Development of E-learning: A Historical Review with Global Perspective

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Development of E-learning: A Historical Review with Global Perspective

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Abstract

This article presents the historical review of e-learning. After summarizing various studies related to the origin of e-learning, it explains that how e-learning is shaped over the past years. It has appropriately summarized, organized and explained the historical progress of e-learning. Moreover, this study presents a systematic literature review about the history of e-learning and its development made from the earliest time to the recent ones.

Introduction

With the advancement of information and communication technology (ICT) such as cloud computing, latest learning materials and reliable networks, a new paradigm - e-learning has been introduced for education in general, and for English language learning, in particular (Aparicio et.al., 2016). This new paradigm has revolutionized the learning process as it keeps changing the way for implementing education worldwide (Teo, Kim, & Jian, 2018). It is considered "as an important tool to meet the demand for highly qualified specialists in the modern technological world" (Vershitskaya et al., 2020, p.2). Moreover, since its inception, e-learning is interpreted in various ways based on the context, implementation and its pedagogical practices. Before, it was termed as 'e-learning', it was differently termed such as web-based learning (WBL), web-based training (WBT), web-based instruction (WBI), internet-based training (IBT), distance education, online learning, blended mobile learning, remote learning, virtual learning and off site learning (Khan, 2005; Masrom, 2007; Regmi & Jones, 2020; Taha, 2014). In other words, e-learning is based on a various tools - synchronous and asynchronous (Bdiwi et al., 2019) - which lead teachers and students to create an interactive as well as autonomous learning environment. Hrastinski (2008) argues that asynchronous e-learning is the type of learning which is based on "media such as email and discussion boards, supports work relations among learners with teachers even when participants cannot be online at the same time" (p.51). He, further, calls it a type of flexible learning because it facilitates learners to learn at their own convenient place and time. Whereas synchronous e-learning is based on internet connection and media such as instant messaging, skype, zoom, and google meet, etc.

Objective

The main objective of this study is to present a historical review of e-learning.

Method

This study is based on the previous studies which were accessed from various rigorous and scholarly journals and books. The journals the researcher identified and selected based on their high ranking, included Computers and Education, British Journal of Educational Technology, Electronic Journal of E-learning, Australian Journal of Educational Technology, and many more. An extensive reading was conducted to obtain the historical research papers and chapters from various books related to the origin of e-learning in order to present the review on it. The articles with historical relevance were investigated and their findings were discussed, starting from the earliest discovery to conclude with the latest discoveries of e-learning related practices.

Definitions of E-learning

In the following sections, the definitions are categorised based on the mediums of delivery (i.e. use of computer and multimedia, internet, information and communication technology, and digital broadcasting) and there are some definitions which have broader concept of e-learning by putting various mediums together.

E-learning, Computer, and Multimedia

E-learning is one of the types of learning that has emerged from the development of ICT. It can, generally and contextually, be defined as the learning with the support of any electronic device, from computers to mobile phone, which may or may not involve the usage of the internet or intranet (Kenan, 2015). Stockley (2005) also relates e-learning with the delivery method of a learning, training or education program by using any electronic means such as computer or any electronic device to provide training or learning material. This definition shows the inclusion of any software or hardware where learning and an access to the learning materials takes place. Similarly, Clark and Mayer (2003) posited that e-learning is the way of delivering instruction by a computer, CD-ROM, DVD-ROM, internet or intranet using instructional methods (which is based on practice and examples), media elements (delivery of content and method through pictures and words), and building skills. E-learning can be delivered through various ways, for example, computer hardware devices (multimedia projectors), computer software and websites. However, there are some applications which have been specifically designed for e-learning, for example, virtual learning which can be delivered without any limitations of time and space.

E-learning as ICT and internet

E-learning as an internet and web-based system that facilitates users' learning and teaching with the use of software applications and tools (Cassidy, 2016). Rosenberg

