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E-Learning Systems and MOOCs - A Review

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Abstract: ***E-learning is one of the most important aspects of today's world. It was started in late 90's to enhance the knowledge of people through the internet such as interactive TV, audio/video tape, satellite broadcast, and other external devices made users to learn the concepts very easily. Because of its flexible nature, the demand for e-learning has increased day-by-day. E-learning systems are gaining attention among students and academicians because it is location and time independent which solves the problems of flexibility of learning new things. Most of the e-learning systems are deployed on internet. E-learning system should be standardized to increase the quality of existing systems because of its increasing demand. This paper is the Review of various e-learning systems developed and designed by professionals and individuals or such educational organizations to support learning process, we also described few e-learning platforms after that and also discussed different Massive Open Online Course(MOOC) platforms available on internet and depicts comparative summary of their features.***
Keywords: E-learning; E-learning systems; E-learning platforms; MOOCs; Learning environments;

I. INTRODUCTION

Nowadays E-learning is an Internet based learning process. This system use internet technology to design, implement, manage support and extend learning and will greatly improve the efficiency of learning. E-learning uses electronic technologies for the process of teaching and learning.[20] There are so many definitions of e-learning but all definitions describes the overall use of electronic media in the process of teaching and learning. K.H. Fee defines e-learning as any learning that involves use of internet or intranet [1]. The term e-learning includes so many things, very much more than online learning, Distributed Learning, Virtual learning, networked or web-based learning. As the letter "e" in e-learning stands for "electronic", e-learning incorporates all educational activities which are carried out by professionals, individuals, groups or organizations working online or offline, and synchronously or asynchronously via networked or standalone computers and other electronic devices [2]. Although there are many disadvantages and advantages, we should not see E-learning as a way of communication, it might bring some challenges to instructors to understand students' perception or views on the courses where no face to face communication takes place. Using feedback tool or such forum modules can play important role to resolve this problem at some point. Findings from a research study carried out by M. Samir et al. states that Instructors need to understand their student motivations when teaching via online classes. Allowing students to submit online assessment forms which can help teachers to identify and apply number of strategies for motivation of students [3].

Here are some advantages of online learning/E-learning systems [4]:

1) Enhancing learner-to-learner and faculty-to learner communication.
2) Learners are able to meet in a virtual space with other members and practitioner experts to discuss issues, answer questions and even participate in simulations and management games without having to leave their office or home.[21]
3) Providing 24/7 accessibility to course materials.
4) Learners can access information that is correct and up to date through the web, information databases or university or company intranets.
5) Learners benefit from learning when required, learners are able to access the right sort of training at the right time with the right people. Learners have access when they want it.
6) Enabling learner-centered teaching approaches.
7) Learners regardless of where they are receive the same message and are able to engage other learners and practitioners globally
8) Providing just-in-time methods to assess and evaluate learner progress.
9) Reducing administration around course management.

Other key advantages may include flexibility, location independence, time independence, easy communication, cost effectiveness and easy distribution of learning material. Joumana et al. mentioned that incorporating learner's feedback or reviews in online courses will help teachers to keep track of learner's learning [5]. This paper aims to study advancements in the domain of e-learning. Section II describes various popular e-learning platforms available in the market. A new and efficient form of teaching learning process known as Massive Open Online Courses (MOOCs), is discussed in section III.

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II. E-LEARNING PLATFORMS

A large number of open source and proprietary E-learning platforms are available which can be adopted by any educational institutions. These platforms also allow integrating customized modules to it to meet personalized requirements of educational institutions or organizations. This section reviews such e-learning platforms.

A. Moodle

Moodle is a Course Management System (CMS), also known as a Learning Management System (LMS) or a Virtual Learning Environment (VLE). It is a free web application that educators can use to create effective online learning sites. Moodle.org [6] is the community site where Moodle is made and discussed.

Moodle has features that allow it to scale to very large deployments and hundreds of thousands of students, yet it can also be used for a primary school or an education hobbyist. Many institutions use it as their platform to conduct fully online courses, while some use it simply to augment face-to-face courses (known as blended learning).

