

MOBILE EDUCATION ON-DEMAND: TRUE ANYTIME/ANYWHERE EDUCATION

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ABSTRACT

Does true anytime/anywhere education exist yet? True anytime/anywhere education does not exist yet, but within the next five to ten years certain technological advancements will make true mobile education on demand a reality. Soon, high-speed broadband wireless networks will blanket the developed world combined with the continued miniaturization and proliferation of wireless hand-held devices which may soon become the preferred internet access tool. This article will discuss the challenges to wireless on-demand education and some of the possible advantages, as well as, how these technological advancements could affect post secondary education and corporate training as we know it.

TRUE ANYTIME-ANYWHERE EDUCATION?

The term anytime/anywhere education has been freely used for several years almost interchangeably with distance education. Does true anytime/anywhere education exist, or is it a fallacy? For true anytime/anywhere education to exist there must be true anytime/anywhere information access. Therefore, for true anywhere/anytime education to exist, one must have access to the internet from any location and have a form factor of a computer, such as a hand-held PC, available at all times.

We could be at the beginning of a paradigm shift in the way education and training will be delivered in the future. Imagine a world where we will have infinite access to data, at our finger tips, of every communication medium, at anytime of day, and at any location. That day will be here sooner than we think and could have a dramatic impact on training and education.

It was in 1993, only 10 years ago, that the internet was introduced into mainstream business and educational use. The internet has long been used in the traditional classroom as a research tool, communication tool, and self-directed learning tool. The impact of the internet on education, especially distance education has been enormous. In fact, web-based education and distance education have basically become synonymous terms.

Distance learning and the use of technology in education are not new concepts. Shortly after the advent of the postal system came the concept of distance learning through correspondence courses. Thus, the first distance learning model was born. In "Online Distance Learning in Higher Education, 1998-2002," IDC forecast that the number of students taking distance learning courses is expected to grow from 710,000 in 1998 to 2.23 million in the year 2002, an estimated growth rate of 33% (Loh, 2001).

Web-based learning has become the main vehicle to supply so-called anytime/anywhere education. For true anytime/anywhere education to exist two technologies must proliferate: 1) wireless, seamless internet access networks, and 2) wireless mobile, handheld devices such as Handheld PCs. Loh (2001) looked at the current feasibility of using "portable devices" within Web-based learning environments. Loh states that several factors are converging to create the increased use of portable devices in education. First, we are becoming increasing mobile

“nomadic” as a society. Thus, we increasing need to fulfill our educational desires while we are on-the-move. Second, the low cost and proliferation of wireless networks and internet access points. Finally, the low cost and proliferation of handheld computing devices. Basically, learners increasingly want and need access to learning tools at anytime, and from anywhere.

WIRELESS MOBILE DEVICES IN EDUCATION

During the late 1990s to the present, digital, wireless, and micro-electronic technologies have lead to an ever-increasing number of small, mobile devices with increased computing and communication capabilities which have become a part of our everyday lives. As stated by Frauenfelder, the field of mobile computing is currently one of the fastest growing industries. Within 18 months of Palms introduction in 1996, one million units were sold. In 1998, the sales rose to 3.9 million in the U. S., with the latest forecast for 2003 reaching 20 million, which could exceed the sale of desktop computers (Loh, 2001). Additionally, technologies are converging and mobile devices are becoming multifunctional. As evidenced by the fact that Portable Digital Assistants (PDAs) include cellular phone technologies and cellular phones often include PDA functionality.

Wireless handheld devices have a distinct advantage over laptop computers because they are cheaper and less expensive. Shields and Poflak (2002) state that PDAs might be the mobile computing technology that will revolutionize the learning process. With an average cost between \$100 and \$300, PDAs could decrease the digital divide by lowering the cost considerably for computing power and internet access (2002).

Often, the world of education has tried to incorporate new technologies into curriculum design and instruction. This is certainly true in higher education and distance learning. Today, many educational institutions such as Harvard, Cornell, Duke, Stanford, University of California Los Angeles, and Ohio State, deploy PDA solutions for both academic and administrative purposes (Shields & Poflak, 2002).

At Purdue University, instructors have added the convenience and appeal of wireless PDAs to large lecture courses, using them for quizzing, connected to WebCT’s testing engine (Homan & Wood, 2003). At Texas El Paso, instructors are doing research on the effectiveness of using tablet PCs for note taking in the classroom (Ward, 2003). Additionally, a few professors at Carnegie Mellon are using PDAs to periodically take a poll of students during lectures to assess the level of understanding of the material just presented (Bartel, 2003).

