

**Moving Out of the Classroom:  
Using PDAs and Tablet PCs in Teaching and Learning**

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### ABSTRACT

Universities are continually challenged to stay abreast of ever-changing technology and provide up-to-date technology and technology services to students. Through this challenge, universities are increasing the availability of technology to students as students have an increased demand for this availability. Mobile technologies have enhanced technology use and obtaining information from a variety of locations. The question that arises at many institutions is: How do mobile technologies affect teaching and learning inside and outside of the traditional classroom?

### INTRODUCTION

Several colleges and universities are providing technology or requiring technology of students. St. John's University in New York is one university that supplies approximately 3,000 IBM ThinkPad notebook computers for freshman (Benson, 2004). Seton Hall University completed a similar task by leasing laptops to freshman. By 2001 every student at Seton Hall University had a new laptop (Villano, 2006). These laptops, in conjunction with an increasing wireless community, provided students the opportunity to use the laptops and obtain information quickly and easily across campus.

Duke University provided iPods to approximately 1,700 incoming freshmen in the 2004 fall semester. This was done to encourage technology usage for creative purposes in education and campus life (Information Technology Update, 2004). Georgetown University has focused on "the mobility of information and incorporating technology such as podcasting and text messaging" so that course content is more readily available (Villano, 2006, p. 34). These are just a few examples which demonstrate how universities recognize the importance of integrating technology into student life and learning on campus.

The University of South Carolina conducted a mobile technology project in which staff and faculty members served as group leaders for four students each. There was a total of 13 teams each assigned one of the following technologies: Treo 650, Samsung i730, Audiovox vx6600, Dell Axim, IBM x41 Tablet PC, Gateway M280 Tablet PC, or HB Tablet PC. Sixty-five technology units were included overall and the outcomes of the mobile technology project experience were as follows:

- Identify the utility of the equipment as it relates to life management skills, the academic classroom, and its relevance to a particular major, class, or discipline;
- Determine whether the equipment was Blackboard friendly;
- Investigate the sensitivity of the equipment;
- Determine if the technology is easy to master;
- Identify the learning curve for the technology;
- Determine if the technology is easily supported by campus IT infrastructure and services;

- Determine if there are certain devices that work better for certain programs of study;
- Investigate whether participants took the initiative not only to use the provided software, but perhaps create their own applications or programs to enhance their productivity/usage.

Student participants were asked to respond to a few survey items at the completion of the mobile technologies project. Overall, the responses were positive about the usage of the technology for managing personal life and applications that were useful for the academic classroom and their particular major/discipline. Students also noted favorably when asked about the ease of using the technology, stylus and/or keypad, and its convenience. The equipment was noted as Blackboard friendly by approximately sixty-five percent of the students, but only fifty percent noted that the technology was easily supported by campus information technology infrastructure and services.

The coordination with the information technology infrastructure and services is a key component of mobile technology usage. If the information technology infrastructure and services do not support the technology, students, staff and faculty will be less likely to utilize it for student learning. University life today is technologically-based in which students need to develop lifelong learning skills to be successful (Chapman, 1996; Holmes, 1999). Providing technology or access to technology gives students an opportunity to develop these necessary skills. As noted by Rawlinson and Bartel, “students increasingly expect faculty to apply bleeding-edge technology in the classroom and integrate it into the curriculum” (2006, p. 41). Therefore, faculty need to understand how to incorporate technology into the curriculum most effectively.

As mobile computing becomes more prevalent on college campuses and in everyday life, it is important to understand the limitations, challenges, and expectations this movement brings. The purpose of this manuscript is to provide selected examples of how PDAs and tablet PCs are currently being used on college campuses and suggest further ways that these mobile technologies can enhance learning inside and outside of the traditional classroom.

## EXAMPLES OF PDA AND TABLET PC USE FOR TEACHING AND LEARNING

Futurelab reported many exciting PDA projects for K-12 education in several countries, including the United Kingdom, the United States, and Canada. For example, in the United Kingdom, a project called Hand e-Learning, enabled children to have “24/7” access to information technologies. The handheld device became a tool to support personalized learning across the curriculum, at home, school, and for fieldwork. In the United States, the Student Centered Learning Project, aimed for students to use handhelds for listening to their own reading, making drafts of their work, using concept mapping tools for planning and using the camera to make nature notebooks. In Canada, the Paperless Classroom for Biotech Course allowed students to use handhelds to submit assignments, gather data using probes, keep notes, and access the Internet for documents, class information, and conferences (Faux, McFarlane, Roche, & Facer, 2006).