Many of Moodle users love to use the many activity modules (such as Forums, Wikis, Databases and so on) to build richly collaborative communities of learning around their subject matter, while others prefer to use Moodle as a way to deliver content to students (such as standard SCORM packages) and assess learning using assignments or quizzes.

B. Docebo

Docebo [5] is an Open Source e-Learning platform (LMS and LCMS) used in corporate and higher education markets. The Platform supports 18 languages and can support different didactic models, including Blended, Self-Directed, Collaborative and even Social Learning through Chat, Wiki, Forums and 53 other different functions. Other Docebo features are:

1) Scorm 1.2 and 2004 support.
2) Forum, wiki, chat, videoconference (DimDim and Teleskill).
3) Competence module and HR software interface.
4) Completely customizable report and business intelligence system.
5) "Area manager" role enabled.

C. Dokeos

Dokeos [7] is one of the largest and most recognized companies dedicated to open source Learning Management Systems. Its main product is a SCORM compliant open source learning suite used by multinational companies, federal administrations and universities in some 60 countries for a total of 1,297,000 users.

The Dokeos code is written in PHP, using MySQL as database backend. It already supports SCORM import. User data can be imported into the system using CSV or XML files.

The main features of the LMS from Dokeos are:

1) SCORM learning path authoring.
2) Templates-based document production.
3) Tests: multiple choice, fill-in-the-blanks, matching, open questions, hotspots.
4) Interaction: forums, chats, groups, web-conferencing.
5) Conversion of PowerPoint and Impress presentations to SCORM courses.
6) LDAP and OpenID authentication
7) Gradebook, reservations, and users sessions
8) More than 30 languages are supported

D. Claroline

Claroline [8] is a collaborative eLearning and e-Working platform released under Open Source license (GPL). It allows hundreds of organizations worldwide (universities, schools, companies, associations...) to create and administer courses and collaboration spaces through the web. The platform is used in more than 80 countries and is available in more than 30 languages. Claroline is compatible with GNU/Linux, Mac OS and Microsoft Windows. It is based on free technologies like PHP and MySQL.

Initially started in 2000 by the UCL (Catholic University of Louvain, Belgium), Claroline has been developed following teacher's pedagogical experience and needs. The Claroline platform is organized around the concept of space associated to a course or a pedagogical activity. Each course space provides a list of tools enabling the teacher to:

1) Write a course description.
2) Publish documents in any format (text, PDF, HTML, video...).
3) Administer public and private forums.
4) Develop.
5) Propose assignments to be handed in online.
6) See the statistics of users' activity.
7) Use the wiki to write collaborative document.

The Claroline Consortium was born on May 23, 2007 during the second annual conference of Claroline users that was held at the Vigo University, Spain. This international non-profit association mainly aims at federating the Claroline community, coordinating the platform developments and promoting its use.

E. ILIAS

ILIAS [10] is an open source web-based learning management system (LMS). It supports learning content management (including SCORM 2004 compliance) and tools for collaboration, communication, evaluation and assessment. The software is published under the GNU General Public License and can be run on every server that supports PHP and MySQL.

The first prototype of ILIAS LMS was developed since end of 1997 within the VIRTUS project at University of Cologne. At November 2, 1998 version 1 of ILIAS was published and offered for learning at the Cologne faculty of business administration, economics and social sciences. Due to increasing interest of other universities, the project team decided to publish ILIAS as open source software under the GPL in 2000. Between 2002 and 2004, a new ILIAS version was developed from scratch and called "ILIAS 3". In 2004, it became the first open source LMS that reached full SCORM 1.2 compliance.

The main features of ILIAS LMS are the following:

1) Individual personal desktop.
2) Course and group management. Learning progress management.
3) Repository with Role-Based Access Control.
4) Learning content (XML, SCORM, AICC).
5) Standards compliance (LOM, SCORM 1.2, SCORM 2004, IMS-QTI, AICC).
6) Chat, forums, exercises, test & assessment, podcasting
7) Authentications (LDAP, Shibboleth, CAS, Radius, SOAP).
8) Google Maps support.

