E-LEARNING METHODOLOGIES AND ITS TRENDS IN MODERN INFORMATION TECHNOLOGY

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Abstract: E-learning is a technology that plays a major role in modern information technology. The e-learning content can be stored, searched, retrieved and assembled in order to provide learning just in time. E-learning is now an integral part in education and training as the learning materials are now available in internet and it can be accessed from anywhere and any time across the globe. Initially the idea of e-learning was to offer online courses but ultimately it was felt that it is too costly and also not flexible. The solution to this problem is given by learning object (LO) technology. The learning objects (LO) are basically small learning material content that can be stored, searched, retrieved and assembled to provide learning as and when it is required. The e-learning platform brings brand new concept and it is a kind of network information learning mode. E-learning may be considered as an assist learning forms to traditional education and self-learning mode of continuing education system. The e-learning methods can be used for traditional content and internal trainings for enterprises and it may be used much more efficiently in technology and engineering education also. The present paper examines a range of issues covering technology, teaching, learning and organizational issues and makes general recommendations for priorities that will promote the successful use of Information and Communication Technologies (ICT). The objective of this paper is to discuss the different methodologies adopted in e-learning and how we can construct Learning objects and this can be applied to develop e-learning material in a better way.

INTRODUCTION

Due to rapid growth in IT now knowledge transfer and updating knowledge has become extremely fast. E-learning platform appeared to get used to the needs of social development and interest of the common people. E-learning platform is digital media based technology and the digital resources are available in internet network. E-learning is a wide set of applications and processes which use all available electronic media to deliver vocational education and training[1,2,3,4]. The term covers computer-based learning, web-based learning, and the use of mobile technologies, it includes virtual classrooms and digital collaboration and uses. The expectations of users are growing up with new technologies and increasingly using them for productivity.

The e-learning market has been expanding and is predicted to grow significantly over the coming years. E-learning is a wide set of applications and processes which use all available electronic media to deliver vocational education and training. The term covers computer-based learning, web-based learning, and the use of mobile technologies and it includes virtual class rooms and digital collaboration and uses [5]. The main drivers for e-learning process continue to be a mixture of the initiation of new information technologies. The e-learning market place has been expanding and is predicted to grow significantly over the coming years. There are many identifiable drivers for ICT-enabled instruction [5, 6]. These may be classified as technical innovation, organizational and business developments, and the needs and demands of the individual learner. Often it is a combination of these three components that brings about change. The capabilities of

hardware, and the technical infrastructure to support it is improving rapidly and often lead to development in other areas. For example, technologies such as wireless access to high bandwidth and web-enabled mobile phones are released to a market and initially adopted by enthusiasts. People first go for Business then experiments with possible viable models for the efficient use of the technologies and methods for integrating them into organizational practices and culture. Finally, as end users become accustomed to the technology and the demographic profile shifts, they will more readily recognize its benefit and the technology becomes a part of their lives, and the cycle is complete. E-learning is efficient because it shortens the time required to update workers on new products and methods.

The supporters of e-learning suggest that it provides real-time learning of critical or just-in-time knowledge. With state-of-the-art e-learning management systems, training costs can be traced to individual learners and costs can then be measured against results. It is established fact that online training is better, faster, and cheaper than conventional training. E-learning has become an integral part of organizational training. E-learning may be delivered via numerous electronic media, including the Internet, intranets, extranets, satellite broadcast, audio/videotape, interactive television, mobile network and CD-ROM.

TRENDS IN E-LEARNING TECHNOLOGIES

Mobile Technologies:

In future, learning solutions and services will be integrated into mobile technologies as mobile phones, digital pen and

paper. In the long term, learning solutions and services are also likely to be integrated into electronic appliances, machines and information interfaces. For mobile learning there are two distinct potential markets which are evolving:

(1) The first one is the market of learning services for people those who are without infrastructure (accessibility to internet and e-learning may not be as wide spread in rural or remote areas) and learners in developing economies.

(2) The second one is the market of learning services for people who's jobs require them to continuously move, people learning and receiving information while visiting various sites and locations, certain type of students who need individual learning education, on the move and while on external projects. In Europe, mobile learning is beginning to develop, and telecommunications companies such as Nokia and Vodafone have already integrated these technologies into their training and development systems. However, the real growth across this sector remains to be seen. Any growth in this market is likely to happen in near future[6,7,8,9].

Simulation in e-learning Process:

For a number of years, simulations have played an important role in the training activities of certain sectors like the defense, aviation and aeronautical industries in several countries. They were not adopted on a large scale until now , due to the lack of tools for developing high-quality simulations and high cost of development. In the recent days the simulations are being adopted in other industries for a broad range of skills and competence development. Today the IT tools such as Macromedia Flash have become ubiquitous and e-learning vendors with simulation-development expertise are trying to offer more industry and topic specific simulation templates. The market for these kinds of learning services will perhaps continue to grow as simulation technologies become more sophisticated and more effective to build.

