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U-Learning: The Next Generation of Learning

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Abstract

This paper talk about newer possibilities and domains related to the third era of computing known as ubiquitous computing-one person using many computers. After the initial impact of computers and their applications in education, the introduction of e-learning and m-learning epitomised the constant transformations that were occurring in education. Now, the assimilation of ubiquitous computing in education marks another great step forward, with Ubiquitous Learning (ulearning) emerging through the concept of ubiquitous computing. It is reported to be both pervasive and persistent, allowing students to access education flexibly, calmly and seamlessly.

The technologies that disappear are regarded as sophisticated. They weave themselves into the fabric of everyday life until they are indistinguishable from it. (Mark Weiser, 1991) Mark Weiser, a researcher at Xerox PARC, coined the term 'Ubiquitous Computing' in the late 1980. It refers to the process of seamlessly integrating computers into the physical world. As we move towards a more ubiquitous computing environment, the presence of computers is becoming less conspicuous and will eventually blend into our everyday lives.

Weiser's third wave in computing describes a many to one relationship between computer and human (Weiser, 1993). This relationship is common in the evolving ubiquitous computing era. This also correlates to the u-learning concept currently emerging. Each student interacts with many embedded devices. In the ubiquitous classroom, students move around Ubiquitous Space (u-space) and interact with the various devices.

The development of a ubiquitous learning environment combines the advantages of an adaptive learning environment with the benefits of ubiquitous computing and the flexibility of mobile devices. Students have the freedom to learn within a learning environment which offers adaptability to their individual needs and learning styles, as well as the flexibility of pervasive and unobtrusive computer systems.

Meaning of u-learning

U-learning means "everywhere learning" (the internet or learning content follows people around). Core "knowledge pots" (work-related content, personal knowledge, internet) hold content and information. Various devices plug in and retrieve the information in the appropriate format (PDA< cell phone, lapton, or any other technology gadgets). It fulfills e-learning's promise of "anytime, anywhere, and any context".

Essentially, U-learning is the extend and advance form of E-learning, and also can be viewed as a combination of the advantages of E-learning and M-learning with the benefits of ubiquitous computing and the flexibility of mobile devices. Students have the freedom to learn within a learning environment, which

offers adaptability to their individual needs and learning styles, as well as the flexibility of pervasive and unobtrusive computer systems.

The ubiquitous learning environment

A ubiquitous learning environment is any setting in which students can become totally immersed in the learning process. To define:

Ubiquitous = pervasive, omnipresent, ever present, everywhere

Learning educational, instructive, didactic, pedagogical

Environment = surroundings, setting, situation, atmosphere

So, a ubiquitous learning environment (ULE) is a situation or setting of pervasive (or omnipresent) education (or learning). Education is happening all around the student but the student may not even be conscious of the learning process. Source data-is present in the embedded objects and students do not have to DO anything in order to learn. They just have to be there.

Characteristics of U-Learning

The following are the important characteristics of ubiquitous learning:

- **Permanency:** Learners never lose their work unless it is purposefully deleted. In addition, all the learning processes are recorded continuously everyday.
- **Accessibility:** learners have access to their documents, data, or videos from anywhere. That information is provided based on their requests. Therefore, the learning involved is self-directed.
- **Immediacy:** Wherever learners are, they can get any information immediately. Thus, learners can solve problems quickly. Otherwise, the learner can record the questions and look for the answer later.
- **Interactivity:** Learners can interact with experts, teachers, or peers in the form of synchronies or asynchronous communication. Hence, the experts are more reachable and the knowledge becomes more available.
- **Situating of instructional activities:** The learning could be embedded in our daily life. The problems encountered as well as the knowledge required forms. This helps learners notice the features of problems situations that make particular actions relevant.
- **Adaptability:** Learners can get the right information at the right place with the right way.

Adaptation of u-learning in an educational setting

The ULE resides within the physical environment. Microprocessors are embedded in objects, or devices. The use of wireless and mobile technology makes them easily accessible and contributes to educational functionality. The wireless and mobile devices include mobile phones and PDAs. A TILE can

provide the props and stimuli needed to easily encourage student involvement but without needing the active attention of the student.

The benefits of the many to one relationship found in u-learning include the potential for one ULE (of many devices) to service an unlimited number of individuals at once. Essentially, the many to one relationship exists for every one of the students within the environment.

In designing the ULE, the application of learning theories is an important consideration. Jacobs (1999) states that using learning theories in educational design helps to create a relationship between the information, the learner, and the environment. Gersten and Baker (1998) explain that when this relationship does occur there is a greater chance that the student will retain the information within their own knowledge base. For example, if a student can understand why and how something happens in nature, such as why and how a seed will sprout in soil and not in rocks, rather than just being told that it is true; the information has more relevance and therefore more meaning. Put simply, once an individual understands a concept they are more likely to remember it. A lack of understanding results in the opposite, as Jacobs (1999) explains: ... if learners learn facts of information that are isolated from a meaningful context, their understanding is often incomplete and meaningless. There are, of course, a number of learning theories that have been presented over the years. However, for this ULE model the theory of constructivism is applied.

The ULE model

The two main factors in this design are the 'what' and the 'how'. The 'what' is the model itself which resembles an interactive learning gallery and uses a wireless network with both Bluetooth and WiFitechnologies. The 'how' is the inclusion of pedagogical information which is based on constructivist theory, allowing students to create knowledge from what they see, hear, read and perceive. Students using the ULE will intuitively interpret their surroundings and construct their own knowledge.

