Cultivating Creativity in Tangible Interaction Design

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Intro:
As part of a larger team developing collaborations between computing and the arts, we created a general education undergraduate course that integrated design and computer science.

Three major course components:
(1) A series of 5 core assignments
These were designed to make the connection between the physical and the computational, with an explicit focus on design intention.

(2) TIDdles®, weekly in-class creativity-enhancing exercises
(3) A final project (exhibited in one of two partner museums)

Technology
Students were introduced to several open software and hardware technologies and required to use them in projects:

Software: MIT Scratch and Inkscape (a free vector drawing program)
Hardware: PicoBoards to interface sensors to Scratch

Students also had to post projects on Wiki account and Ponoko. This introduced many to putting work into the larger world of the cyberspace allowing for feedback beyond the classroom.

Intangible Music—Analog and Computational Theremin
Developed by two engineering majors, “Intangible Music” is a two-person musical instrument that combines an analog Theremin with a computerized drum machine. Break-beam light sensors trigger the drum sounds, and accompanying visual displays are shown on a computer monitor hidden underneath the tabletop. The exhibit allows two people to collaborate in creating music, while attracting attention from others in the space.

Soccer Scratch—An Arcade-Style Video Game
“Soccer Scratch” was created by a philosophy major and a psychology major. It was a simple videogame with a visually appealing physical interface. To shoot the ball at the on-screen goalie, one kicked the wall-mounted soccer ball. In the students’ design process, they selected a sports theme initially, and narrowed it to soccer, but had a breakthrough in their thinking when they changed their early software prototype from a side-view of the soccer field to the shooter’s view of the goal itself. Then, the physical action of kicking the ball became kinesthetically integrated with the virtual action.

Scooby—A Physical/Virtual Puppy
“Scooby,” developed by two liberal arts majors, is a physical and virtual puppy-dog. Starting with a plush puppy, the students carefully installed large arcade-game buttons as the dog’s nose and as its two front paw-pads, and wired the three buttons to their PicoBoard interface. With Scratch software, they created an on-screen representation of the dog. The virtual puppy is displayed on a netbook inside the plush doghouse, behind the physical puppy. When you press any of the physical puppy’s three buttons, the on-screen puppy reacts. The project had an immersive, playhouse appeal, especially for small children.

TIDdles
Take a 5 minute creative challenge!

Students worked individually on a challenge that needed to be completed in 15 minutes. Using familiar materials such as paper, Play-Doh, and LEGO bricks—challenges like build a bridge between two desks, make a magical device, or make the tallest tower were accomplished with both zeal and skill.

Two insights emerged from this work:
(1) students’ ideas flowed more freely when they made physical models
(2) Some Tiddles (e.g., bridge- and tower-building) involved real engineering, and allowed us to engage in discussions about aesthetics vs. functional design.

The Tiddles supported a welcome playfulness in the classroom, and facilitated good sharing and discussion.

Below: Challenge was to Make an object with “magical powers.”
(Left) Boots that Fly (Right) “Undo” anything in your day button.