F. ATutor

ATutor [9], first released in late 2002, is an Open Source Web-based Learning Content Management System (LCMS). The system is cited as unique for its accessibility features (useful to visually-impaired and disabled learners), and for its suitability for educational use according to software evaluation criteria established by The American Society for Training and Development (ASTD).

ATutor is the first LCMS to comply completely with the accessibility specifications of W3C WCAG 1.0 at the AA+ level, allowing the access to all the included content of the system at all levels of user-privilege, including administrator accounts. Its conformity with XHTML 1.0 is intended to ensure that ATutor is presented and displayed consistently in any compatible technology. ATutor's developers assert that it is the only fully-accessible LCMS software on the market.

Two, of many, accessibility features in the system are text alternatives for all visual elements, and keyboard access to all elements of the program. These features also allow ATutor to adapt to a wide variety of technologies, including cell phones, PDAs, and text-based Web browsers. ATutor is also designed for adaptability to any of several teaching and learning scenarios. There are four main areas that reflect this design principle: themes, privileges, tool modules, and groups. The ATutor theme system allows administrators to easily customize the look and layout of the system to their particular needs. Themes are used to give ATutor a new look, to give categories of courses their own look, or to provide multiple versions of ATutor on a single system, from which users could choose one as a preference setting.

Next, we present two tables where comparison between the most widely used open source and close source LMS is performed. All open source LMS above described have been included in the tables, which are completed with the following close source LMS (Sumtotal, Saba, Blackboard, Giunti Labs and Plateau).

Table I
Comparing Open Source and Close Source LMS: Functionality and Didatic Issues [11]

	Customers – Installations	Scorm	Forum	Wiki	Videoc.	Didactic Model
Docebo	SKY, AON assicurazioni, Università Bicocca, Mediaset, Riello, Volksbank	YES	YES	YES	YES	Self learning, Blended, Collaborative
Moodle	Dublin city university, San Francisco State university, The open university	YES	YES	YES	YES	Blended, Collaborative
Dokeos	Belgacom, Ancelor Mittal, Brico Plan-It, Ministero de trabajo (Espana)	YES	YES	YES	YES	Self-learning, Collaborative
Claroline	Universität Klagenfurt, Amnesty International, Universidade Rio Grande	YES	YES	YES	YES	Self-learning, Collaborative
Atutor	Università di Toronto, Sido E-Learning portal, Ambiente Impresa onlus	YES	YES	YES	YES	Self-learning, Collaborative
Ilias	Università degli Studi di Bergamo, Konsortium Edutrends, CTRRCE	YES	YES	YES	YES	Self-learning, Collaborative
Sumtotal	Pfizer, AXA Group, Halliburton, AT&T, Microsoft MSN, EMC Corporation	YES	YES	YES	YES	Self-learning, Blended
Saba	Cisco, BMW, Alcatel, Petrobras, Nissan, Credit Suisse	YES	YES	YES	YES	Self-learning, Blended
Blackboard	Portland State University, University of Central Florida, University of Surrey	YES	YES	YES	YES	self-learning, Blended, Collaborative
Giunti labs	Abbott, Ericsson, Elea, Dompé Farmaceutici, Scania, UniCredit Banca	YES	YES	YES	YES	self-learning, Blended, Collaborative
Plateau	Idaho power, U.s Airforce, Nasa, Rbc, Union pacific, Roche Bioscience	YES	YES	YES	YES	Self-learning, Blended

Table II
Comparing Open Source and Close Source LMS: Initial Comparison GRID [11]

	License	Targets	Multimedia learning object production	Server facilities	Type of target
Docebo	Open source	Corporate, University, Big Government	YES	YES	Commercial
Moodle	Open source	School, Small university, Research Center	Moodle partner	Moodle partner	Commercial
Dokeos	Open source	University, Medium size company, School	No website information	YES	Commercial
Claroline	Open source	University, School	No website information	No info	University
Atutor	Open source	Government, University	No website information	No info	University/Association
Ilias	Open source	University, School	No website information	No info	University
Sumtotal	Closed source	Corporate	YES	YES	Commercial
Saba	Closed source	Corporate	YES	YES	Commercial
Blackboard	Closed source	Corporate, University, Big Government	No website information	No info	Commercial
Giunti labs	Closed source	Corporate, University, Big Government	YES	YES	Commercial
Plateau	Closed source	Corporate, University, Big Government	No website information	YES	Commercial

III. MASSIVE OPEN ONLINE COURSES (MOOC)

Massive Open Online Course (MOOC) is an open access platform where any student having an internet connection can enroll for an online course. The method of delivering learning material is video lectures, usually of 8-15 minutes, designed with keeping student's view in mind [18]. Most of the courses offered are free and can prove as a critical medium to provide education in remote areas where enough expertise is not available.

