Artifact Report

From e-Learning to m-Learning: Wireless Technology and the Impact on Education

Sections of this report:
- Background
- Problem Statement
- Solution
- Rationale for Solution
- Analysis
- Results
- Evidence of Value
- Reflection
- Responsibilities

BACKGROUND

The web has thoroughly pervaded our society and allowed us to access information within seconds. It is difficult to imagine how the web could become more integral to our daily lives. Yet, it appears that the next revolution is right around the corner, and this technological transformation has the potential to fundamentally change the way training is done.

Recently, we moved from “just-in-case” instructor-led training to “just-enough, just-in-time” training. Along with it came the terms e-learning and blended learning. Now, students are again raising the bar and seeking “just-for-you” customized learning. Enter wireless technology and the concept of mobile learning (m-learning).

PROBLEM STATEMENT

There is no denying that we are living in an increasingly wireless environment. The trend toward ubiquitous wireless, handheld computing is upon us and the implications of students having widespread access to this technology are profound. It will force instructional developers (IDs) to re-think the way they design training materials. From condensed verbiage and chunking information to screen layout and security issues, everything is going to change.

The questions requiring research and analysis are: Should schools implement wireless technologies? What impact will wireless technology have on instructional design?
SOLUTION

The questions are: Should schools implement wireless technologies and what impact will wireless technology have on instructional designer? The solution to this problem lies in conducting thorough research to determine the pros and cons of implementing wireless technology...and to what extent.

A strong argument can be made for implementing wireless technologies. The potential for anywhere/anytime access is alluring, especially for universities. Students could access reference materials during lectures, respond to threaded discussions from the convenience of their dorm room or bedroom, download readings in a pdf format rather than stand in line at the bookstore. The mobility of the wireless network also adds value to existing computer programs. Students are not tied to the computer lab, or even to their desks.

As a tool of instruction, wireless technologies help support a wide variety of instructional practices. Wireless student response systems can help a teacher assess student learning. The novelty of the technology can also help with student engagement in the lesson. Wireless technologies have a cost effective, flexible configuration that can grow with the school. And, the choice doesn’t have to be wireless or wired. Wireless networks can work seamlessly with wired ones. Perhaps the most compelling reason to implement is the pervasiveness of wireless technology. Wireless is coming whether we like it or not. Increasingly students will grow up with this technology, and while the decision to implement is an individual one, schools without it will certainly be left behind.

RATIONALE FOR SOLUTION

There are many drivers contributing to the demand for wireless technologies and applications in the world. On the corporate side, the flexibility and mobility of wireless applications are most important. A wireless network allows training to be conducted anywhere, anytime. Employees are not tied to their desks. Laptops equipped with wireless cards can connect to the Internet or to the company intranet. Likewise, employees in the field can send and receive data through a Personal Digital Assistant (PDA) or similar device without being tethered to a wired network.

Another demand for wireless technology is based on saving time. People do not have the time to attend training classes. With a wireless network, information can be delivered “on-the fly,” giving the employee just-enough, just-in-time information to make it useful.
Economics are always a factor in the corporate world, and wireless networks can represent substantial savings over wired networks. A wired network, for example, is a better choice when trying to retrofit a network in a building not designed for wires. Maintenance costs are also cheaper.

Another driver for the implementation of wireless revolves around the events of September 11, 2001. In this post-9/11 world, the marriage of broadband Internet access and wireless technology has become a national goal. This push from the federal government will surely advance the development and implementation of wireless devices and applications.

As with the corporate world, flexibility and mobility are strong factors in the demand for wireless in educational settings. Envision the situation in countless school computer labs across the country—bulky desktops anchored in place by a tangle of wires and usually a lone student or two using a computer as a word processor for English papers.

