Chapter 4.6
Ubiquitous Computing Applications in Education

Kostas Kolomvatsos
National & Kapodistrian University of Athens, Greece

ABSTRACT

With the development of technology, new roads have been opened in education. An interesting idea is to use computers in teaching and learning procedure. Students will have the opportunity to gain access to information resources in a timeless and limitless way. Teachers will be able to transform their classes in a student-centered environment, avoiding the drawbacks of the traditional teacher-centered model. In this direction, ubiquitous computing has significant advantages. Ubiquitous means that computational devices are distributed into the physical world, giving us boundless access to communication and information channels. Now, knowledge can be built based on collaboration, communication, experimentation, and on students' experiences. Research has shown positive impacts on learning. This chapter deals with issues directly connected to ubiquitous computing, such as its features, types of devices used, and pedagogical goals. The advantages and disadvantages of ubiquitous environments are fully examined and some initiatives are referred.

INSIDE CHAPTER

With this effort we try to cover the subject of ubiquitous or pervasive computing in education. We present important issues related to it. The first is the features of this technology. It is important to see and understand them. We also describe the connection means in a pervasive environment. Devices are basic elements of such systems because all educational activities are based on them. Devices vary from those with small screens to those with larger screens. Another separation may be given based on their computational capabilities. We also deal with the pedagogical goals that must be implemented. It is a crucial part of such efforts because the desired result is to assimilate and efficiently teach the students. We describe the advantages and disadvantages of the referred technology. As we will see, ubiquitous computing offers a lot of interesting advantages, but on the other hand, there are open issues that must be taken into consideration. The last part is devoted to the description of some initiatives that take or took place in universities and schools. We describe some platforms that may be used to

construct learning environments, most of which originated in the USA. Of course, there are common characteristics between these attempts, but their number is large enough to force us to describe only a few. These were randomly selected.

INTRODUCTION

New technologies have brought many changes in teaching, and of course in learning. Traditional classrooms are being transformed in order to utilize the advantages of the technology.

Ubiquitous computing (also known as "Pervasive," "Ambient," "1 to 1," or "one to one") is about distributed computing devices in the environment, with which users are able to gain access to information resources. These devices can be wearable computers, or sensors and computers embedded in everyday objects. On the other hand, ubiquitous computing involves the necessary infrastructures needed to support pervasive computing applications.

Ubiquitous computing integrates technology into the environment, giving the opportunity to users to utilize it anytime and anywhere. It differs from traditional systems where the user is bonded to a computer in a specific place. Now it is possible for a user to utilize the technology without the restriction of place or time.

Ubiquitous computing may provide significant advantages in the application domain of education. It can offer continuous access to a wide range of software, or the Internet, to all students, as well as teachers. As we will see below, the main targets of using pervasive techniques in education are efficiency in teaching and learning, equality between all students as to access to technology, regardless of their economical state, increased student engagement with their lessons, and different approaches according to the students' needs (Bonifaz & Zucker, 2004).

This chapter is organized as follows. The next section gives information about the examined technology, and the third section describes its basic features. In the fourth section, a full description of the means that are being used in order to help a user connect and utilize ubiquitous facilities is given. The fifth section describes the pedagogical goals of the use of pervasive computing, and in the sixth section, the advantages and disadvantages of the emerged technology are given. In the seventh section, we outline some initiatives in this research area, and in the eighth section, we give a specific case study. Finally, our conclusions are depicted in the last section.

BACKGROUND

Ubiquitous computing environments are different from what one traditionally finds in most school settings. It offers to all students and teachers continuous access to a wide range of software, electronic documents, the Internet, and other digital resources for teaching and learning. These initiatives' goals include increasing economic competitiveness, reducing inequities in access to computers and information between students from wealthy and poor families, and raising student achievement through specific interventions. Other reasons cited for supporting laptop initiatives include improving classroom culture, increasing students' engagement, making it easier to differentiate instruction according to students' needs, and solidifying home-school connections (Bonifaz & Zucker, 2004).

The UK government and Scottish executives have listed a number of priorities for ubiquitous education for the 14+ age range. This list is discussed in Smith (2002) and Sutherland (2002). According to authors, the priorities posed are:

- Widening participation of students
- Increasing the diversity of students in education
- Quality and standards through the use of ubiquitous computing

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