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Ubiquitous Learning Unveiled: Educational Aims, Implementation Techniques, Digital Tools, and Barriers

Gati Krushna Nayak,Sitanath Biswas
Dept. of Computer Science and Engineering, GIFT Autonomous, Bhubaneshwar, 752054, India
Email:sitanath@gift.edu.in

Abstract:

By utilising technology, Ubiquitous - Learning enables people to learn at any time and from any location. Training, the distribution of knowledge at the right moment, and professional advice may all be provided through Ubiquitous - Learning. Increasingly more students are using it as a learning strategy in higher education institutions as a result of the fast development of Internet technology. To successfully meet the demand to quickly acquire current information in productive situations, Ubiquitous - Learning enables users to successfully gain knowledge and education using both synchronous and asynchronous approaches. There are now a number of restrictions on Ubiquitous - Learning. This review article covers a variety of Ubiquitous - Learning objectives, strategies, technologies, and e-limitations. learning's Both asynchronous and synchronous techniques are the core emphasis of Ubiquitous - Learning approaches. The three main Ubiquitous - Learning tools were the subject of the paper. The report also examined E-technical Learning's limitations in relation to personal matters, comparisons with on-campus learning, design concerns, and other problems. In order to support a "anytime" learning paradigm, the article concludes by recommending the integration of synchronous technologies into asynchronous settings. It also makes the observation that Ubiquitous - Learning has to overcome a number of challenges.

Keywords: Ubiquitous - Learning; Methodology; Tools; Limitation; Synchronous Tools.

Introduction

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What is ubiquitous - learning?

a) Ubiquitous - Learning is instruction delivered through a network, a standalone computer, or the Internet. Ubiquitous - Learning is essentially the network-enabled transmission of information and skills (Fig-1). Ubiquitous - Learning is the practise of learning using electronic tools and procedures. Digital collaboration, Web-based learning, computer- based learning, and virtual classrooms are all examples of Ubiquitous - Learning applications and procedures. EL refers to the delivery of material via satellite TV, the Internet, intranet/extranet, audio or video cassette, and CD-ROM. The names "Internet- Based training" and "Web-Based training," along with other versions of the term "Ubiquitous - Learning," are still used today. Personalized learning is a component of EL that goes beyond traditional training and education [1],[2]. The Ubiquitous - Learning programme has six main objectives, which are as follows: A) Practitioner confidence and skills
b) Access and choice for students
c) Systems and tools that are adaptable and flexible
d) facilitating, affordable technical infrastructures e) eLearning rules and procedures that are enabling and flexible
f) Institutions that offer flexible learning possibilities and encourage work-based learning through Ubiquitous - Learning.

Fig-1: Ubiquitous - Learning devices

With its quick access to specialized knowledge and information, Ubiquitous - Learning marks a revolutionary change in the area of education [4]. Through a variety of electronic learning solutions, including Web-based courseware, online discussion groups, live virtual courses, video and audio streaming, Web chat, online simulations, and virtual mentorship, it provides online teaching

that can be provided at any time and anywhere (fig-2).

By offering a unified virtual learning environment, Ubiquitous - Learning allows firms to overcome distance and other organisational obstacles. To remain competitive, businesses must educate and train their partners, clients, workers, and suppliers. Ubiquitous - Learning can deliver this just-in-time training in an economical manner. One may need to connect the dots between the goods and services offered by many suppliers in order to develop and implement efficient Ubiquitous - Learning programmes. Identifying the objectives of the intended learning solution is a good place to start. The following variables influence how an Ubiquitous - Learning solution's objectives are defined:

3.1 Perform task analysis

Identify the activities that need to be taught, their subtasks, and other components, as well as the knowledge, abilities, and attitudes needed to carry them out successfully.

3.2 Perform a needs analysis for training.

Determine who will receive the training. Determine the audience's knowledge, skill, and attitude gaps and what the target learners need to know.

3.3 Examine current capacities

Examine current systems and infrastructure for delivering instruction or addressing learning requirements.

