University Seminar on New Media Teaching and Learning
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Activity Centered Design

An Ecological Approach to Designing Smart Tools and Usable Systems

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Summary by Linda Catalano, Rapporteur

Dr. Geri Gay of Cornell University discussed a number of current research projects on the use of new media technology in formal and informal learning contexts. She characterized this work as centered on identifying trends in usage in order to tap opportunities for the effective use of learning technologies in the future.

The first study evaluated the use of wireless computing both in and outside of the classroom. Students in selected classes were given laptop computers with wireless modems, and their online computing activity (e-mailing, instant messaging, web browsing, etc.), as well as their logging activity on the network, was continuously tracked.

The tracking data were analyzed with respect to who was "talking" to whom, the number of URLs viewed, the type of web content accessed, and where students went on campus. Gay reviewed these and related findings, including the degree of overlap in the use of particular web sites, and gender differences in the type of web content accessed. A final point of analysis was the amount of unrelated online computing students pursued during class lectures and its effect on their learning.

Next, Gay presented two design case studies of handheld technology used as a navigation and social collaboration tool. In the first case, handhelds were used to enhance the museum component of a third-grade curriculum on ancient China. Students visited an exhibit of ancient Chinese objects using the handhelds to engage in activities specific to items in the collection. For example, one exercise challenged students to "build" a watchtower that would collapse if they did it incorrectly. Success required close study of the corresponding physical object to determine how it had been built.

Project designers reported the initiative receiving a positive response from both school and museum participants. They credited this to the handhelds drawing students into a creative experience and conferring a sense of ownership. Gay later noted that students remembered more and for a longer time afterward than those who explored the exhibit with paper-and-pencil exercises.

The second case was a guided tour system of the Cornell campus. Here, Palm Pilots used GPS to find visitors' locations and alerted them to the availability of information about that location. In turn, users could add notes and provide feedback using the devices. The evaluation of this project measured user response patterns, both positive and negative; additional data were gathered on such other patterns as high and low room use over time.

Returning to the museum context, Gay next considered the handheld's ability to facilitate creative communities by supplying users with such information as who among them is at a particular location and/or what they are excited about. Gay explained that this kind of information can help visitors to find those who might be interested in conversing about a given item, and to make purposeful decisions about, for example, where in the museum to go next. Similarly, handhelds can tell where to find exhibits of various kinds, such as most or least popular, or that contain specific content. Gay also related that handheld devices can display a visual record of one's movement through the museum, thus indicating what one has or has not yet seen. Finally, Gay described handhelds' support of social learning by allowing users to share their thoughts and questions through a chat-like mechanism.

The last set of experiments Gay highlighted involved distributed collaborative learning environments. She explained that they are part of an ongoing effort with NASA to understand how people interact in shared spaces. Herein engineering students at Cornell and Syracuse University were arranged into work groups for a final class project. Email traffic and student-student contact were tracked. Using social network analysis, Gay and her associates then assessed the patterned nature of these exchanges.

Gay shared several of this study's findings; namely that: students made little use of available resources, including each other; there was little interaction between the schools; and that toward the end of the semester, students reverted back to their old friendship networks. Gay also reported that so-called weak ties (e.g., between acquaintances) contributed to successful task completion, and that students with the most ties performed the best. Gay praised social network analysis for allowing the team to visualize these dimensions of group work.

Gay concluded by outlining some areas of future work at Cornell, in particular, the morphing of virtual and physical worlds and its implications for learning.

The discussion that followed centered on how to square the kind of evaluation Gay presented with the kind that funders typically demand. More generally, it concerned how best to demonstrate the learning benefits of projects such as these.