(2001) also confined e-learning to the internet only when he considered e-learning as the use of internet technology in order to exchange information. Bdiwi et al. (2019) relate e-learning with wide variety ICT synchronous and asynchronous communication tools used in education. Demiray (2010) stated that the 'e' indicates the inclusion and implementation of information and communication technology which has revolutionized the learning from the analogue to the digital world. Bhuasiri et al. (2012) stated for e-learning as "an innovative approach to education delivery via electronic forms of information, which enhances learners' knowledge, skills or other areas of performance" (p.843). Ruttenbur et. al. (2000) also argued that e-learning with its use of networked technology has made the revolution possible. There are a numerous research studies which have proved internet as a flexible learning tool where students can learn at their own pace and it also widens the opportunities for modern teaching and learning (Hardaker & Singh, 2011; Macharia and Pelser, 2012; Moos and Azevedo, 2009; Wang and Wang 2009; Zhang et al., 2008). Horton (2012) concluded e-learning that supports learning with "the use of information and computer technologies to create learning experiences" (p.1). This definition is not limited to the online courses, but it talks about all learning experiences which takes places either in a classroom or outside the classroom with the help of computer technologies. Further, Horton (2012) iterated that the outcomes of the e-learning depend on design (what decisions a teacher takes) and development (how s/he carries out those decisions). Furthermore, e-learning includes 'standalone courses' taken by a solo learner; 'learning games and simulations' is also the part of e-learning; and 'mobile learning' and 'social learning' which take place on social-networking sites such as Facebook, online discussion forums, and virtual classroom (Horton , 2012).

E-learning as combined mediums

According to Haznedar (2012), e-learning is considered as an umbrella term which refers to all the electronic tools used for learning. Some researchers give a broader perspective of e-learning as it is the delivery of education through various mediums such as electronic media which includes intranets, extranets, internet, satellite TV, audio/video recordings, CD/DVD ROM, and memory sticks (Benson et al., 2002; Clark, 2002; Engelbrecht, 2003; Koohang & Harman, 2005; Masorm, 2007; Moore et al. 2011). In congruence to this definition, Horton and Horton (2003) argued that e-learning is not only supported by Learning Management System (LMS), but by various other technological tools too such as personal computer, media player, internet connection, web browser, email programs, microphone for audio conferencing, client software for online meetings, and video camera for video conferencing. E-learning also includes software tools such as Microsoft Word, PowerPoint, Excel, PDF, whiteboards, screen casting, audio broadcasting methods such as webcasts and podcasts, video broadcasting methods in YouTube, Skype and Webcams (Patil, 2014). According to some other researchers, email communication, use of social network websites, e-books, web conference and webinars, chat rooms, and multimedia applications are the equipment of e-learning (Yapici &Akbayin, 2012).

History of E-learning

The origin of e-learning stems from the mail-learning method which was through some correspondence courses. Sir Isaac Pitman was the pioneer of the correspondence course who introduced mail courses for teaching by using shorthand technique in 1840 which is considered the first distance learning course (Verduin & Clark, 1991). This form of writing aimed to improve writing speed. He used to send the assignment tasks to his students by mail and his students used to send him back after completing those assignments. Thirty years later, Anna Eliot Ticknor, in 1873, laid a foundation of a society which encouraged studies at home in Boston and Massachusetts, and that was based on the correspondence model school which is a "form of distance education given that the teacher and students are physically separated (Kentnor, 2015, p. 23). However, this system was criticized on the basis that there was no support for two-way communication. Therefore, it was justifiably argued that such method could not be considered a formal distance education (Verduin & Clark, 1991). Afterwards, almost a year later, Illinois Wesleyan College became the first academic institution to offer degree programs "in absentia" (Emmerson, 2004, p. 2). With the evolutionary development in the field of technology, the mediums were modified though the concept of distance learning remained the same throughout the history. The concept of teaching machine, which was actually brought by Sidney Pressey, emerged in 1920. Then it was widely popularized through the works of B. F. Skinner when he invented the teaching machine, called "Glider", in 1954. This machine was differed from Presseys's machine in way that it focused on teaching students rather than only testing them. These teaching machines "empowered schools to direct programmed instruction to their students" (Bezhovski & Poorani, 2016, p. 51). Following the same trend by using the then new facility of broadcasting sound to read the masses, Iowa University of United States introduced the first "radio course" of five credit hours in 1925 (Moore & Kearsley, 2005). This innovation led educational institutes of United States to use the "radio course" and thus 176 radio stations were directed to meet educational objectives (Schlosser & Simonson, 2010). These distance learning courses were taught by using radio which led the audio system to the instructional delivery of lectures. Moreover, telephone and then television were also introduced by the University of Iowa in mid 1930s as a tool to be used in distance courses (Casey, 2008). With the growing interest of students in such type of courses in United States, some "Tele-Courses" were developed by the Annenberg Foundation along with the Corporation for Public Broadcasting (CPB) for universities even in some remote areas of Alaska, which were affected by harsh weather which did not allow students to come to campuses. Gradually, these courses became the natural part of educational practices (Moore & Kearsley, 2005). Harasim (2006) called it the "communication revolution" which began from telephone and advanced with "Network Revolution" with the invention of internet, email and World Wide Web (p. 60).