3.4 Establish objectives

Identify specific demands for ROI and/or expectations from the intended Ubiquitous - Learning solution. Setting objectives is the first step in developing an Ubiquitous - Learning plan. What is the goal of the Ubiquitous - Learning strategy? Without a thorough grasp of the objectives of the Ubiquitous - Learning plan, success will be challenging, if not impossible. Organizations must establish shared goals or objectives prior to implementing Ubiquitous - Learning. The following are typical aims and goals:

3.5 To save money on education

As a small company owner, you are aware that internet transactions are far less expensive than those using paper or personnel. The same is true with online learning because there are no documents, delays, or travel costs. to shorten the amount of time needed for successful learning "Just-in-time" learning is another name for electronic learning. Employees that get this type of training are able to apply what they have just learned to the work at hand.

3.6 To inspire workers

Ubiquitous - Learning is regarded as a successful method for keeping up with current technologies, generating fresh ideas, and inspiring your team.

3.7 To increase course delivery flexibility

The majority of smaller enterprises lack the personnel to oversee their programmes for training and development. These administrative limitations can be circumvented by Ubiquitous - Learning technology.

3.8 To increase the company's capabilities

Small businesses must make better use of their high-potential personnel. Employers can advance their employees' contributions with the use of Ubiquitous - Learning. The following are some more targets:

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To decrease the need for classroom instruction, to monitor employee growth, and to gauge the efficiency of training (or absorption) integrating knowledge management and training to cut down on time spent away from work and to boost productivity in order to further company goals to make education accessible everywhere, at any time.

Many businesses use employment cuts or cost savings from reduced travel expenses to later justify their Ubiquitous - Learning projects. Even while these are real cost reductions, and Ubiquitous - Learning effort shouldn't be driven only by them. When compared to in-class training, Ubiquitous - Learning must show that employees are learning more effectively and remembering more of the material.

IV. CATEGORIES OF UBIQUITOUS - LEARNING

4.1 Courses

The majority of Ubiquitous - Learning debate centres on academic programmes. Courseware for education is often adjusted, expanded, and added to using a variety of media before being transferred to a networked environment for online access. Today, educational institutions employ a number of well-liked learning management systems (LMS), including WebCT and Blackboard. Ubiquitous - Learning and classroom environments are quite comparable since both students and teachers are involved in the same course structure and flow.

4.2 Informal Learning systems

The informal learning method, according to Wikipedia, "has no curriculum and is not professionally planned but rather arises unintentionally, intermittently..." One of the leading proponents of informal learning, Jay Cross[14], characterises it like follows: Most of us learn how to execute our professions through informal learning, which is unofficial, unplanned, and spontaneous. Informal education is similar to riding a bike in that the rider choose the destination and the path. The biker has the flexibility to divert at any time to take in the view or assist another rider. Cross believed that in the job, we learn more during downtime than in a classroom setting. Via informal learning, sometimes through trial and error and other times through dialogues, we advance more quickly in our careers.

4.3 Blended Learning

A smooth transition from in-person instruction to online instruction is made possible through integrated learning. Online and face-to- face instruction are both used in integrated learning, which is also known as blended learning. One cannot overstate how effective this approach is. It promotes evaluation of knowledge and information outside of the classroom. In blended learning, face-to-face education is combined with a variety of delivery modalities, including collaborative software, web-based courses, and computer communication techniques. The best classroom instruction is combined with the greatest online instruction in integrated learning.

4.4 Communities

Learning happens in groups [1]. We frequently faced complex and unpredictable issues in our corporate environment. We are living in a global world, thus our approaches to issue resolution are always evolving. People converse with one other in the same organisation or network worldwide to other organisations as a result. Communities significantly influence how tacit knowledge is shared.

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4.5 Knowledge Management

Early knowledge management (KM) technologies included document management systems and online business directories for finding experts. In the middle of the 1990s, KM technologies grew along with the early development of collaborative technologies (particularly Lotus Notes). Later KM initiatives made use of semantic technology for search and retrieval as well as the creation of Ubiquitous - Learning resources for professional groups. Knowledge management is a crucial process that deals with how to foster a culture of knowledge sharing for activities like information exchange, adoption, and dissemination within an organisation. The link between the theory of Ubiquitous - Learning and the idea of knowledge management is strong, and it is producing confusion in the two domains.