Now envision a “wireless cart” wheeled into any classroom, laptops passed out like textbooks, and students connecting immediately to information on the Internet. This kind of flexibility and mobility decreases the amount of time spent on administrative tasks and increases the amount of time spent on instruction. Wireless technology and devices can also be a solution to the “digital divide,” which denies Internet access to lower socio-economic schools and children. Using a low cost wireless network, Internet access could reach into rural areas where wires do not currently exist. Instead of spending money on just a few computers, schools could invest in numerous PDAs and use them in place of laptops. Obviously cost savings is another driver behind the demand for wireless technology in educational settings.

**ANALYSIS**

With the advance of wireless, many devices have appeared in the marketplace and in education. Among the most popular are Personal Digital Assistants (PDAs), Student Response Systems (SRS), tablet PCs, remote controls, headsets, projectors and printers.

Probably the most significant wireless device as far as education is concerned is the PDA. But, is it possible to do serious teaching and learning on a PDA? The answer to this question is dependent on the applicability and robustness of the hardware and software being used.
PDAs have always been good for handling routine daily tasks, but their use in education was quite eye-opening. It is almost to the point that if it is possible on a computer, then it is also possible on a PDA. Entire chemistry books can be downloaded, complete with a pen-based interface to draw molecules. Math functions that used to be illustrated in two dimensions on a TI-85 are now on PDAs. The three dimensional modeling capabilities, available within a PDA, enable students to more fully understand the concepts.

One of the most fascinating and rapidly growing uses for PDAs is in the healthcare field. The concept of converting old-fashioned charts to electronic health records (EHR) started in Europe about seven years ago. Numerous countries collaborated to come up with standards and methods that enable patient data to be shared among doctors and healthcare workers in different locations. Today the EHR is extremely popular in larger hospital settings where patient information can be securely transmitted from Norway to Denver and then accessed in the patient’s room from a PDA.

Not only were PDAs used to access patient records, but they also became an invaluable tool in the delivery of training. Lessons and certification courses available on a computer were soon transported to PDAs. One notable advantage of using PDAs to deliver instruction is that it forces interactivity, generally using the stylus. With the ever-increasing storage on these devices, the lessons will undoubtedly become more and more robust.

Along with the adoption of PDAs came devices that were used as part of a Student Response System, which involves a sending device—either a PDA or a clicker—and a receiver. The devices provide for interactive classroom questioning with almost instantaneous feedback—the data available for later analysis. This real-time feedback mechanism allows the teacher to know if the learners are absorbing the material and, if necessary, to correct or repeat misunderstood concepts.

Tablet PCs are essentially a cross between a regular PC and a PDA. Instead of having a keyboard, a digital pen serves as a user interface device. It enables the saving, searching and reviewing of handwritten documents, text or drawings. Conversion of handwritten notes into typed text is converted for use with other applications. The ability to annotate documents from multiple applications encourages teacher-student interaction. MIT (Massachusetts Institute of Technology) has adopted the policy of giving its students tablet PCs. They have
had remarkable results in fostering creativity, especially with the engineering students.

Many other wireless devices have indirectly affected the look and feel of education today. Wireless remote controls with laser pointer have enabled a more efficient method for instructor presentations and wireless printer adapters have eliminated the nuisance of transferring information from a PDA to a PC and then to a printer. With a wireless printer adapter and a Bluetooth-enabled PDA, the print job is merely a click away.

One of the most popular wireless devices that is currently being used worldwide is the wireless cell phone headset. Bluespoon,™ one of the newer models being sold, is the smallest headset available, weighing less than 10 grams. Using wireless instead of corded headsets is just one more step in facilitating communication. Envision two students in different locations with PDAs displaying the same complex problem. The two students are discussing solutions with each other with their cell phones in their backpacks, but with tiny wireless headsets. What a world we live in!!

RESULTS

Wireless technology will force instructional developers (IDs) to re-think the way they design training materials. From condensed verbiage and chunking information to screen layout and security issues, everything is going to change. With e-learning, educational development moved from a “just-in-case” focus to a “just-enough, just-in-time” focus, and more and more students are seeking a “just-for-you” customized education. Developers, therefore, must take a less teacher-directed and a more student-centered, constructivist approach to future development.