In early 1960s, Programmed Logic for Automated Teaching Operation (PLATO) was introduced which is a timeshared computer system and is considered as the first

computer-based training porgramme. It was basically a computer-assisted instruction system created by Professor Don Bitzer who was an electrical engineer. It developed students' literacy programmes with an aim to deliver computer based education. According to Nicholson (2007), PLATO provided platform to students and educators to use educational programming language TUTOR and to communicate with educational courseware through electronic notes, which Woolley (1994) considers a forerunner and foundation of today's online conference and message system. As he stated, "the PLATO system pioneered online forums and message boards, email, chat rooms, instant messaging, remote screen sharing, and multiplayer games, leading to the emergence of what was perhaps the world's first online community" (Woolley, 1994, p. 1). Nicholson (2007) also called this system as "an ancestor of today's e-learning systems such as Blackboard and WebCT" (p. 5). In Shimura's (2006) words, PLATO contains the basic layout of modern e-learning. The computer was thus considered as a tutor which played the role of presenting instructional materials and providing practice opportunities (Rahimi & Pourshahbaz, 2018). With the invention of PLATO, another form of e-learning, Computer Assisted Language Learning (CALL) was introduced. Levy (1997) defined CALL as "the search for and study of application of the computer in language teaching and learning (p. 1). In other words, it's the use of any technological application for learning and teaching purpose. During this era, the type of the CALL, also known as Behaviorist CALL, was used which involved students into drills, translation tests, and grammatical explanations (Ahmad et al., 1985). Along with this development, there were some language teachers, such as Rex Last and Graham Davies, who individually initiated to use technology for language learning purposes in the UK. Earlier among them in this connection was a teacher named Patrick Suppes, who founded the Computer Curriculum Corporation in 1967 with his strong belief into the educational potential of computers (Nicholson, 2007). He developed Computer Managed Instruction (CMI) System while using it in his courses and provided CMI tutorials in mathematics to elementary school children. In 1971, Murray Turoff, who is considered the father of computer conferencing, developed the first computer conferencing system named Delphi System (EMISARI). In 1974, New Jersey Institute of Technology developed computer mediated communication technology (which eventually was called Virtual Classroom) in order to facilitate group discussion among learners. It also invented Electronic Information Exchange System (EIES) for scientific research committee.

In 1980, there came the era of personal computers (PCs) which further paved the way for e-learning. Rahimi and Pourshahbaz (2018) argue that technology, and specifically computers, have brought about revolutionary change in the way information is created, saved, transferred and processed today. The first computer by Apple was introduced in the same year, called MAC, which enabled people to have an easier access to the computers in their homes to learn particular subjects and to enhance certain computer skills and this method gave the actual form to the e-learning. This led the launching of BitNet which linked the universities worldwide. By early 1980s, the notion of educational collaborative networking was used as a future model for short online

courses, virtual classrooms and online degree programs. In 1985, Nova Southeastern University began to offer online graduate degree programmes. Later, in 1989, Mindweave Communications published the first commercial online learning platform with the title of Lotus Notes. In the same year, the first online university degree programme was also introduced by the University of Phoenix. Thus 1980 brought intense innovation and expansion in e-learning technology and unfolded new aspects of e-learning which moulded learners' and teachers' perceptions, attitudes, and mindsets, accordingly, modified pedagogical practices, and introduced technological affordances (Harasim, 2006).

During the same era, the Computer Managed Instruction (CMI) system, which was also used for other communication purposes apart from education, was progressed into Computer Based Training (CBT) and Computer Based Learning (CBL) (Bezhovski & Poorani, 2016). This emerged concept of Communicative Computer Assisted Language Learning (CALL), though the behaviorist CALL was already in practice with the invention of PLATO. According to Rahimi and Pourshahbaz (2018), "the affordances the PCs offered language educationists to contribute to the development and fortification of the principles of Communicative CALL and consequently many software packages were designed" (p. 08). Communicative CALL was clearly defined by Tafazoli and Golshan (2014) as an approach which was "used for activities that involved communication such as conversations, written tasks, critical thinking, etc." (p. 33). It is the use of language for the real purpose which required the use of the computer as a tutor in order to provide teaching/learning materials to the users of communicative CALL. In this approach, computers were used as a tool to check spelling, grammar and text reconstructs.