Two higher education examples of using PDAs for teaching and learning stand out. At Virginia Commonwealth University (VCU), they have several innovative PDA projects. Two health-related projects involve providing the right information at just the right time. For medical students, PDAs were loaded with various medical reference software to use when they were working with patients. For nursing students, video clips of procedures about nurse anesthesia are downloaded for quick reference in the field. For the general university population, VCU developed channels on the AvantGo web site, a mobile Internet network, to communicate content to students and faculty via their PDAs and implemented infrared kiosks around campus so that mobile PDA users could easily sync to the network to use email and download web clipping content (Sommers, Hesler, & Bostick, 2001).

At Wake Forest University, software engineers developed a software application that turns a Pocket PC into a web server. Faculty and students can then use their Pocket PCs as real-time quizzing devices, presentation controllers, and class communication devices. The application, called ClassInHand, includes the following functionality: a) presentation control for PowerPoint slides; b) text feedback enabling students to submit text to the web server through a form in the browser; c) a feedback meter enabling students to submit numbers through a browser form, creating a continuous graph on the instructor's Pocket PC; and d) a quizzing and polling feature (Bishop, Dinkins, & Dominick, 2003).

The most common applications of Tablet PCs were the teacher using it as a slate with a wireless projector to deliver a presentation. This activity mimics using a blackboard or overhead transparencies. Where each student has a tablet, teachers planned collaborative activities that also included passing documents electronically for revision and posting and presenting them for the class to discuss (Amirian, 2004).

Pen computing indicative of tablet PCs have several advantages, most notably in the writing process, for problem-solving, and when empowering student understanding. When editing a document during the writing process, the keyboard has limitations. Pen technologies allow for ink annotations that could address balance issues, identification of redundancy, alignment of ideas, and sentence structure. For problem-solving, pen computing allows students to show their work as well as the problem solution. Using the pen gives students the ability to try multiple approaches and make intermediate notes and calculations that is meaningful to them. A tablet PC has the ability to simplify the note-taking process for students. Software solutions such as Microsoft OneNote and Agilix GoBinder permit a combination of typewritten and handwritten notes, graphic images, web pages, and multimedia. Additionally, all this information is searchable (Backon, 2006).

At the University of Washington, specific pedagogical goals of using tablet PCs are to: a) increase student engagement; b) provide real-time feedback to the instructor on student understanding; and c) integrate student materials into classroom discussions. Classroom Presenter, a classroom interaction system, was designed for using tablet PCs in the classroom for active and collaborative learning. Faculty involved in this project believe that the long term value of student devices in the classroom will come from a combination of services including: a) access to outside resources; b) support for note-taking integrated with instructor's materials; and

c) allowing real-time classroom interaction in the context of the course content (Anderson et al., 2006).

## SUGGESTIONS FOR UTILIZING MOBILE TECHNOLOGIES

Students and teachers sometimes use mobile technologies in the same ways that they had used desktops and notebooks (Amirian, 2004). It is important to think through and plan how mobile technologies will be used for learning. Does the technology support the pedagogy? To maximize the benefits of personal ownership indicative of working with mobile technologies, pedagogical approaches and teaching styles could accommodate a more autonomous learner role. Learner responsibility should be considered (Faux, McFarlane, Roche, & Facer, 2006).

Tom Farrell, an expert on tablet PCs in education, has compiled a list of tips for using tablets in education. Some of his suggestions follow:

- Use pen annotations to add life and color to presentations. Handwriting adds a personal touch. Easily create freehand drawings.
- Share and post presentations before and/or after lectures. Annotations can be saved and viewed as extensions of the presentation.
- Incorporate electronic textbooks and related digital material. These materials can be projected, explored, and enhanced during class.
- Collect, grade, and return assignments electronically. Go paperless by using digital ink markup (Farrell, 2005).

Teachers and students agree that mobile technologies, such as PDAs and tablet PCs, provide immediate accessibility to information. Students are able to collect, store, and organize data. They can easily research, calculate, write, and share information. Handhelds encourage “the use of technology in everyday activities and enable students to understand the computer as a tool” (Van ‘T Hooft, Díaz, & Swan, 2004).

## LOOKING FORWARD

What is still missing for mobile technologies to become ubiquitous in teaching and learning? Van ‘T Hooft, Díaz, and Swan (2004) suggest that a handheld or mobile pedagogy is needed. In addition, professional development is necessary to give teachers and students the tools and ideas they need to tap into the full potential of mobile and ubiquitous computing.

As we look forward to experiencing the full potential of mobile and ubiquitous computing, consider the following learning challenges posed by Wagner (2005):

- Will wireless access in the classroom encourage or enable cheating?

- Will brevity of expression—characteristic of wireless communications—trump depth of knowledge?
- Will the “filter generation”—learners that multi-process and multitask using multiple media—learn how to think critically and communicate effectively while using today’s and tomorrow’s digital tools?

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