

E-Learning: Trends, Technologies, and Challenges

Mamta Mittal^{1,#}, Neetu Goyal²

¹Dept. of Computer Science Engineering
G. B. Pant Govt. Engineering College,
New Delhi, India

²Ph.D. Scholar,
Guru Gobind Singh Indraprastha University,
New Delhi, India

[#]Corresponding Author Email: mittalmamta79@gmail.com

Abstract— E-learning stands for ubiquitous learning through electronic media. The internet has played a vital role to make it pervasive by not limited it to the Online course on the desktop; rather it is now integrated learning which is available anytime and anywhere. It has now incorporated offline, online, synchronous, asynchronous mode to interact with each other and to gain maximum benefits of educational activities without the barrier of distance. It has touched many areas like schools, offices, training institutions and distance learning programs for education and training courses. This paper discusses trends, technologies, and challenges being faced in this field. Popular modern tools have also been discussed.

Keywords— E-learning, Internet, Distance Education

1. INTRODUCTION

Exponential changes and growth in electronics and computer industry made it feasible for the people to buy a personal computer, laptop (due to cost reduction) and access to the internet (due to speed). In traditional days it was merely a dream to have a personal computer. But now due to this revolutionary new method of learning also emerged. E-learning is one the most popular way to educate maximum people by concept of anytime anywhere availability. Now for all age group, people who are familiar with the computer can get educate themselves with low cost and without distance barrier. In today's fast-paced culture many organizations preferring to implement e-learning environment. It has affected and

made easy to access for all sectors of public life with new modern ways of Graphical User Interface (GUI) and Application Programming Interface (API)[1]. E-Learning is Internet-enabled learning in which contents can be delivered in multiple formats with latest technologies, not in the form of traditional classroom curriculum. [2]. Fig. 1 illustrates some of the important characteristics of e-learning. By these characteristics, we can say that e-learning is well structured modular technique available anytime, anywhere and globally accessible too. It provides knowledge from a diversity of resources, amplified access to information, improved quality of services, and availability of latest information.

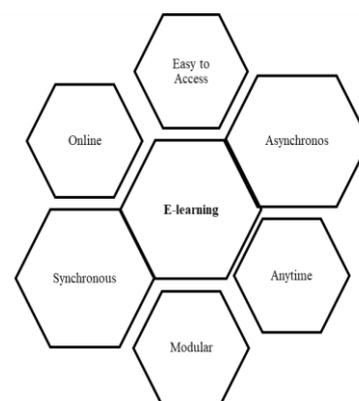


Fig. 1: E-learning characteristics

The remaining paper has been structured into four sections. In next section, various trends and technologies of e-learning have been presented. In section 3 some e-learning tools have been reviewed with their advantages and disadvantages. Section 4

presents the various research issues related to e-learning. And, in the last section, the work carried out in this paper has been concluded.

2. TRENDS AND TECHNOLOGIES AVAILABLE FOR E-LEARNING

A number of trends and technologies have been used in the area of e-learning. Out of them, some were designed originally for e-learning and others have been adopted from many areas like computer gaming. Various communication tools such as Email, Blog, discussion forums, etc. have also been used for enabling the participant/ students/ user to discuss various topics and issues that they experience [4]. Many other technologies like video conferencing, screen sharing, inputs using microphone are combined together to make the experience of e-learning like that of Classroom learning, where the users can speak to each other, see each other's screen (using screen sharing) and are able to provide and highlight comments on the work/ notes of other participants, all at a time [3].

Content Management and Database management are of utmost importance for e-learning [5]. All the courses of e-learning are to be managed in the Content Management System (CMS) and the progress of each of the users like their scores, number of pages that they have read, their bookmarks, etc. are to be stored in a database. Also for good Learning Management System (LMS), it is important that the LMS is able to create the dashboards and reports, highlighting not only the performance of an individual but also for the entire group for comparison.

A new form of learning known as Hybrid learning (as shown in Fig. 2) has used to make presentations interesting with graphically rich content. Lots of online services are also available to help in creating interactive elements for different courses such as quizzes and games. Table 1 briefly presents the literature survey on trends and technologies of e-learning.

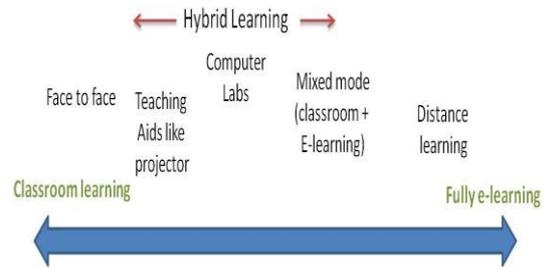


Fig. 2 An illustration of Hybrid Learning

TABLE 1: LITERATURE SURVEY ON TRENDS AND TECHNOLOGIES OF E-LEARNING.

