

E-Learning Objectives, Methodologies, Tools and its Limitation

Devajit Mahanta, Majidul Ahmed

Abstract: *E-Learning is the use of technology to enable people to learn anytime and anywhere. E-Learning can include training, the delivery of just-in-time information and guidance from experts. It has become an increasingly popular learning approach in higher educational institutions due to the rapid growth of Internet technologies. E-Learning allows users to fruitfully gather knowledge and education both by synchronous and asynchronous methodologies to effectively face the need to rapidly acquire up to date know-how within productive environments. There is also present various limitations in E-Learning. This review work discusses on various E-Learning Objectives, methodologies and tools and limitation of E-Learning. The main focus of e-learning methodologies is on both asynchronous and synchronous methodology. The paper looked into the three major e-learning tools. The paper also looked E-Learning limitation in particular related with technologies, personal issues, comparison with traditional campus learning, design issues, and other issues. Finally the paper suggests that synchronous tools should be integrated into asynchronous environments to allow for "any-time" learning model and also given a remark that E-Learning needs to improve from various barriers.*

Keywords: *E-learning; Methodology; Tools; Limitation; Synchronous tools*

I. INTRODUCTION

E-learning includes all forms of electronically supported learning and teaching. The information and communication systems, whether networked learning or not, serve as specific media to implement the learning process [1]. This often involves both out-of-classroom and in-classroom educational experiences via technology, even as advances continue in regard to devices and curriculum. E-learning is the computer and network-enabled transfer of skills and knowledge.

E-learning applications and processes include Web-based learning, computer-based learning, virtual education opportunities and digital collaboration. Content is delivered via the Internet, intranet/extranet, audio or video tape, satellite TV, and CD-ROM. It can be self-pace or instructor-led and includes media in the form of text, image, animation, streaming video and audio.

It is commonly thought that new technologies can make a big difference in education. In young ages especially, children can use the huge interactivity of new media, and develop their skills, knowledge, and perception of the world, under their parents' monitoring, of course. Many proponents of e-learning believe that everyone must be equipped with basic knowledge in technology, as well as use it as a medium

to reach a particular goal and aim. In the 20th century, we have moved from the Industrial Age through the Information Age and now to the Knowledge Age. Knowledge and its efficient management constitute the key to success and survival for organizations in the highly dynamic and competitive world of today. Efficient acquisition, storage, transfer, retrieval, application, and visualization of knowledge often distinguish successful organizations from the unsuccessful ones. The ability to obtain, assimilate, and apply the right knowledge effectively will become a key skill in the next century. Learning is the key to achieving our full potential. Our survival in the 21st century as individuals, organizations, and nations will depend upon our capacity to learn and the application of what we learn to our daily lives.

E-learning has the potential to transform how and when employees learn. Learning will become more integrated with work and will use shorter, more modular, just-in-time delivery systems. By leveraging workplace technologies, e-learning is bridging the gap between learning and work. Workers can integrate learning into work more effectively because they use the same tools and technology for learning as they use for work. Both employers and employees recognize that e-learning will diminish the narrowing gap between work and home, and between work and learning. E-learning is an option to any organization looking to improve the skills and capacity of its employees. With the rapid change in all types of working environments, especially medical and healthcare environments, there is a constant need to rapidly train and retrain people in new technologies, products, and services found within the environment. There is also a constant and unrelenting need for appropriate management and leveraging of the knowledge base so that it is readily available and accessible to all stakeholders within the workplace environment.

II. WHAT IS E-LEARNING?

E-learning is an education via the Internet, network, or standalone computer. E-learning is basically the network-enabled convey of skills and knowledge (Fig-1). E-learning refers to using electronic applications and processes to learn. E-learning applications and processes include Web-based learning, Computer-based learning, virtual classrooms and digital collaboration. EL is when content is delivered via the Internet, intranet/extranet, audio or video tape, satellite TV, and CD-ROM. E-learning was first called "Internet-Based training" then "Web-Based Training" Today you will still find these terms being used, along with variations of E-learning. EL is not only about training and instruction but also about learning that is tailored to individual [1],[2]. There are six core aims of the e-learning programmed concern [5], they are-

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E-Learning Objectives, Methodologies, Tools and its Limitation

- A) Practitioner confidence and skills
- B) Learner access and choice
- C) Flexible, customizable systems and tools
- D) Enabling, cost-effective technical infrastructures
- E) Enabling, responsive e-learning policies and processes
- F) Institutions using e-learning to widen participation, deliver flexible opportunities, support work-based learning.