4.6 Seven Learning Networks

Learning network is a procedure of developing and preserving relationship with people and information and communicating to support each other's learning. Therefore (LN) is enhancing and it offers chances to its members to engage online with each other, sharing knowledge and expertise. [13] States that, the use of pen and paper in our educational system today is producing inadequacy and challenges in the global era that we are in today where subject matter is changing speedily "Ubiquitous - Learning provides a new set of tools that can add value to all the traditional learning modes - classroom experiences, textbook study, CD-ROM, and traditional computer- based training." Old-world learning models do not scale to meet the new world learning challenges. Ubiquitous - Learning can provide the tools to meet that challenge.

V. Ubiquitous - Learning Methodologies

Ubiquitous - Learning has been used at many institutions, as well as a variety of training facilities and schools, thanks to the resources made available by communication technology. Web technology is used by Ubiquitous - Learning as its fundamental technical foundation for knowledge delivery. A greater need for technological assistance is anticipated in the near future because Ubiquitous - Learning is now on the rise in academic and industrial settings. The analysis, design documentation, implementation, and distribution of instruction over the Web should all be supported by software tools that assist the crucial process of instruction design.

A. Interaction in Learning

Interaction between a learner and a tutor and interaction between a learner and another learner are the two forms of human interaction that individuals are most accustomed to. As a result, the majority of research studies—especially those on computer supported collaborative learning—concentrate on these two forms of interaction (CSCL). According to [13], students should be more encouraged to actively engage and should see the medium as reasonably friendly and personal as a result of the online social interactions if collaborative rather than individual learning methods were employed in an online class. Higher views of self-reported learning were the outcome of the online course's more active group interaction and involvement. While those who worked online alone tended to be less motivated, report less learning, and do worse on the mastery exam. In CSCL, researchers often distinguish between two types of interactions between students and tutors and between students themselves. All participants in the first type of contact, known as synchronous interaction, must be online at the same time. Examples include voice

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over Internet Protocol (VoIP), video teleconferencing, text-based chat, instant messaging, virtual learning environments (VLEs), graphical virtual reality, and virtual auditorium or lecture room systems based on the internet. Synchronous engagement fosters quicker problem solving, planning, and decision-making and increases development chances. Heron et al. conducted research on the interaction in synchronously supported virtual learning groups in 2000. The researchers discovered that synchronous engagement, equal student participation, and content-related discussions with little off-task discourse may all significantly improve learning in virtual environments. However, synchronous contact is typically quite expensive, and it is also more limited because of time differences. The second kind is asynchronous interaction, in which students or instructors can engage at any time and from any place. Examples include communication via email, message boards, and bulletin board systems. According to some reports, extending interactions to times outside of class can lead to more consistent communication and stronger interpersonal relationships between students [12]. So, while synchronous contact cannot completely replicate a real classroom, asynchronous interaction can afford time for greater reflection and enable worldwide connection without being limited by time zone restrictions. As a result, asynchronous interaction rather than the more expensive synchronous contact is increasingly frequently offered in CSCL systems. A seven-step development technique is used for all Ubiquitous - Learning projects (fig-2).