Sr. No.	Author's Name & Year of Publication	Brief description
1	Victor Chang (2016)	Use of interactive learning is recommended for training employees in the industry as well as for students in universities. Various learning activities have also been provided to demonstrate the efficiency of interactive learning
2	Urh, et al. (2015)	The model for the introduction of gamification into e-learning in higher education has been presented. Its effect on students towards motivation and engagement in work has also been discussed.
3	Tayeb Brahimi & Akila Sarirete (2015)	The concept of the flipped classroom is discussed in this paper. A survey has been conducted to study the performance of student learning outside classroom through websites and social media using MOOCs.
4	Michelle Pieri & Davide Diamantini (2014)	In this paper , a new e-learning platform named Thinktag has been reviewed, which is used for training the students. The platform is evaluated by giving a questionnaire to students who were filled by them sitting at their home and submitted through the internet.
5	de-Marcos, et al. (2014)	The author compared gamification with social networking to identify their effect on academic performance of students.
6	Mihaela Muresan & Emilia Gogu (2013)	In this paper, barriers to e-learning have been focused. The primary barrier is digital divide which separates people who have digital skills and access to internet from the persons

		who don't have access to computers and internet
7	Chen, <i>et al.</i> (2012)	Here a web 2.0 annotation system, MyNote has been developed by the authors. Its architecture, user interface, and potential benefits have been presented.
8	Oye, <i>et al.</i> (2012)	Authors discussed the synchronous and asynchronous methodology for e-learning. Further, some tools like a digital library, curriculum, and knowledge representation have also been presented.
9	Moore <i>et al.</i> (2011)	Authors surveyed people to discover the inconsistent use of terminologies like online learning, e-learning and distance learning.
10	Alka Kalra, Mamta Mittal (2008)	The authors discussed the concepts, modalities, and usability of E-learning and also pointed out the challenges in it.

3. REVIEW OF E-LEARNING TOOLS

There are lots of e-learning tools present in this information age like MOODLE, MOOC, Gamification, Web 2.0, Microlearning, Blackboard, WebCT, Email, Discussion Forums and many more. We have studied some of them, and following subsections present a brief review of them.

3.1 Moodle

It is a free software designed to help teachers and students in improving the quality of education. Moodle is named as Modular Object-Oriented Dynamic Learning Environment by Martin Douglas at Curtin University, Australia [6]. It is the best tool to manage and promote learning. It helps teachers in creating online communities for true learning. It is an E-learning platform based on resources and activities. The main resource is training, based on weekly lessons and activities; learner can go page by page or can go chapter by chapter using the "Quick jump" option and at the end of each module, an evaluation module can be inserted. This module is very flexible and allows teachers to build many evaluation techniques such as

in the form of questions that can be "true or false," "multiple choice" or "fill in the blanks." Moodle can provide links to many resources that are available on the internet.

3.2 MOOCs

The concept of MOOCs was developed by George Siemens and Stephen Downes. MOOCs (Massive Open Online Courses) have gained an extensive global profile a few years back. MOOCs have attracted great interest in education. Bill Gates said "The value of MOOCs comes when you use them to create hybrids that are best for both worlds [7]. Rather than having the instructor lectures during class and then send the students home with assignments, many instructors are now using MOOCs to flip the classroom." MOOCs use the concept of the flipped classroom. In this student can interact with other students. He / She can have accessibility to all contents and resources even before attending the class. MOOCs have following characteristics-

Massive: There is no limit on a number of students enrolled for the course.

Open: It is available free of charge to any age group people. So, open for all without any restriction of location and background

Online: It can be accessed anywhere, anytime by anyone without having any face to face interaction.

Course: They can run courses for the specific time period, on the basis of prearranged content with the guideline to the students during that period of time. This makes them similar to traditional courses.

3.3 Web 2.0

The term Web 2.0 was first used in 2004 by Tim O'Reilly and Dale Dougherty [8]. It (as illustrated in Fig. 3) is used to discuss the second-generation internet services such as YouTube, Wikis, Facebook, Skype, blogs, Google (not only for searching but also for communication as in Gmail and for document sharing as in google docs), Flickr, etc.