A. EdX

EdX offers interactive online classes and MOOCs (Massive Open Online Courses) from the world's top universities, colleges and organizations. With more than 90 global partners, EdX currently has 2,300+ faculty and staff teaching over 950 courses. Courses are free with the exception of professional education courses. The course format includes tools, videos and game-like labs. EdX is based in Cambridge, Massachusetts and is a non-profit initiative created by founding partners Harvard and MIT.[12]

B. Coursera

Coursera is an education platform that partners with top universities and organizations worldwide. It typically provides immediate feedback on points student didn't understand. Many institutions have incorporated courses offered on coursera in their curriculum to provide blended learning to students [13].

C. Udacity

Udacity focuses on providing courses based on skills required by industries. Nanodegree programs offered on this platform are co-created by industry giants such as Google, Facebook, AT&T, mongoDB, Twitter, NVIDIA, Amazon web services and others [14].

D. MEC

Massively empowered classroom is a community initiative by Microsoft research. It is a research project designed to bring the highest quality classroom material to every undergraduate engineering student in India [15].

E. FutureLearn

FutureLearn is providing free courses for everyone in the area of language, culture, business, management, science, technology, health, psychology and many more Users can browse the individual course list or take advantage of one of FutureLearn's "Collections", a hand-picked selection of free online courses, to help learners discover a new passion, understand a subject in depth or become an expert in a particular field. [16].

F. Canvas Network

Canvas Network focuses on easier learning for higher education, K-12 and workforce users. It is developed with open, adaptable, reliable and native cloud technologies by Instructure Company [17].

The following table describes features of the above mentioned e-learning environments.

Table III. Summary Of Features Supported By Variousmooc Platforms[19]

	edX	Coursera	Udacity	MEC	FutureLearn	Canvas Network
1. Learning Methods						
Video with audio	YES	YES	YES	YES	YES	YES
Audio only	NO	NO	NO	NO	YES	NO
Articles	YES	YES	NO	NO	YES	YES
Projects	NO	NO	YES	NO	NO	NO
Discussions	YES	YES	YES	YES	YES	YES
2. Assignments	YES	YES	YES	YES	YES	YES
3. Quiz Tests	YES	YES	YES	YES	YES	YES
4. Transcripts	YES	NO	YES	NO	YES	NO
5. Video with interactive transcripts	YES	NO	NO	NO	NO	NO
6. Certificate	YES	YES	YES	YES	YES	YES
7. Peer Assessment	NO	YES	NO	NO	NO	NO
8. Adaptive Learning	NO	NO	NO	NO	NO	YES
9. Course joining timings	-Scheduled -Anytime	-Scheduled -Anytime	-Scheduled -Anytime	Anytime	Scheduled	Scheduled
10. Target Users	Anyone	Anyone	Professionals	Anyone	Anyone	Anyone

IV. CONCLUSION

E-learning definitely helps learner to improve their performance. Different learning environments have their own way of implementation of such distinct systems. Technological developments have made it a lot easier to develop and customized learning solutions. The review experienced that the recent developments are more focused on adaptive and personalized e-learning environments. E-learning platforms can be adapted by institutions to enhance teaching learning process. One major footstep in this area is MOOC, which provide quality to e-learning from eminent experts without any cost. This review shows that educational material is made handy with emerging technologies to everyone who needs it Professionals and students, who are not in situation to attend classes at a specific location on daily basis, could find e-learning as a great opportunity to enhance their knowledge and skills. Comparative study of various MOOC platform shows that most platforms are designed in such a way that they mimic the traditional features of pedagogy in electronic form.