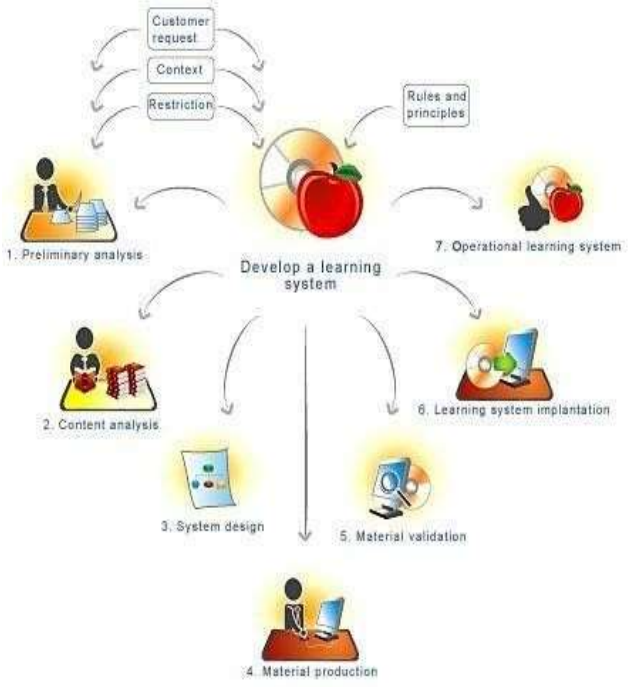

Fig-2: seven-step development methodology is applicable on every Ubiquitous - Learning

VI UBIQUITOUS - LEARNING TOOLS

Here, we'll talk about three different categories of Ubiquitous - Learning tools: curriculum, digital library, and knowledge representation.

6.1 Curriculum Tools.

a) For the supplied education, these instruments are employed in schools and colleges of the educational system. In order to facilitate class activities, materials are chosen and arranged. To facilitate cooperation and assessment, extra features are added, such as online forums and quizzes. Three interconnected components make up a typical commercial curriculum tool: administrative tools, student tools, and instructional tools. Curriculum design and online tests with automated grading are

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examples of instructional tools. Authentication and authorisation mechanisms for file management are included. Functions of student tools include:

b) browsing the course materials, including readings, projects, assignments, and other resources
c) Bulletin boards, discussion forums, and synchronous and asynchronous collaboration are examples of these.
d) Schedules for scheduling and monitoring learning progress, including activity logs, personal calendars, and reminders to turn in assignments.
e) Self-testing and evaluation: assessments created by teachers to gauge pupil performance
f) Blackboard and Web CT are the most widely used commercial curricular technologies.

6.2 Digital library Tool

It concentrates on finding resources. It aids in the phases of information search known as exploration and gathering. Search, browsing, and finding unique collections or exhibitions are frequently included in digital library services. To find resources and investigate connected subjects, search and browsing are utilised. Organized resources found in special collections or shows constitute a priceless resource for interested users.

6.3 Knowledge Representation Tool

It aids students in visually reviewing, retaining, or expanding their information. The majority of curriculum tools use a text-based, syllabus-based approach to conveying course material. This method frequently fails to clearly define how the ideas and abilities presented in one course relate to those covered in another. Additionally, it fails to demonstrate the body of information that a student will have attained by the completion of their academic programme.

When a visualisation tool creates spatial semantic displays of the information, concepts, and abilities that the learner knows and gains, it can involve both students and instructors in an active learning process. 2009's top 10 Ubiquitous - Learning discoveries (fig-3).

Fig-3: 2009 Top 10 Ubiquitous - Learning Tools

VII. LIMITATIONS OF UBIQUITOUS - LEARNING

The numerous drawbacks of Ubiquitous - Learning may be divided into three categories: technical, comparative to traditional campus, and personal.

7.1 Technological and hardware limitations

For Ubiquitous - Learning, students require the proper technology, such as desktop or laptop computers and printers (Kathawala, Abdou, Elmulti, 2002; Hiltz, 1997). Therefore, the requirement of computer hardware and pertinent resources is one of the main technological limits of online learning. Sambrook (2003) said that one of the reasons why Small and Medium Enterprises are reluctant to engage in Ubiquitous - Learning to educate its staff is the absence of hardware to enable it in organisations. Equipment and other ICT resources are required for the deployment of Ubiquitous - Learning at institutions. Even with

the introduction of fast DSL connections to replace old 14.4 Kbps capacity, technological limitations like insufficient bandwidth remain a problem in today's Ubiquitous - Learning in addition to the limited Internet coverage (Chadha & Kumail, 2002, p.28). Another instance of a sluggish connection was given by Roy (1996, p. 9) when Green Island and Rhode Island students were unable to respond to their instructor's questions during an online discussion session. Despite the fact that Ubiquitous

- Learning is meant to be a multimedia-rich learning environment, the restricted bandwidth may make it harder to study because downloading multimedia content may take longer. At Northern Arizona University and the National University of Singapore, video frames transferred over the Internet occasionally froze up and the audio occasionally cut out, respectively, as examples of inadequate transfer rates that impede video streaming (Collins, 2002; Lee and Al-Hawamdeh,

2001). Pachnowski (2003) added that the issues with video conferencing that were already stated delayed the start of class and added some more issues, such audio loss. Since the Internet's bandwidth may still be constrained, it is not unexpected that many Ubiquitous - Learning courses still rely on text.