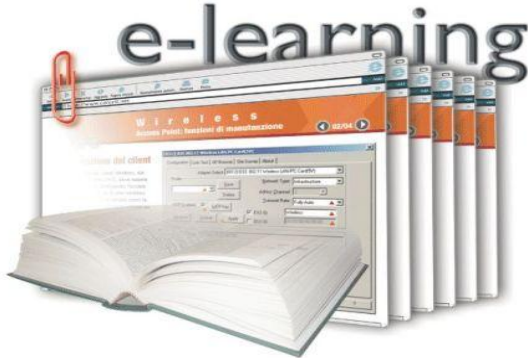


Fig-1: E-Learning devices

III. E-LEARNING OBJECTIVES

E-Learning represents an innovative shift in the field of learning, providing rapid access to specific knowledge and information [4]. It offers online instruction that can be delivered anytime and anywhere through a wide range of electronic learning solutions such as Web-based courseware, online discussion groups, live virtual classes, video and audio streaming, Web chat, online simulations, and virtual mentoring (fig-2).

E-Learning enables organizations to transcend distance and other organizational gaps by providing a cohesive virtual learning environment. Companies must educate and train vendors, employees, partners, and clients to stay competitive and E-Learning can provide such just-in-time training in a cost-effective way.

Developing and deploying effective E-Learning programs may require products and services supplied by a variety of vendors, leaving one to connect the dots. One way to start is to define the goals of the desired learning solution. Definition of the goals of an E-Learning solution is driven by the following factors:

3.1 Perform task analysis

Determine the tasks to be taught, identify subtasks and other elements involved, and identify the knowledge, skills, and attitudes required to complete the tasks efficiently and effectively.

3.2 Perform training needs analysis

Identify the target audience for the training. Identify the shortfall in knowledge, skills, and attitudes of this audience and determine what the target learners need to know.

3.3 Review existing capabilities

Review existing methods and infrastructure for providing training or meeting learning needs.

3.4 Determine expectations

Identify concrete expectations and/or ROI requirements from the desired E-Learning solution. The development of an E-Learning strategy begins by setting goals. What will the

E-Learning strategy accomplish? Without a true understanding of the goals of the E-Learning strategy, it will be difficult, if not impossible, to be successful.

Before implementing E-Learning, organizations need to set common goals or objectives. Common goals and objectives include the following:

3.5 To reduce learning costs

As a small business owner, you know that online transactions cost a fraction as much those requiring paper or staff. It's the same with E-Learning because there are no papers, no delays, and no travel expenses. To reduce the time required for effective learning Electronic learning is sometimes called "just-in-time" learning. Such learning enables employees to take what they have just learned from their computer screens and apply it to the tasks at hand.

3.6 To motivate employees

E-Learning is considered an effective way to keep up with new technology, to generate new ideas, and to keep your workforce fresh and inspired.

3.7 To improve flexibility of course delivery

Most smaller businesses don't have the staff to manage their training and development initiatives. E-Learning technologies can overcome these administrative restrictions.

3.8 To expand the capabilities of the business

Small organizations need to get more out of their high-potential employees. E-Learning helps employers take these employees to a higher level of contribution.

Other goals and objectives include the following:

- To reduce the need for classroom training
- To track employee progress
- To track training effectiveness (or absorption)
- To link training with Knowledge Management
- To reduce time away from the job
- To improve job performance
- To support business objectives
- To make learning available anytime, anywhere

Many organizations justify their E-Learning initiatives after the fact by eliminating related jobs or reducing training-related travel expenditures. Although these are viable cost savings, they should not be the sole motivation for an E-Learning initiative. E-Learning must demonstrate that employees are learning more efficiently and retaining more of the curriculum compared with in-class training.

IV. CATEGORIES OF E-LEARNING

These are considered as follows:-

4.1 Courses

Most discussion of e-learning focuses on educational courses. Educational course materials or courseware are usually modified and added with various different media and are uploaded to a networked environment for online accessing. Today, there are several popular learning management systems (LMS) such as WebCT and Blackboard which are commonly used by educational institutions. E-learning has distinct similarities

with classroom environment whereby both of the learners and the instructors are together related to the common course arrangement and flow.