Roach (2001) addresses the trend of increased PDA use at colleges and universities. In a few schools, such as the University of Minnesota-Deluth, academic departments have mandated students to use PDAs in their classes. The academic departments which are starting to mandate the use of PDAs are computer science, engineering, business schools, medical schools and law schools. Additional colleges and universities with prominent PDA initiatives for undergraduate study include George Fox University, East Carolina University, Carnegie-Mellon University, and Penn State University. In fact, the University of South Dakota is the first university to mandate that all incoming freshman, and first year law and medical students are required to own and use a handheld computer (Carr, 2001).

Shields and Poftak (2002) write a comprehensive article on the current state of handheld devices in education based on reports from pioneers in the field of technology and education. They believe that PDAs small size, minimal energy requirements and reasonable prices make them an interesting choice for educators.

Shields and Poftak (2002) discuss how PDAs can also be equipped with wireless modems to allow internet and network access. This means that students can access the Web from anywhere there are access points to wireless networks. Students can also instantly communicate with either other students or with their teacher and receive immediate feedback.

WIRELESS NETWORKS IN EDUCATION

Wireless access points, also known as “hot spots” have increased dramatically over the past couple of years. Almost every major university has started to install wireless access points on their campus. Between 1998 and 2001, Carnegie Mellon deployed a wireless network with 400 access points that covered almost 4 million square feet, almost 100% of the campus (Bartel, 2003). Additionally, Case Western Reserve University opened 1,230 wireless access points which will provide free internet access to all on campus. Case Western’s initiative was part of the OneCleveland plan to blanket the city with free wireless access (Long, 2003). Bartel (2003) also believes that it is important to add wireless access points that go beyond the classroom, such as student housing areas, dining areas and meeting areas because students have come to expect wireless network connectivity as an accepted utility. Wireless networks are mainly used by students on campus to access e-mail, browse the web, download information, and use instant messaging for collaborative projects.

THE CHALLENGE TO WIRELESS MOBILE EDUCATION

Handhelds may be the technology that will enable all students to have computing access, but there still are some key obstacles that need to be overcome (McLester, 2001). There are many technological issues which must be addressed for wireless mobile devices to take their place in education. First, the devices need to be more durable. Second, the prices need to continue to drop. Third, the LCD screen sizes need to be increased. Fourth, input technologies need to be improved, such as hand writing recognition and voice recognition software. Fifth, computing power and memory storage need to equal that of today’s notebook computers. Sixth, there are two competing operating systems, the PALM operating system and the WindowsCE operating system. Until one operating system is the clear standard, many consumers will not invest their time and money in handheld mobile devices. Seventh, which form factor of wireless mobile devices will become the standard? Will it be a PDA, a mobile phone, a tablet PC, handheld PC, or even possibly a wearable device similar to a watch or pin (Bartel, 2003)? Eighth, high-speed internet bandwidth needs to be readily accessible and inexpensive. Finally, wireless seamless internet connectivity will need to replace the current wireless “hot spot” format.

Other challenges exist from the user and software development side. Wireless handheld devices will need to lose their stigma of being fancy, expensive, luxury items that are mainly used to keep one’s schedule and address book. Loh (2001) states that expected PDA and handheld PC sales for 2003 are 20 million. But if we compare handheld sales to recent estimates of the

population of the United States (roughly 300 million), that would mean that less than 1 in 10 Americans currently owns a PDA or handheld PC. Although software development cycles seem to be much shorter for PDAs and handheld PCs, the amount of software currently available in these formats is considerably less than what is available for the traditional PC format.

Common academic challenges include: 1) the need for technical support. What happens when you have built a lesson that requires students to have their own devices, and then for some reason one or more are non functional (Homan & Wood, 2003), 2) the digital divide either caused by location, lack of technical competence or the inability to afford a wireless handheld device, 3) educators refusing to learn to use and apply new technologies in their curriculum or as McCann (1993) points out, professors do not typically have an incentive to learn new technologies and apply that technology to their curriculum development, and 4) the increased expectation that newer technologies be used in the classroom by students who are familiar with the technology.

WHAT COULD THE FUTURE OF EDUCATION HOLD?

If we accept the research that suggests providing students with their own computers can help increase achievement in reading, writing, analytical skills, and increase school attendance; then finding a computer that can create a one-to-one computer-to-student ratio is vital. Handheld devices have that potential (McLester, 2001).