Then, in early 1990s, e-learning was used through the practice of CD-based training. Previously, information was delivered in the form of text but then this low-cost media storage device could store and transfer text, digital video, digital audio, graphics, or animated information (Rosser, 1996) which could be accessed by using computer, monitor and speaker. This expansion of multimedia technology emerged along with the advent of integrative CALL later in 1990s which was used as multimedia technology integration in teaching and learning all four language skills (listening, speaking, reading and writing) (Rahimi and Pourshahbaz, 2018). This development shows that "by the late 1990s, the use of e-learning had matured from *supplementary* to being an *integral* part of the course or program curriculum" (Harasim, 2006, p.91). Accordingly, schools started using e-learning by practicing activities such as making pen pals electronically, arranging electronic field trips, asking a query from an expert by using any application, and questions and answer forums. Moreover, universities were implementing e-learning through emails as students were bound to submit online assignments to their teachers using email, by using web for research purpose, online quizzes, and grade books.

Afterwards, around 1998, with the invention of the World Wide Web (www), learners were able to get the enriched text along with graphics worldwide. WWW took over

CD and provided materials including learning instructions on the web. It also introduced study groups, chat rooms, newsletters and interactive content (Bezhovski & Poorani, 2016). Warschauer (2001) has defined www as "an international online database that allows the sharing of linked multimedia documents" (p. 207). This system led to the spread of internet all over the world which consequently declined the internet price and this way internet was accessible to the majority of the individuals belonging to middle class too. Baggaley (2008) considered it a paradigm shift from the traditional method to online method. According to Wagner (2006), world wide web had "the power to completely transform teaching, training, learning, and performance support practices" (p. 2).

Consequently, this easy access to the internet made Web Based Training (WBT) more popular to everyone. WBT is a type of computer based training which uses web browsers for learners to have an access to the organized learning materials by using internet. Therefore, www is also considered as the other technological advancement having a crucial role in developing integrative CALL and e-learning as it expanded the possibilities of interaction among peers as well as between a teacher and the learners. Some new programs were introduced to enhance the communication between teacher and students along with teaching.

Since the start of the 21st century, the expansion in the internet helped the invention of Learning Management Systems (LMS) defined as online technologies for learning, management and delivery of course material (Sabharwal et al. 2018; Turnbull, Chugh, & Lcuk, 2020). The first web based LMS was created in 1996 with the name of Cecil. According to Sheridan, Gardner, and White (2002), Cecil deals with organizing documents, recording and delivering e-learning courses. In 2001, Martin Dougiamas developed the latest version of LMS which was named as Moodle. It was open source and free software developed to assist educators to build online courses focusing on interaction. The use of the modern LMS is expanded to hosting and delivering learning content, web conferencing, chat forums, learning games, blogs, grading, etc. This is how the concept of e-learning evolved which made the synchronous learning possible. The synchronous learning is the type of learning where both the teacher and the learner are participating and communicating simultaneously through internet by using any medium such as webinar, instant messaging, etc. The modern LMSs are mainly web based programmes delivering various types of learning material which include reading material, audios, videos, wikis, chats blogs, web conferencing, forums, learning games, testing, grading, including Facebook live sessions, skype sessions, etc. (Bezhovski & Poorani, 2016). To date, LMS are playing crucial role in creating the digital environment by facilitating learning and teaching (Turnbull et al., 2020).

Later on, in 2005, YouTube was founded by Jawed Karim, Steve Chen and Chad Hurley. It was initially created for sharing videos which was then acquired by Google to aid its search data. According to Weller (2020), this realization transpired the people that they could make his/her own video and could share it easily with others. It was "the next step in the democratization of broadcast that had begun with the web" (ibid, p. 85).

Higher education systems around the globe increased the use of embedding videos from sites such as YouTube.

There were some new initiatives which upgraded e-learning method into interactive and communicative one by providing an open access and self-learning platform, for instance, Massive Open Online Courses (MOOCs). George Siemens and Stephen Downes introduced this term in 2008 to describe the open online courses entitled as Connectivism and Connective Knowledge in the University of Manitoba in which, first time, 2300 people participated from all over the world (Margaryan et al., 2015). This model was known as cMOOC while the "c" stands for "connectivist". This model inspirited many instructors in various disciplines and they began experimenting different pedagogical models for the autonomous learners (Poritz and Rees, 2017). This development of digital technology upgraded educational revolution from traditional face-to-face learning to online learning. Because of the great success of MOOCs, Sebastian Thrun found Udacity, a first private MOOC company which were followed by a number of other e-learning websites such as Coursera, FutureLearn, and EdX. These websites started to offer online courses and have their memorandums of understanding (MOU) with various universities across the world supporting millions of students to take benefits from the online courses.