7.2 Personal Issues

Carr (1999) noted that one of the challenges in Ubiquitous - Learning instruction is a lack of ICT skills. E-learners will need to learn new skills and responsibilities connected to the technology because Ubiquitous - Learning is a product of modern technology (Angelina, 2002a, p.12). Information and communication technology (ICT) experts should be e-learners. Technical proficiency may frustrate Ubiquitous - Learning students because of their separation from others and the unorthodox nature of the Ubiquitous - Learning environment, according to Hamid (2002). Therefore, for ICT beginners, needing to master new technologies may be a barrier or disadvantage in Ubiquitous - Learning.

Many people find that studying online is difficult since it takes a lot of self-discipline. According to Schott et al. (2003), students' capacity for self-direction and internal motivation greatly influences the success rate of Ubiquitous - Learning. Therefore, it makes sense for Rivera and Rice (2002) to state that learners who lack self- motivation would not enjoy web-based learning.

Learners must plan their assignments and manage their learning in an Ubiquitous - Learning environment (Grant & Spencer, 2003). As opposed to the typical learning environment, where students must attend certain classes in actual classrooms and complete their assignments or exams within a set amount of time, this is much different (Miller & Corley, 2001). As a result, Ubiquitous - Learning students could take longer to graduate than conventional students who must finish their coursework by a certain deadline (Choy, 2002). Students who struggle with writing may be at a disadvantage in an online learning setting (Smith & Rupp, 2004).

7.3 Restrictions in comparison to a traditional campus

According to McAleavy and McCystral's (1996) research, half of the University of Ulster students pursuing an Advance Diploma in Education noted that seeking help was more difficult than receiving face-to-face teaching. However, having actual classrooms would help students learn more quickly since they can constantly ask the teachers or their other students for advice. In Ubiquitous - Learning, body language is missing. One instance is when a pupil complained that he was missing "facial and hand movements," which are vital indicators (Meyer,

2003). According to McKnight (2000), the absence

of the physical interactions depicted above will impede learning since it will make it more difficult for professors or instructors to meet students' requirements. Ubiquitous - Learning is criticised for lacking resources found on traditional campuses, such as internship options, volunteer opportunities, access to physical libraries, book stores, and career and development counselling, in addition to this lack of personal connection (McCraken, 2004).

7.4 Design Restrictions

According to Ivergard & Hunt, inadequate Ubiquitous - Learning courseware design is a significant problem for both students and Ubiquitous - Learning providers (2005). Ubiquitous - Learning may be too technical for ICT beginners because it is primarily intended for the ICT knowledgeable (James-Gordon, Young & Bal,
2003). Additionally, Angelina (2002b, p.12) emphasised the significance of guaranteeing equitable access for students from various socioeconomic backgrounds and societal spheres. In essence, the course materials must be simple to use, come with thorough instructions, and ultimately be appropriate for all students. In addition, Kearsley (2000) said that before giving an online course, suppliers and teachers must take into account a variety of software programmes. The learner's pleasure may rise if the course materials are adequate (Grooms, 2003). Choosing a suitable courseware to support learners therefore appears to be a challenging issue.