It is easy to use because nowadays everyone uses social networking sites for communication and sharing information with each other. It not only helps users in communication, sharing content and collaboration but also allows users to produce their own content. It helps all the persons involved (students, teachers or other learners) to enthusiastically participate to learn more and more information and helps them to recommend their content, to create learning communities. Nowadays social networks have become an important part of our student’s life. Social networks help students in making online communities for test preparations, for language learning and for different subjects understanding and learning [9].

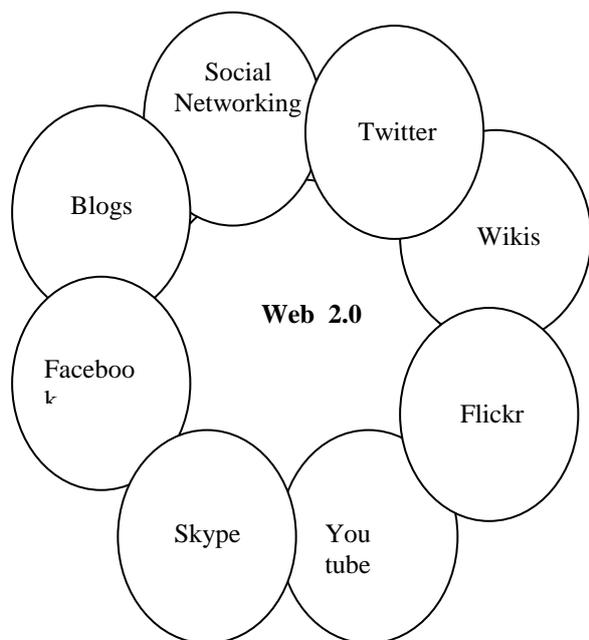


Fig. 3 Web 2.0 Services

3.4 Gamification

Gamification is a term that was first used in 2003 by Nick Pelling but did not gain popularity until 2010. In this learning strategies are formed with the concepts of games [10,11]. In games, we have instant feedback and instant connection with other players due to advances in information and communication technology. In games, players have more freedom; they have the

TABLE 2. SUMMARY OF MERITS DEMERITS OF E-LEARNING TOOLS.

Tool	Merits	Demerits	Target Audience
MOOC	Enhances active learning Encourages flipping the classroom Promotes peer evaluation Helps in sharing ideas & knowledge	No proper evaluation methods Limits the practical exposure Dropout rate of MOOC is high	Open to all
MOODLE	Easy to install Widely available Greater Flexibility Highly Secure	Not suitable for big projects Reporting is difficult Closed (not open to all users)	Students and Teachers
Web 2.0	Any time available Ubiquitous Easier and faster access to information	Information overload Leads to low quality of actual content Too many fake ids and spammers	Open to all
Gamification	Entertaining Increases student engagement Creates enthusiasm Provides instant feedback	Costly Decreases student attention span Lack of strategic connection	Students and Employees

freedom to fail, they are allowed to restart or play again on failing, making their mistakes recoverable. BY this way confidence level among students have achieved when they experiment things by themselves and increase their engagement in any activity. The reason for using gamification in e-learning is to motivate students to evolve in the activities without fear of failures.

Table 2 highlights the merits and demerits of various e-learning tools along with the target audience that they impact.

4. CHALLENGES FACED IN THE FIELD OF E-LEARNING

In the current scenario, lots of factors like pedagogical, technical and industrial concerns affect e-learning research. These factors affect the research goals in e-learning. These broader social and cultural issues have a great impact on research in e-learning and will have an important role in deciding the future practices [12]. In Indian research communities, the following issues emerged:

- Use of e-learning in multiple disciplines: Every area like education, corporate, distance learning has different research perspectives. There are different challenges for each area in adoption and use of E-learning technologies. Issues like access management and increasing the number of participants are common issues.
- The pace of change of technology impacts the e-learning mechanisms. The appropriate strategies for managing these changes and their implementation mechanisms need to be identified.
- Convergence in the area of technology, pedagogy, various sectors and organizations and the intent of making the e-learning interoperable in all these areas makes this a complex relationship.
- Scalability: Because of globalization, scalability of technology and technique is needed.
- Supporting various platforms: With the advancement of the mobile technologies, the strategies need to be identified to be able to support not only e-learning but also Mobile-learning.

5. CONCLUSION

In this paper comprehensive review on e-learning trends and technologies has been presented. Further, various tools for e-

learning have been discussed in detail with their advantages and disadvantages. The future scope is also presented for the researcher in the form of challenges. This extensive survey will help the researchers and users to select proper tool and technology for their work.

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