

Smart Learning through Pervasive Computing Devices

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INTRODUCTION

An increasing number of educators are calling for high standards and challenging learning activities for students. Learning blended with technology can especially provide all possible sources of education. The technologies are not only going to act as technical add-ons to the system but also they can try their best to improve the quality of education.

New technologies can provide meaningful learning experiences for all learners, especially those who are in the developing countries. Educational centers that capitalize on the technological and educational reforms will help students to develop higher order skills and to function effectively in the world beyond the classroom. Achieving such fundamental change, however, requires a transformation of not only the underlying pedagogy but also the kinds of technology applications typically used in classrooms serving at-risk students.

The vision of classrooms structured around student involvement in challenging, long-term projects and focused on meaningful, engaged learning is important for all students. Yet such a change in practice would be especially dramatic for those students who have been characterized as *economically disadvantaged* or *at risk*. Traditionally, schools have had lower expectations for such students. Teachers have emphasized the acquisition of basic skills for at-risk students, often in special pullout programs or in lower level tracks.

BACKGROUND

The impact of technology is seen everywhere—at work, at home, and, indeed, at educational institutions. Educators, policy makers, businesses, and other community groups are

looking to technology as a tool for reshaping and improving education.

The educational sectors, whether academic or training divisions, have enjoyed the benefits of technologies in various ways. The technologies used for education range from the storage device technologies to the recent e-learning technologies. Earlier computers were used for storing the contents as well for better information presentation only. With the advent of e-learning, new dimensions are realized by learners, educators, and administrators.

The e-learning environment, where the use of electronic tools like computers and the Internet deliver content, has emerged as the fastest growing segment in the field of education/training and development. The “e” in e-learning focuses on the technology-enabling feature of the learning. The e-learning environment came to forefront for taking the traditional classroom training model and applying technology advancements to create new ways for teaching and learning (Thorpe, 2004).

According to the report produced by the National Committee of Enquiry into Higher Education (2001), the rapid growth in e-learning, has overcome many of the barriers of higher education, thereby providing universities and educational sectors with an opportunity to meet the changing demand for education. The advent of e-learning is inevitably linked to a number of challenges. The real challenge of e-learning centers most on the usage pattern. The biggest myth surrounding e-learning is, “Build it and they will use it.”

Recently, e-learning is evolving from the initial technology-driven approach towards a more measured, sophisticated evaluation of its strengths and weaknesses. Recently, the “e” has shifted the focus of learning and training onto the choices in design and delivery of education. But soon, the focus of learning and education will be back where it should be—on learning; the act, process, or experience of gaining knowledge or skill.

The modern-day learners demand knowledge and content that are more sophisticated, dynamic, interactive, and more relevant. Both the learners as well the organizations that depend on them need to learn new skills quickly, and they should have the ability to apply them at the right time. The problem of how to get inside an expert's head and transfer the wealth of knowledge that resides there is being aided by e-learning. While this remains a real challenge, we are beginning to develop tools and approaches for better capturing of that knowledge and delivering it directly into the hands of those who need the same knowledge.

In cases where e-learning is appropriately deployed, educators can generally anticipate student academic performance that is at least equivalent to traditional classroom instruction (Cavanaugh, 2001).

MAIN FOCUS—MERGING PERVASIVE COMPUTING AND E-LEARNING

Generations of Computing

In this history of computing, we have seen several various generations of computing. Initially, the mainframe computing was introduced to enable several people to share one large computer. The problem was that individuals have to personally be present in the proximity of such systems—then came the personal computing era. Personal computers are general purpose devices, designed to do any task. Though it is advantageous, PCs can not be flexibly used for any individual task, that is, not human centric. Another problem related to them is that they are not highly secured. While focusing on stability, security, or transparency aspects of the system, the user's flexibility may be limited.

Network computing is the next big thing that happened. As distinct from stand-alone computing, this term first appeared informally in the late 1970s to denote computers working together over a network. It later came to have a specific technical meaning, denoting a graphical form of remote computing. This led to the introduction of Internet computing.

The growth of the Internet today has exploded into the latest craze. It is the newest wave of communication through e-mail, file transfer, telnet access, transaction applications, and more. This in turn with the invention of World Wide Web has revolutionized computing to a greater extent.

In the history of computing the move towards the next generation of computing—the fourth generation—has happened (see Table 1). Over time, the cost and size of computers has reduced significantly to allow more people to participate in the world of computing (Amor, 2001).

Pervasive Computing

Pervasive computing is the integration of computing power into almost anything, including household equipment, toys, housing, furniture, or even a coffee pot. The name pervasive computing tells only part of the story; a parallel revolution also exists in network-enabling these pervasive computing devices by providing transparent, ubiquitous access to e-business services (Satyanarayanan, 2001). Pervasive solutions enable anytime, anywhere information exchange and access to applications. Davis (2002) points out the analysis of the implications and consequences of pervasive solutions as “anytime/anyplace computing” (p. 3) for future knowledge work.

It is done by natural interaction and control of the ambient environment by people and by artifacts. Interfaces used in pervasive computing support natural communication such as speech and gestures taking into account the user's preferences, personality, and context of use, and enabling multisensory interaction.

Pervasive computing is about making technology and computers disappear. In fact, the more technology becomes transparent, the more business will prosper. The move is towards linking devices like mobile phones, hand-held digital devices, automobiles, refrigerators, and several other easy-to-use devices to the Internet, thereby allowing people to connect anytime, anywhere. It will be pervasive—global—and it will change forever the way we think about the Internet.

Pervasive Approach to e-Learning

Pervasive computing, sometimes called ubiquitous or nomadic computing, describes not only a class of computing device that does not fit the form factor of the traditional personal computer, but also a set of new business models supporting these devices. Ubiquitous computing, prior to pervasive computing, defines a world where computers and associated technologies become invisible and thus makes

Table 1. Generations of computing

Type	Features
Mainframe computing	Many people sharing one large computer
Personal computing	A person works with one computer
Internet computing	One person using several services through global network
Pervasive computing	Many devices serve several people in a personalized way on a global network

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