4.2 Informal Learning systems

According to Wikipedia, "informal Learning system has no curriculum and is not professionally organized but rather originates accidentally, sporadically..." Jay Cross[14], one of the biggest advocates of informal learning, describes it like this:

Informal learning is the unofficial, unscheduled, impromptu way most of us learn to do our jobs. Informal learning is like riding a bicycle: the rider chooses the destination and the route. The cyclist can take a detour at a moment's notice to admire the scenery or help a fellow rider. Cross opined that in workplace we acquire more knowledge during break time than in a formal learning environment. We progress more in our jobs through informal learning, sometimes using trial and error and other times through conversations.

4.3 Blended Learning

Integrated learning provides a good transition from classroom learning to e-learning. Integrated learning which is also referred to as blended learning is a combination of a face to face and online learning. The productiveness of this method cannot be over emphasized. It encourages educational and information review beyond the classroom settings. Blended learning combines several different delivery methods, such as collaboration software, web-base courses and computer communication practices with face to face instruction. Integrated learning utilizes the best of classrooms with the best of online learning.

4.4 Communities

Learning is social [1]. The frequent challenges we battled with in our business milieu are sophisticated and unstable. Because we are in the global era, our methods of problem solving are changing daily. Therefore people dialogue with other members of the same organization or network globally to other organization. Communities strongly contribute to the flow of tacit knowledge.

4.5 Knowledge Management

Early Knowledge management (KM) technologies included online corporate yellow pages as expertise locators and document management systems. Combined with the early development of collaborative technologies (in particular Lotus Notes), KM technologies expanded in the mid-1990s. Subsequent KM efforts leveraged semantic technologies for search and retrieval and the development of e-learning tools for communities of practice. Knowledge management is an essential process which is concern with how to create atmosphere for people to share knowledge on distribution, adoption and information exchange activities in an organization. The semblance of knowledge management and the theory of e-learning reveals powerful relationship which is causing disarray between the two fields.

4.6 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 "E-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. E-learning can provide the tools to meet that challenge.

V. E-LEARNING METHODOLOGIES

With the resources provided by communication technologies, E-learning has been employed in multiple universities, as well as in wide range of training centers and schools. E-learning exploits Web technology as its basic technical infrastructure to deliver knowledge. As the current trend of academic and industrial realities is to increase the use of e-learning, in the near future a higher demand of technology support is expected. In particular, software tools supporting the critical task of instruction design should provide automated support for the analysis, design documentation, implementation, and deployment of instruction via Web.

A. Interaction in Learning

Learner(s) - Tutors(s) Interaction, and Learner(s) -Learner(s) Interaction: these two types of interactions are among humans, and they are the interaction forms that people are most familiar with. Therefore, most research studies are focusing on these two types of interaction, especially in the research of Computer Supported Collaborative Learning (CSCL). According to [13], if collaboration rather than individual learning designs were used in an online class, students should be more motivated to actively participate and should perceive the medium as relatively friendly and personal as a result of the online social interactions. This increased active group interaction and participation in the online course, hence, resulted in higher perceptions of self-reported learning. Whereas individuals working alone online tended to be less motivated, perceive lower levels of learning, and score lower on the test of mastery. In CSCL, researchers usually distinguish two types of interactions between learner- tutor and learner- learner. The first one, synchronous interaction, requires that all participants of interaction are online at the same time. Examples include Internet voice telephone, video teleconferencing, text-based chat systems, instant messaging systems, text-based virtual learning environments, graphical virtual reality environments, and net based virtual auditorium or lecture room systems. Synchronous interaction promotes faster problem solving, scheduling and decision making, and provides increased opportunities for developing. In 2000, Heron et al. studied the interaction in virtual learning groups supported by synchronous communication. They found that learning in virtual environments can be greatly enhanced by content-related dialogues with minor off-task talk,

E-Learning Objectives, Methodologies, Tools and its Limitation

coherent subject matter discussion with explanation, and equal participation of students supported by synchronous interaction. However, the cost of synchronous interaction is usually very high, and synchronous interaction is more constricted due to time differences. The second one is asynchronous interaction, in which learners or tutors have freedom of time and location to participate in the interaction, examples including interaction using e-mail, discussion forums, and bulletin board systems. It has been reported that by extending interactions to times outside of classes, more persistent interaction and closer interpersonal bonds among students can occur [12]. Thus, while one cannot totally simulate a real classroom with synchronous interaction, one can offer asynchronous interaction that provides time for better reflection, and allows global communication un-bounded by time zone constraints. Asynchronous interaction thus is more commonly provided in CSCL systems than the costly synchronous interaction. There are seven-step development methodology is applicable on every E-Learning (fig-2).