However we can use these kind platforms with such improvements in IT organizations as well, to train the newly hired persons according to company or organizations' preference, we can also customize different modules for different person according to their performance and they can get their exact evaluation reports. This can be a revolution in this technological era where nothing is hard to learn.

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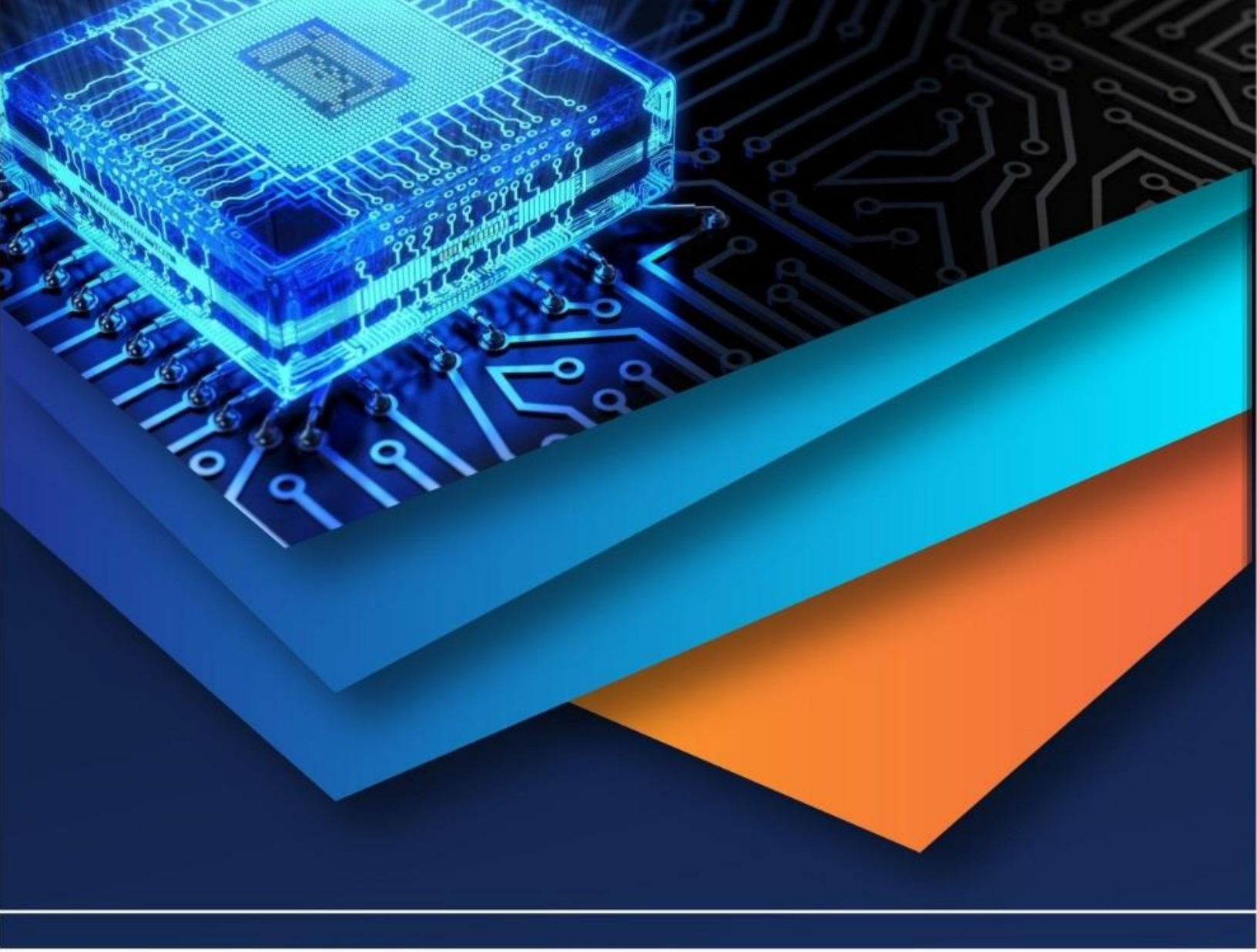

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