Conclusion

One of the most significant explosions brought on by the internet revolution is Ubiquitous - Learning. This enables users to productively gain education and information using both synchronous and asynchronous methodologies to successfully address the demand to quickly learn current knowledge in professional situations. Through electronic information and communications technology, Ubiquitous - Learning distributes content (ICTs). [2] asserts that using these resources entails a variety of approaches, such as a systematised feedback system, computer-based operating network, audio and video conferencing, internet-based global websites, and computer-assisted training. The choices for how, where, and when employees may engage in lifetime learning are expanded by this distribution mechanism. In order to support the "Any-time" learning paradigm, we argue that synchronous tools should be incorporated into asynchronous settings. This environment would be predominantly asynchronous, with synchronous technologies that integrate into the asynchronous environment being used to manage background conversation, assignments, and evaluation. Ubiquitous - Learning also appears to be inappropriate for people without self-discipline, according to this research. Sometimes it takes a lot of self-control, mainly since students are busy working adults, as was previously said. Additionally, it appeared that e-learners needed preparation training, particularly in ICT skills, in order to get used to the Ubiquitous - Learning environment.

Reference

1. Attwell, G. (2007). Personal Learning Environments–the future of eLearning? eLearning Papers, 2(1). https://elearningpapers.files.wordpress.com /2007/01/elearning_papers_2_2007.pdf
2. Attwell, G. (2007). Context-Aware Ubiquitous Learning. International Journal of Emerging Technologies in Learning, 2(2), 8–14. https://www.researchgate.net/publication/ 32552343_Context-Aware_Ubiquitous_Learning

3. Chen, B., & Joo, Y. J. (2012). Understanding Ubiquitous Learning: A Conceptual Framework. Educational Technology & Society, 15(4), 30–44. https://www.jstor.org/stable/jeductechsoci. 15.4.30
4. Chiu, C., Lin, J., & Tsai, R. (2006). Understanding knowledge sharing in virtual communities: An integration of social capital and social cognitive theories. Decision Support Systems, 42(3), 1872–1888. https://www.sciencedirect.com/science/article/abs/pii/S0167923605001400
5. Salim, F., Abu Bakar, K., & Abawajy, J. (2009). Ubiquitous learning: A survey of tools, techniques and applications. International Journal of Emerging Technologies in Learning (iJET), 4(3), 5–19. https://www.researchgate.net/profile/Fazilah_Salim/publication/228900309_Ubiquitous_Learning_A_Survey_of_Tools_Techniques_and_Applications/links/5a4f4d5705a29a9b9a369d46/Ubiquitous-Learning-A-Survey-of-Tools-Techniques-and-Applications.pdf
6. De Laat, M., & Lally, V. (2006). The use of e-learning in higher education: Some common misunderstandings. British Journal of Educational Technology, 37(3), 429–439. https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1467-8535.2006.00598.x
7. Traxler, J. (2005). Defining, discussing and evaluating mobile learning: The moving finger writes and having writ… British Journal of Educational Technology, 36(5), 757–765. https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1467-8535.2005.00498.x
8. Anderson, T., & Dron, J. (2011). Three generations of distance education pedagogy. The International Review of Research in Open and Distance Learning, 12(3), 80–97. https://www.irrodl.org/index.php/irrodl/article/view/890/1830
9. Kukulska-Hulme, A., Traxler, J., & Chrismore, A. (2005). Ubiquitous learning: Small pieces loosely joined? British Journal of Educational Technology, 36(2), 241–250. https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1467-8535.2005.00461.x
10. Tay, C. N., & Loi, S. S. (2013). Ubiquitous e-learning: A review. International Journal of Digital Literacy and Digital Competence, 4(2), 16–26.
11. Sharples, M., Taylor, J., & Vavoula, G. (2007). A theory of learning for the mobile age. International Journal of Mobile and Blended Learning, 1(1).
12. Kim, K., & Bonk, C. J. (2006). The future of e-learning: Ubiquitous learning and the anytime, anyplace, anyone, and anything paradigm. Educational Technology & Society, 9(3), 100–111.
13. Magedanz, T., & Schaffers, H. (2010). Ubiquitous learning and its application in educational environments. International Journal of Interactive Mobile Technologies, 4(4), 17–23.
14. Miao, J., Li, J., & Chen, S. (2011). Ubiquitous learning: A review of research and applications. Educational Technology & Society, 14(3), 243–257.
15. Adell, J., Castaño, J., & Castaño, M. (2008). Ubiquitous learning: A review from the learning sciences perspective. Computers & Education, 51(2), 856–876.