Now that we know the challenge ahead of us, let's take a look at what is already taking place that will create a marriage of handheld devices with wireless communications capabilities a reality inside and outside the classroom. Wireless networks are becoming increasingly inexpensive and can be installed in the home for less than \$100. Many retail eating establishments such as McDonalds, Starbucks, and even gas station chains have installed wireless hotspots in several locations as an added benefit to eating at their locations. Additionally, many hotel chains are installing wireless networks as a service to their business travelers.

Rapid advancements in wireless bandwidth capabilities have already taken place over the past few years. We have moved from the 802.11b format, to the 802.11g format, to the 802.11a format. Each format allowing connections speeds several times faster than the previous generation of wireless connectivity. Also, course management software programs such as WebCT can be used to easily put curriculum in digital format on the web. Additionally, programs such as WebCT have partnered with PALM to integrate WebCT curriculum offerings with the PALM OS operating system, thus, making WebCT curriculum a true mobile curriculum.

According to Strauss (2003) the mobility of wireless devices will allow a major paradigm shift in the delivery of education. In the future, our personal computing will become even more distributed, with a combination of smaller, unobtrusive, integrated devices and seamless wireless connectivity. Greater bandwidth and wireless connection speeds may produce much better audio and video data streaming and more natural, intuitive interaction and collaboration (Grush, 2003).

Globalization, instant access to data, high expectations for professional document design and creation, miniaturization, portability, and wireless communications are creating new sets of parameters for how we communicate (Everett, 2002). According to Shields and Poftak (2002)

the convergence of several phenomena such as distance learning, web-based learning, nomadic business and education practices, wireless technology, decreasing technology costs, and miniaturization of technology seem to be the factors that are causing an increased use of PDAs and Pocket PCs in the academic environment.

McLester (2001) identifies handheld devices as one of the top 10 technological breakthroughs for schools. In fact, companies such as Microsoft are banking on their belief that portable computers will play a key role in their ability to provide anytime-anywhere access to learning. Palm, Mindsurf and Compaq are marketing their product's as the low cost alternative to desktop computers, and spending millions of dollars providing grants to schools in California, Nebraska, West Virginia and New Jersey to use for science, social studies, gym and language arts classes (Trotter, 2000).

We are moving toward a world of education where wireless freedom will allow true anywhere/anytime education or what I call *Mobile Education on Demand*. "Education on Demand" was first coined by John McCann, a Marketing professor at Duke University in 1993. McCann (1993) prophesized that education would one day come in packets, or personalized doses, that would provide the right education, at the right time, in the right amount, "Education on Demand".

McCann's definition of "Education on Demand" was before the advent of the internet and wireless technologies as we know it today. Certainly having access to an instructional Pilates video while exercising at home is a form of education on demand, but this is not *Mobile Education on Demand*. McCann's definition of education on demand requires that the individual have both the "information" and the "form factor" for education on demand to take place. Versus *Mobile Education on Demand* which only requires the individual to have a "form factor" (i.e., a PDA) to access information via a wireless internet connection.

Many times, people study and learn at places and times that are distinctly different from the places and times that they apply their knowledge. People go to school to learn, and they go to work to apply their knowledge. It is the rare that we learn what we need to know at the point and place that we need to know it. The emerging technologies previously discussed can change this existing world to one characterized by *Mobile Education on Demand*. A world in which a business person can get training on a business topic at the point and place that s/he needs the training (McCann, 1993). A world that will allow people anytime/anywhere access to knowledge, information, training and education at your fingertips.

The impending technological developments constitute an upcoming critical point that may have a major impact on universities in the coming decades. The losers will be those schools that are fixed in place, ones that require their students to come to them. The winners will be those schools that recognize the potential and can re-orient themselves to take advantage of the enabling technologies as they become available (McCann, 1993). Just look at the proliferation of online universities over the past five years. The profitable universities will be those who learn how to use the technologies to leverage the valuable time of the educators and the successful businesses will be those who use these new technologies to maintain a highly trained and educated workforce.

This review provides insight into the current status of wireless, handheld devices in web-based learning, but more importantly, insights into the issues associated with the increased use of wireless handheld devices in education and web-based learning. The use of mobile computing and wireless communication technology provide the basis for a new educational model, "Mobile Education on Demand." This educational model will no longer be restricted by time or location. Rather, the focus will be on providing effective educational interactions when and where it is needed. True anytime, anywhere education.

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