began designing Shape Fit, they interviewed a professor in the education department to find out more about how elementary students learn and what they're capable of doing in the classroom. In the real world of project management, similar interviews are required to define the goal of the new program before writing the computer code begins.

The project Linsky and his group worked on is a lesson - or several lessons - within a lesson. The seniors in the class worked on three applications, including Shape Fit, a lesson on fractions for elementary students called "Pizza Party" and an interactive map that visitors to the Gettysburg College campus could use. There was a lot of individual work to do, but the projects also involved meetings - weekly meetings of the large group working on the applications and weekly meetings of the smaller groups working on specific parts of the project, such as the visual images.

The seniors did interviews to obtain background information for the project so they could design an appropriate project. Then they learned how to program the Smart Table device and researched programming challenges they encountered. In the end, they worked to a deadline to get the applications running in time for the presentation to the class and professors.

Not easy

It wasn't always easy. Linsky said the basic level of Shape Fit involves matching an image to an outline of an image. That may not sound complicated, but the programmers had to learn Photoshop and image editing in order to develop the cartoon-like images and outlines.

Shape Fit had four levels. The first level, for kindergarten students, shows images and outlines. A student can put a hand or finger on the picture of the fire truck, drag it to the outline of the fire truck, center it, and watch it "snap" into place. The outline and the fire truck are both at the same angle. In the second level, the outline may be at an angle, so the student who moves the fire truck has to turn the image before it will snap into place.

On the third level, students matched geometric shapes such as triangles, diamonds and parallelograms to various parts of a drawing. The application is a computerized version of tangrams. On the fourth level, the shapes are rotated, so to match the shape the student again has to drag and turn the image to snap it into place. It is geared to second-grade students.

Cam Riera was another student who worked on the project. In addition to learning to match things visually, rotating the image "also helps a little bit with eye-hand coordination," Riera said. Shifting the position of the pieces involves "more spatial reasoning."

Positioning the shapes at angles so the match would be more challenging was also more challenging for the programmers, Riera said. The images also had to be spaced properly on the "canvas" - the screen on the top of the Smart Table.

Each session is timed and the program tracks the progress of the group of students working on the Smart Table. Mason Showalter said the students learned tracking progress isn't just a convenience for the teacher.

Tracking important data

If a school decides to seek a grant to obtain a Smart Table, the school has to show that students are learning. So tracking the results from the lesson is vital not just for day-to-day use, but to justify the budget expense or grant for the equipment and the software to run it.

The group ended up designing a log-in program as part of the tracking system. Up to four students can be logged in at once, and the results from the group are shown in each student's record. The teacher can log in, touch the screen, and view the results of the individual student or the whole class.

Graham Sauers said Divonna Stebick, an assistant professor in education, provided the programmers with a lot of feedback. "Basically, she changed a lot of our ideas about what would be acceptable in a school environment."

After talking to Stebick, Sauers said the seniors wrote a requirements document on Google Docs. It outlines what the program would have to do. Google Docs, which stores the documents on servers managed by Google instead of on someone's personal computer, allowed the students to work together to revise the requirements document even when they were working at different times and places.

Sauers said the students used the Microsoft programming language C# and encountered some problems when they discovered "it's not well documented." He said solving programming problems - debugging the code - "was a little more difficult."

The educational applications the students worked on (Shape Fit and the Pizza Party) could be further developed, Sauers thought. He suggested going for a split screen so the elementary school students could do individual multi-player work, where their scores could be tracked individually while they were still using the Smart Table in groups, and more levels and variety could be added to the lessons.

The educational lesson projects and the interactive map project involved two different groups of students under the leadership of project manager Ben Winston, also a senior taking Tosten's course.

"We're learning about all the processes that go into software development," he said. The goal of the course is to have the project be "as closely related to a real world job" as possible. He supervised both groups doing programming for the Smart Table, holding meetings and keeping people on track.

'Easily searchable'

The interactive map was the other big project. Gettysburg College has an interactive map online, so the students had to come up with a map that offered more features for the Smart Table project.

Kyle McCarthy said the students decided to try to create a virtual tour so people could explore campus by touching the map and obtaining information. They wanted to "localize information and make it easily searchable."

D.J. Groff said the group eventually decided to use "trays" at the side of the map to display information so two people could use the map at once. They thought about using information "bubbles" that would open up when someone touched a building, but display bubbles didn't offer any interaction.

A person could highlight a building by touching it and information about the building will show up on the "tray," said Walter Einhorn. People can pull up text, photos and video, and the tray displays the main photo or video and shows thumbnails of others.

Images show the interiors and exteriors of buildings. Text lists majors and minors and shows where the departments are located on campus. Amanda Gower said the menu options can expand and contract so people can locate the information they need.

The GVirtual application was used with the Smart Table to manage the map, said Fumba Chibaka. "It brings all the multimedia to one place," he said, but programmers could add data as they built the map application.

He suggested in the future an adaptation of the map could offer customized tours, perhaps using mobile devices. A trivia game about the campus could be developed using facts in the database. The map could also be expanded to offer information on nearby attractions, since Gettysburg has many historic sites.

The Smart Table was a good choice for the programming projects, said Winston. He said often educational software is designed for a desktop computer. "It's more aimed toward business or schools."

Smart Boards and other whiteboards are geared more for presentations. "The Smart Table really does bridge this gap. You can gather around the table and interact around the table," Winston said.

The students may upload their educational programs to an open-source site so others can use their code to build new applications.

"A lot of work goes into making it look easy," Winston said.

Tosten said students have to be prepared for the latest technology. "It's really coming down to trends. You have to keep up with trends."

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        Rodney Tosten