Adaptive learning environments (ALEs):

In the recent years there is a tremendous growth in awareness of the potential benefits of adapting learning in e-learning methodology. This is happening because the idea of individualized learning cannot be achieved especially at a massive scale using traditional approaches. A learning environment is considered adaptive if it is capable of monitoring the activities of its users such as interpreting these on the basis of domain specific models, inferring user requirements and preferences out of the interpreted activities.

Open Source e-learning tools:

There are quite a number of providers those who can provide learning management system(LMS). Most of these products have extensive developer communities and present strong arguments for considering open source applications like an alternative to commercial products. Open Source software applications are cost saving and stable. On the other hand for ensuring that users in the near future will have access to the best available applications. These Open Source software applications should be built on open standards. Time is coming when Open Source Software will play a big role for preparing e-learning tools.

E-learning in context:

E-learning has moved through a number of distinct phases - from Computer Based Training   to Learning Management Systems and Courseware Management Systems, to now include an increasingly broader scope of applications and activities. There are quite a   number of points to be noted here, which are as folows:

a. Ongoing development in dedicated e-learning software applications, commonly known as learning management systems (LMS) or managed learning environments (MLE) has evolved where many of the early LMS vendors now offer their LMS as one application within a suite of products

b. E-learning is now facilitated by an increasing range of specialized e-learning applications within the wider infrastructure and is not necessarily delivered bymanaged learning environment such LMS. Much of this learning happens in context, for example 'just in time' in the workplace.

Some Features of E-learning:

The features of E-learning application are :

a) Knowledge Networking: Knowledge studying is no longer from a book but a relevant professional knowledge databases.

b) Arbitrary learning: E-learning is an effective solution which can meet their learning schedule needs. For the employees, the study is long-term, whether in the office, home or anywhere as you can have time you can learn. In e-learning the employees can arrange study according to their schedule not just stand to the schedule from training institutions. This basically increases the degrees of learning freedom.

c) Learning content update in time and continuously: From the structure and operation mode of E-learning we can see that the resources within the repository can be updated together in real-time, a variety of learning materials with latest information.

d) The need for training: The traditional training staff need to tailor for training materials, arrange training venues and organize examination, logistics, and after that prepare for the next training.

According to technological developments and demands currently, establishing an intelligent E-learning system is still hard but combined the data warehousing with intelligent algorithms, E-learning system has already become a focus in public, and it is one of the current directions of E-learning research. E-learning system is a product of the development of social economic and IT technology, its development trends depend on the existing technology platform and the application effect of repository.

E-Learning methods:

In this section we will explore the different E-learning methods used in modern days. Table-1 shows the roles of traditional learners and the teachers:

Table-1

Participant	Role
Teacher	Makes structure of learning materials, defines learning activities, supervises and assesses learners work and helps learners.
Learner	assively accepts and uilds knowledge

Two most important classes of e-learning are experimental(means significant) learning and cognitive(means meaningless) learning. Studies showed that learners better acquire knowledge when they take active role in educational process. The emphasis thus shifts from the instructor and content-centred approach toward the learner-centered approach. The role of the teacher moves increasingly toward an advisor, guide and motivator. There are quite a lot of methods that can contribute to effective building of knowledge but many of them put project or problem-based learning as central point of interest. Problem solving techniques named problem-based learning can be used to engage learners in active knowledge building. Besides problem and project-based learning there are other similar learning methods including active learning, inquiry-based learning and service learning.

In active learning process the students must perform great effort in analysis, synthesis and evaluation. It means only listening is not enough on the other hand the students must take active role in discussing, writing, playing roles in simulation games and problem solving.

Inquiry-based learning based on recognition that science topics are question-driven, open-ended process and to understand this fundamental aspect of service, learners have to learn how to pose and refine questions and perform investigation and present the results. Furthermore, inquiry activities provide a valuable context for learners to acquire, clarify and clarify and apply an understanding of science concepts.

Service learning is a form of experimental learning involving community oriented service to enrich learning experience and further understand learning content. Thus learners are more interested in learning materials with introduced elements of community education.

The new teaching strategies use the following teaching methods:
(i) Laboratory instruction
(ii) Tutorial strategies
(iii) Subject's tutorial
(iv) Degree's tutorial
(v) Adviser's tutorial

The laboratory instruction gives students to perform an experiment at the same time. Several Institutions have implemented this strategy.

In subject's tutorial learners do much of the works, role of the learners is to make rich tasks, challenge students work with misconceptions and make active working atmosphere.

Degrees tutorial included meeting sessions to provide constant challenges and opportunities for both instructors and students. Several sessions were conducted to deal about students' major concerns regarding the whole organization aspects.

Assessment of students activities are done in various ways. A key term here is CCA or Computer Aided Assessment. It encompasses usage of computers to deliver, mark and analyze assignments or examinations. This is done using OMR sheets. The opposite to this is CBA or Computer Based Assessment means usage of terminal to interact with the user. The authors usually deal with so called Unit blanks as a collection of questions grouped by topic, difficulty or type of skill. It is frequently discussed as CAT or Computer-Adaptive Testing. System automatically issues questions and tests to test limits of learners ability.