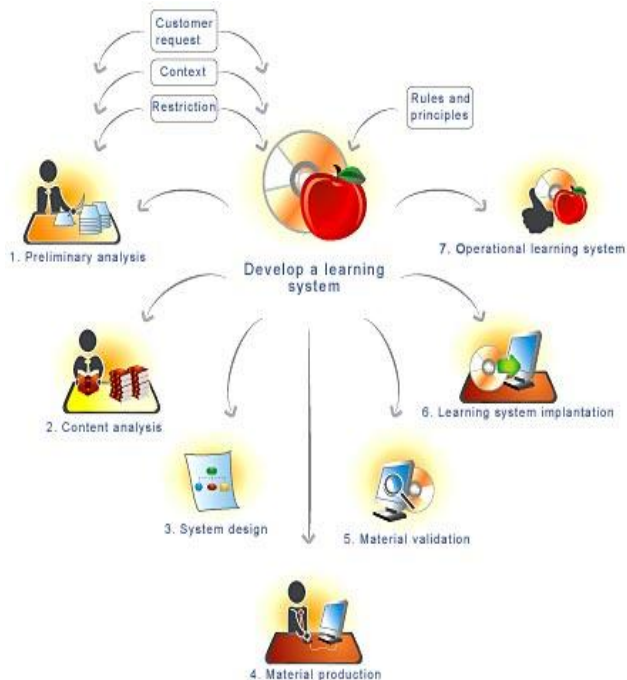


Fig-2: seven-step development methodology is applicable on every E-Learning

VI. E-LEARNING TOOLS

Here we discuss three types of e-learning tools: curriculum tools, digital library tools and knowledge representation tools.

6.1. Curriculum Tools.

This tools are used in school and college of education system for given education. Materials are selected and organized to facilitate class activities. Additional tools, such as discussion forums and online quizzes, are integrated to support collaboration and evaluation. A typical commercial curriculum tool includes three integrated parts: instructional tools, administration tools, and student tools. Instructional tools include curriculum design and online quizzes with automated grading. Administration tools include file management authentication, and authorization. Student tool functions include:

- Browsing class material: readings, assignments, projects, other resources
- Collaboration and sharing: and asynchronous synchronous bulletin boards and discussion forums.
- Learning progress scheduling and tracking: assignment reminders and submission, personal calendars, and activity logs.
- Self-testing and evaluation: tests designed by instructors to evaluate student performance
- Web CT and Blackboard are the most popular commercial curriculum tools.

6.2. Digital library Tool

It focus on locating resources. It support the exploration and collection phases of information search. Digital library features usually include search, browsing, and discovering special collections or exhibits. Search and browsing are used to locate resources and explore related topics. Special collections or exhibits contain organized materials representing a unique treasure for interested users.

6.3 Knowledge Representation Tool

It help learners to visually review, capture, or develop knowledge. Curriculum tools rely primarily on a text-based, syllabus approach to describing course content. This approach often fails to delineate the relationship of concepts and skills covered in one course to those covered in another. It also fails to show the knowledge base that a learner will have acquired at the end of his/her course of study. A visualization tool can engage both learners and instructors in an active learning process when they construct spatial semantic displays of the knowledge, concepts, and skills that the learner possesses and acquires. In 2009 top 10 E-learning find(fig-3).



Fig-3: 2009 Top 10 E-Learning Tools

VII. LIMITATIONS OF E-LEARNING

The various limitations of e-learning can be categorized as technological limitations, limitations compared to traditional campus, and personal issues limitations.

7.1 Technological and hardware limitations

Students need necessary hardware for e-learning such as desktop or notebook computers and printers (Kathawala, Abdou, Elmulti, 2002;Hiltz, 1997). Therefore, one of the major technological limitations of e-learning is the necessity of computer hardware and relevant resources. Sambrook (2003) mentioned that the lack of hardware to support e-learning in

organizations is one of the factors why Small and Medium Enterprises are not willing to Engage in e-learning to educate its employees. Hardware and other ICT resources are necessary for e-learning implementation in institutions. In addition to the limited Internet coverage, technological barriers, such as limited bandwidth, are issues in e-learning today, even with fast DSL connections introduced to replace outdated 14.4 Kbps bandwidth (Chadha & Kumail, 2002, p.28). Roy (1996, p.9) provided another example of a slow connection when students in Rhode Island and Green Island could not provide answers for their instructor during an online discussion session. While e-learning is supposed to be a multimedia-rich learning environment, the limited bandwidth may hinder the learning process as the downloading of multimedia materials may take a longer time. Good examples of poor transfer rate that hinders the video streaming happened in Northern Arizona University and the National University of Singapore, where video frames transmitted via the Internet could freeze up and the audio could be interrupted at times (Collins, 2002; Lee and Al-Hawamdeh, 2001). Pachnowski (2003) further mentioned the problems of video conferencing as listed above caused delay in class start time and some other additional complications like loss of audio. As a result, it is not surprising that many E-Learning courses are still text-based as the Internet bandwidth may still be limited.