As wireless technologies evolve, designers will need to continually become more personalized for the audiences who access the lessons. The content must be easily accessible and navigable, and changes made to content since the last visit should be readily apparent. In this respect, developers of wireless instructional materials should take note of such recent commercial Web sites as My Yahoo or My MSN, and so forth. On these sites, interfaces and content are tailored to the user’s needs and history, and other material of little interest to the user is filtered out. The need for this kind of filtering is made more evident when considering the screen space and memory capacity most wireless users are afforded.
Wireless users should be able to take advantage of the relevant content and collaboration available on a site without being overwhelmed by either a media-heavy environment or a lack of organization within and between pages. The solution might be a hybrid system that would cache information on the local handheld device. Some helps would be navigation maps and notifications of updates upon arrival at a site. In a more sophisticated environment, one might also consider an intelligent agent that would “push” notification of new content to participants before they log in, prompting a visit to the site at a convenient opportunity.

Anytime, anywhere access will allow wireless to infuse more interactivity into the design of content. As a result, there will need to be a large number of small modules and a high degree of user interfaces with these modules. This will enable more effective human-computer communication as these devices make it possible for users to be always connected and therefore have information pushed to them and be able to respond almost immediately.

Another way to enhance interactivity would be through the use of advanced web forms that allow user input beyond text typed from a keyboard. It is at least likely that users would, of necessity, be restricted to making responses using pen, voice, or symbolic (icon) inputs.

Other design considerations include:

- Intuitive operation and screen layout
- File sizes that aren’t too large, yet large enough to convey the intended message
- Using simple images
- Using words judiciously. Similar to poetry, every word should count.
- Using hierarchical indexing
- If possible, providing for chat capabilities

**EVIDENCE OF VALUE**

While wireless devices are approaching ubiquity today, the industry is still in its infancy. To say the best is yet to come is an understatement. While wireless devices work well today, the improvements we’ll see in the future will undoubtedly be vast. Fortunately, the industry is growing up quickly, and it won’t be long before expectations nearly match actual performance.

Currently, there is little empirical data about the potential impact of wireless technology on teaching and learning. Many articles state that students enjoy
using the latest and greatest devices and as a result have become more involved with their learning. Conventional wisdom suggests that learning is enhanced when the students are interested and motivated by interactive courseware.

Companies are finding ways to develop content and services that will dramatically improve the learning experience. The key to making this successful will be to stay focused on the learners’ experience without getting distracted by the newness of the device itself. At the end of the day, what’s most important is that learners come away with a greater experience.

**REFLECTION**

This project was one of the most enjoyable and insightful projects I researched while in the Information and Learning Technologies program. The topic of wireless is emerging quickly and new, fascinating information is emerging daily. Recently, we moved from “just-in-case” instructor-led training to “just-enough, just-in-time” training. With the advent of wireless and the concept of “mobile learning,” we will soon be required to create “just-for-you” customized learning.

Another thing that made this research project enjoyable is working with teammates, Jim Ladd and Debby Paulson. Both individuals are personable and driven to do a thorough job in everything they do. Collectively, we uncovered a wide range of technologies and interesting applications.

When I leave the ILT program, it is my intention to seek speaking opportunities in one of the niche areas in the wireless market. It would be an extremely gratifying to conduct presentations while employing entertrainment principles.

**RESPONSIBILITIES MET**

_Responsibility #1 – Continued improvement of professional practice that requires critical inquiry, professional development, and reflective practice_

No other project I worked on at UCD required more in the way of continuing my professional practice than this one. Critical inquiry, professional development, and reflective practices continue to expand, even though this project officially ended six months ago. Our research benefited the three of us; then, this information was shared with UCD cohorts and others in a professional society (ISPI). Furthermore, as a result of my exposure and subsequent interest in this area, I intend to continue this “information sharing” to countless others as I advance my professional career.