Supporting Technologies:

Software tools provide realization of certain activity during learning and commonly used categories are hypertext, tutorials, video lessons, simulators, drills, educational games, slide presentations, electronic tests, chat, forum, wiki, blogs, e-mail, instant messaging etc. On the other hand e-learning systems integrate and interconnect different e-learning tools into one integrated platform for learning based on communication characteristics of software and resources. Three different environments could be distinguished for e -learning's:
Self study
Asynchronous study
Synchronous study

Self study means the learners have to study at their own. The asynchronous study means the learners do not interact at all or their learning activities are not bound by time. Self study approach is oriented to tools and material prepared in advance which are used by learner itself without any interactions. Typical example of self study software tools are tutorials, e-books etc. Apart from those simulations, educational games, open-ended learning environments could be designed as self study oriented.

Asynchronous e-learning is usually facilitated by the tools that do not require for participants to be present at the same time to enable work relations. Examples for asynchronous e-learning include watching video lesson, taking an on-line exam or posting questing questions to a message board.

For synchronous learning to be realized the participants have to join the virtual sessions in the same time due to real time characteristics of synchronous e-learning style. In Table-2 we have shown the different types of synchronous and asynchronous mode e-learning:

Table-2: Synchronous and Asynchronous e-learning

e- learning type	Asynchronous	Synchronous
Supporting tools and technologies	Email, discussion boards, Web-based training	Instant messaging, shared whiteboards, audio-vide conferences, online chat, Livee web casting, We conferencing
Characteristics	Just in time . Individual or poorly collaborative independent learning. Self paced.	Scheduled Collaborative. Co-presence of learners and instructor. Concurrent learning

E-learning systems can be classified as:
a. LMS : Learning management System
b. CMS : Content management System
c. LCMS: Learning Content Management System

LMS[10,11] provides successful presentation of learning modules and trainings to learners. Moreover, there are mechanisms to manage user access control and user classification. One important characteristic of such systems is ability to monitor progress of users activities and completion status.

CMS is a family of software, when used as e-learning systems it enables content creators, instructors and teachers to store, manage, create and edit learning resources. By building sharable context, one aspect of such systems becomes important, so called Reusable Learning Objets(RLO) or reusable content components.

LCMS are systems that integrate LMS and CMS. In such environments that are often Web-based there are possibilities to build learning content using elementary and reusable components to manage access track learners activities progress and manage presentation.

Learning Objects (LO):

IEEE defines a LO *as* "any entity, digital or non digital, which can be used, reused or referenced during technology-supported learning"[4] . The main characteristics that a LO should have: *re-usability* and *interoperability*. We can define LO as : "A Learning Object is an independent and self-standing unit of learning content that is predisposed to reuse in multiple instructional contexts".   Each LO is accompanied by a set of data (metadata) that provide the necessary information to define the content of each LO, the way that it can be used, its special requirements etc. Apart from the definition and the structure of a LO, another matter of dispute is the size (or granularity) of the LO. The basic idea behind this technology is the use of small chunks of information so that they can flexibly be reused to form learning material. This is very similar to the way that objects are used in Object-Oriented Software Engineering. The term Aggregated Learning Object is used to refer to different levels of granularity. The ideal reusable LO should have the following attributes:
 Modular, free-standing and transportable among applications and environments;
 Non sequential;
 Have a single learning objective;
 Accessible to broad audiences;

Metadata:

One of the most important attributes of a LO is its metadata. Metadata can be defined as "the means to fully describe and identify every piece of e-Learning content so that you can efficiently find, select, retrieve, combine, use/re-use, and target it for appropriate use *"*. The metadata are used in e-Learning for the following purposes [9]:

 Categorization*:* To organize LOs into categories.
 Taxonomies: The organization of categories into ordered-groups of relationships (e.g. hierarchical structures)
 Re-use: The reusability of learning content increases as the content becomes smaller and its metadata more structured.
 Dynamic assemblies: The metadata can be used to enable the dynamic assembly of Los[4].

The IEEE's LTSC (Learning Technologies Standards Committee) has done extensive work on metadata and has developed the first metadata standard, the IEEE 1484.12.1 Standard for Learning Object Metadata (LOM) , which defines the metadata that should accompany each LO.

CONCLUSION AND FUTURE SCOPE

In the present paper the historical evolution and new trends of learning systems are reviewed in contexts of learning paradigms and supporting methodologies. The software tools and systems supporting learning are reviewed, with special emphasis on LMS, CMS, and LCMS. We have discussed on Learning object (LO) and its object oriented concept. We have also discussed the impact of the most important developing IT areas such as mobile technologies, data mining, agent systems, and virtual environments on E-learning system. Lot of research work is needed and a joint venture is also needed to make the e-learning system successful. Government must come forward to assist private sectors to develop e-learning materials and to host it for all kind of learners, trainers and any kind of user. To make the 100% literacy successful we have to adopt e-learning methodology from very elementary stage. There is lot of research scope in the area of e-learning methodologies, preparing e-learning objects. The time is coming when not only students but teachers, trainers, educators, corporate people, housewives may also take advantage of e-learning materials [11, 12].

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