7.2 Personal issues

Carr (1999) mentioned that the lack of ICT skills is one of the barriers in e-learning training. As e-learning is the product of the advanced technology, e-learners will have to learn new skills and responsibilities related to the technology (Angelina, 2002a, p.12). E-learners should be Information & Communication Technology (ICT) savvy. Hamid (2002) stated that technical skills could cause frustration to e-learning students due to the unconventional e-learning environment and isolation from others. Consequently, having to learn new technologies may be a barrier or disadvantage in e-learning for ICT novices.

E-learning is not an easy task for many as it requires a lot of selfdiscipline. Schott et al. (2003) asserted that the e-learning success rate was very dependent on students' abilities to be selfdirected and internally motivated. It is therefore reasonable for Rivera and Rice (2002) to comment that learners who are not self-motivated will find web-based learning an unsatisfactory experience.

In an e-learning environment, learners need to manage their learning and schedule their assignments (Grant & Spencer, 2003). This is rather different from the traditional learning environment where learners need to attend some courses in physical classrooms, and they need to do their assignments or take examinations within a certain time frame (Miller & Corley, 2001). As a result, e-learning learners may take a longer time to graduate, as compared to traditional students who need to complete their studies within a time frame (Choy, 2002). Learners with poor writing skills may be at a disadvantage in e-learning environment (Smith & Rupp, 2004).

7.3 Limitations compared to Traditional Campus

McAleavy and McCystral (1996) found out that half of the students for an Advance Diploma in Education from the University of Ulster commented that it was rather hard to seek advice, as compared to face-to-face instruction. Physical

classrooms however will enable learners to learn faster, as they can always refer to the instructors or peers for guidance. Body language is absent in e-learning. An example is when a student stated that he missed "facial and hand gestures", from which important cues can be derived (Meyer, 2003). The lack of physical interactions shown above will hinder the learning process as pointed out by McKnight (2000), that the omission of observation of student emotions may prevent professors or instructors from responding to student's needs. Apart from this lack of physical interaction, e-learning is also criticized for not having facilities like traditional campuses: internship, volunteer opportunities, access to physical library, book stores, career and development counselling (McCraken, 2004).

7.4 Design Limitations

Poor design of the e-learning courseware is a major issue for learners and e-learning providers, as pointed out by Ivergard & Hunt (2005). Since e-learning is designed basically for the ICT savvy, it may be too technical for ICT novices (James-Gordon, Young & Bal, 2003). Angelina (2002b, p.12) also stressed the importance of ensuring equality of access to learners from all backgrounds and walks of society. In short, the courseware should be easy to use and come with detailed guidance and ultimately be suitable for all learners. Kearsley (2000) also mentioned there that there are many software applications that the providers and instructors have to consider before offering an online course. The appropriateness of the courseware may increase the learner's satisfaction (Grooms, 2003). Therefore, selecting an appropriate courseware to suit learners seems to be a difficult task.

VIII. CONCLUSION

E-learning is among the most important explosion propelled by the internet transformation. This allows users to fruitfully gather knowledge and education both by synchronous and asynchronous methodology to effectively face the need to rapidly acquire up to date know-how within productive environments. E-learning delivers content through electronic information and communications technologies (ICTs). According to [2], the use of these facilities, involves various methods which includes systematized feedback system, computer-based operation network, video conferencing and audio conferencing, internet worldwide websites and computer assisted instruction. This delivery method increases the possibilities for how, where and when employees can engage in lifelong learning. Finally we conclude that synchronous tools should be integrated into asynchronous environments to allow for "Any-time" learning model. This environment would be primarily asynchronous with background discussion, assignments and assessment taking place and managed through synchronous tools that integrate into the asynchronous environment. It is also finding that E-learning seems unsuitable for those individuals without self-discipline. Some times it requires a lot of self-discipline, mostly because learners are busy working adults as explained earlier. Besides, E-learners also seemed to need preparatory training especially in ICT skills in order for them to get used to e-learning environment.

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