The ULE model is not unlike the interactive guides currently being produced and implemented in large museums. Electronic museum guides provide an information service to aid museum culture and tend to mimic or replace human guides; however, this model is designed for use in the education sector rather than entertainment or enrichment. Also, the source information is meant to be both adaptable and flexible, allowing updates and amendments to be applied through the network's database. In this way curriculum changes can be easily achieved.

Types of U-learning

These are a few of the most common types of U-learning.

- Mobile Based Learning (MBL):

  Mobile devices accompany users in their everyday experiences and become a convenient source of information or means of communication that assists with learning. Mobile devices provide just-in-time access to learning resources, news information, planners, address books, calculators, and so forth.
- Technology-Based Learning (TBL)

Technology-based learning includes deployment of methods that use recent technological developments such as computer-mediated communication, videoconferencing, multimedia, groupware, video on demand, desktop publishing, intelligent tutoring system, virtual reality and so on.

- Web-Based Training (WBT)

  Generally web-based learning, e-learning uses streaming media, text, and graphics to develop exciting learning environment that is deployed right on the user via the internet. In that method, Learning takes place through Internet.

- Synchronous e-learning

  Synchronous c-learning means learning and teaching takes place at the same time while the trainer and learners are physically separated from each other. Synchronous learnings are as follows: Internet telephony, Web conferencing, Online lectures, and Audio/video conferencing.

- Asynchronous c-learning

  Asynchronous c-learning means that the user can take the training indent of any schedule. Asynchronous c-learning does not need a facilitator or instructor. Asynchronous c-learning are the following: Self-paced courses taken via internet on CD-ROM, stored audio/video level presentations or seminars.

  Components of the ULE include:

1. ***Microprocessors*** with memory will be embedded in every object/device. The information each microprocessor will hold will be about the object. When a student approaches, the sensor detects their presence and will start relaying information to the student's PDA.
2. ***ULE Server Module*** will include the Server, the Educational Strategies Unit and a Database: The ULE server manages the network resources; The Educational Strategies Unit allows for the application of strategies to reinforce and aid student understanding through interaction and feedback. It analyses student responses to short quiz questions and returns more information or information in a different form when needed; DataBase — stores all the data about the 'objects/devices', the users and the interactions that occur.
3. ***Wireless technology*** **—** this will be in the form of Bluetooth and WiFi: Bluetooth has weak signal strength, uses little power and covers a relatively short distance. Its low power consumption and ability to communicate with many devices is extremely beneficial when using handheld devices. WiFi, based on the IEEE 802.11 specification, has a range and speed which surpasses that of Bluetooth. It is compatible with any brand of Access Point and client hardware built -to the WiFi standard (Brevard User's Group, 2002)

4. ***Sensors*** will be used to detect any changes in surroundings. These will be placed adjacent to the objects/devices and will be used to recognise the presence of students. The sensors used will include proximity, to detect movement, and light, to detect changes in light intensity.

The ubiquitous learning centre

In the Ubiquitous Learning Centre each student will carry a wireless device (PDA or mobile phone) fitted with headphones. The ULE Server Module tracks and locates each student within the u-space by the use of sensors. When a student approaches an object, sensors wirelessly access the intranet and ULE Server Module and transmit information about the object. The data is then transmitted from one of the objects in the Ubiquitous Learning Centre to the student's handheld device.

The type of content suitable to be taught within the ULE includes knowledge based iplines such as History, Geography and the Sciences, which require knowledge transfer, reflection and active (physical or mental) participation. This may also be referred to as museum, or gallery, style learning which caters for the primary learning styles of visual, aural, and kinesthetic/tactile learning. Students are encouraged to create their own knowledge from their surroundings as they move around in u-space and interact with various objects and devices. Constructivist theory is used to allow students to build knowledge from what they see, hear, read and perceive.

Benefits of U-learning

The following are the some of the benefits of ubiquitous learning:

Any where and any time

A participant can access the learning programme at any time that is convenient not just during the specific is set for a conventional course. The participants do not have to meet. That means they can be anywhere. International sharing is feasible. Individuals can log on at work, home, the library, in a community-learning center or from their hotel when traveling.

Faster learning

With U-learning students will learn up to twice as much in half the time that they would in classroom teaching. This is because the course progresses as fast as the students can without worry for other student or an instruction.

Consistent Instruction

Every instructor has his or her own style, which may not be best for students learning. Some day the instructor is in top form and delivers a great class, other days he or she may be bored, tired or simply unmotivated. With u-learning the course is software driven and each student receives the same high quality content.

Conclusion

The concept of ubiquitous computing and u-learning goes beyond portable computers. As new technologies evolve and more pervasive forms of technology emerge, computers will become 'invisible' and will be embedded in all aspects of our life. They will be seamlessly integrated into our world in a phenomenon referred to as calm technology. Wearable computers and embedded microchips are not as unbelievable or mind boggling as they were when first depicted in early science fiction novels and movies. Many technologies have become integrated into our lives over the years, for example: the telephone; television; PCs; the Internet and mobile phones. These innovations may have appeared strange and futuristic at first but, over time they blended into our everyday lives. In this age of progress and great change, we tend to easily adapt to the technologies and pedagogies that emerge. Ubiquitous technology and u-learning may be the new hope for the future of education.

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