Wireless Computing in the Classroom Project

Quarterly Report: First Quarter

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1 Project Overview

The goal of this project is to investigate ways in which new and emerging technologies, such as multimedia laptop computers and wireless networking, can be used to improve teaching in the classroom. In particular, we are developing a wireless classroom environment in which each student is equipped with a laptop computer and a wireless network connection to the Internet. We are investigating the technical challenges of developing this environment. We are also exploring and developing new teaching techniques that use the environment to enhance the educational process.

Although still in the early stages, the project is on track with no expected changes to the scope or anticipated outcomes. Moreover the project has already received a lot of attention and the research done todate has already taught us an enormous amount about how wireless classrooms and the challanges involved in setting up a wireless educational environment. As for the budget, we have not had to make any adjustments with most expense estimates currently coming in at or below the proposed budget.

The following sections outline out accomplishments to date and describe our plans for the next quarter.

2 Accomplishments

During the past two months our primary focus has been on evaluating and selecting the hardware and software needed to create the wireless classroom environment. More specifically we

- **surveyed, evaluated, and ordered laptop computers.**

  We looked at laptops from several vendors, comparing features, software, and price. Features that we examined closely included the pointer/mouse device, battery life, and screen resolution since they play a big role in the machine's effectiveness in a classroom setting. We decide scratch pads offered the best mouse control, lithium ion batteries are necessary for extended use, and large color screens are needed to clearly see the multimedia data being presented. Our evaluation showed that dual-scan color would be sufficient (and in the correct price/point) and that cd-roms would be particularly useful to help reduce network traffic. Because we intend to use both Windows and UNIX based software, we looked for laptops able to run Win 95, Win NT, and Linux. We also wanted the price of the system to be within reach of the average student.

After evaluating several systems and loaner equipment and comparing prices, we ordered 22 Gateway laptops (133 Pentium, 32MB RAM, 1.3G HD, 11.3" dual-scan color, scratch pad, with lithium ion battery) which is a medium-price laptop certainly in the price range of students.

We are in the processes of evaluating Wacom tablets as an enhanced mechanism for stylus/mouse input.

- **surveyed, evaluated, and ordered wireless network equipment.**

  We investigated all existing wireless PCMCIA vendors for laptop computers and obtained loaner equipment to evaluate their performance. In particular, we wanted PCMCIA cards that had low power consumption, high transfer speeds, large coverage areas, good noise immunity, network drivers for Win 95, Win NT, and Linux, and IEEE 802.11 standard complaint. Unfortunately some of these goals are contradictory. In addition, we worked closely with UK communications to select a technology that could be used as a university-wide standard. We evaluated wireless equipment in both of the allocated wireless ranges (915 Mhz and 2.4 Ghz).

  After evaluating and comparing equipment from several vendors we ordered 2 Mbps WAVELAN PCMCIA cards and WAVEPOINT access points. WAVELAN was the only technology that worked with all three operating systems, was interoperable with other vendors (e.g., DEC Roamabout), supported both 915 Mhz and 2.4 Ghz in a single access point with an inexpensive upgrade path to their announced 10 Mbps technology (due out in a year). We selected 2.4 Ghz cards for their noise immunity and reduced power consumption.

- **performed a site survey.**

  After selecting the WAVELAN product line, we did a site survey with the WAVELAN equipment to determine the best locations for the network access points. We were able to develop a network plan that will use four access points to provide wireless coverage for four buildings at UK. Questions still remain as to whether existing bridges can be configured to ensure instantaneous cell handoffs between access points, but we can only test this once the access points are installed. The work order to install the necessary wiring has been issued.

- **begain developing on-line materials.**

  The three PIs have begun locating and developing on-line materials for use in the wireless classroom. We are currently investigating a wide range of approaches and software packages.

- **obtained related funding.**

  We have obtained additional funding through a research grant from Databeam Corp. to hire a research assistant to help convert course materials into on-line formats, evaluate different software packages for use in the classroom, and perform distance learning tests.

3 Plans For The Next Quarter

During the next quarter we plan to accomplish the following objectives:

- receive and configure the laptop computers and install the necessary software
- receive, install, and configure the wireless network cards in the laptops
- install the wiring between the access points
- configure and test the wireless network
- begin using the wireless classroom on a daily basis
- experiment with several different software packages for presenting multimedia data.
- continue to develop course materials for the web
- continuously analyze, evaluate, and refine the network system and the teaching techniques employed as we gain new experience