Bezhovski and Poorani (2016) argued that "what once was just 'computer based training' now became 'take your class anywhere you go'" (p. 51). This is how learning has recently become omnipresent without any boundary of location. The current situation of e-learning has enabled learners to have full control over their learning process. Since this era is the era of mobile phones and related gadgets, e-learning has also been developed by integrating mobile technology with the learning system, growingly known as mobile learning (m-learning). Though m-learning is a form of e-learning, it is slightly different from e-learning in a way that it is not only electronic but also mobile. It is considered as the natural evolution or extension of e-learning as it extends connectivity, collaboration, portability, context sensitivity among learners and educators. Traxler (2005) stated that as compared to e-learning, mobile learning is more spontaneous, bite-sized and offers many ways of interactive mobility to learners.

There are varieties of mobile learning based on its attributes offered by different researchers, and most of them revolve around mobility and technology (Pachler et al., 2010). Bezhovski and Poorani (2016) define m-learning as "the portable and lightweight platform where the learner can engage in learning activity without any geographical constraint" (p.52). Pieri and Diamantini (2009) see it as "a modality of distribution of any learning content with portable devices" (p. 184). Some of the examples of mobile learning tools are mobile phones, smart phones, Tablet PCs, palmtops, laptops, handheld computers, and media players.

Nicholson (2007) explained the origin and history of e-learning and presented a table (given below) which showed "macro-level features" of the historical perspective of e-learning:

Table 1: The Changing Focus of Educational Technology over the Past Years

Era	Focus	Educational Characteristics
1985-1975	Programming; Drill and practice; Computer-assisted learning-CAL.	Behaviourist approaches to learning and instruction; programming to build tools and solve problems; local user-computer interaction
1990-1983	Computer-Based Training; Multimedia	Use of older CAL models with interactive multimedia courseware; Passive learner models dominant; Constructivist influences begin to appear in educational software design and use.
1995-1990	Web-based Training	Internet-based content delivery; Active learner models developed; Constructivist perspectives common; Limited end-user interactions.
2005-1995	E-learning	Internet-based flexible courseware deliver; increased interactivity; Distributed constructivist and cognitive models common; Remote user-user interactions.

Nicholson (2007)

The Current Status of E-learning

Currently, MOOCs, mobile phones and LMS are widely used in e-learning across the globe as Pappas (2015) earlier argued that the demand for LMS was $2.65 billion in 2013 which would grow up to $7.8 billion in 2018. Researchers further expected that the demand for LMS would increase up to $31 billion by the end of 2021. A recent research study conducted by Pappas (2019) reported that over 49% of the students have taken online course over the past few years which is a great rising number as compared to the last decade. Therefore, most of the universities started offering not only individual courses but also entire degree programs.

E-learning in 2020 amid Covid-19 Pandemic

The year 2020 has seen a rapid demand as well as relevance of e-learning all over the world since World Health Organization (WHO) declared Covid-19 as a pandemic on March 11, 2020 (Cuccinotta & Vaneli, 2020). Reacting to the situation of Covid-19 almost all schools, colleges, higher education institutions across the world were closed so that students could follow social distancing in order to reduce the risk of infection (Toquero, 2020). The pervasive situation left a serious impact on students, teachers and educational institutes (Mailizir et al., 2020). Since no one knew when this pandemic would end, it was decided by all educational institutes across the world, including

Pakistan, to start classrooms, conferences, seminars and other educational activities virtually by using already available technical resources (Kaur, 2020). The UNESCO report revealed that 1.5 billion learners and 63 million educators were compelled to modify their practices from traditional method to online method. With this, the global market of e-learning is expected to rise over $243 billion dollars by 2022 (Duffin, 2020).

This unexpected and rapid transition from traditional face to face learning to the virtual/online learning caused multiple challenges of digitalization too in implementing e-learning without required preparedness, especially in the developing countries (Crawford et al., 2020). Lack of resources was the major challenge which teachers, students and administration of educational institutes were facing. Bates (2020) examined that Covid-19 created multiple forms of inequalities in the education system and also increased the need for low cost and universal need of internet. It also caused social marginalization of students as some students could afford devices, internet packages and a proper environment to learn online whereas other students could not afford these things. Thus it created lack of access and availability of the internet and technology which affected students' capacity to perform in the digital learning environment (Zhong, 2020). Lack of interaction with students and with other fellows was another barrier as this pandemic reduced socialization (Zhong, 2020; Adnan & Anwar, 2020).

Conclusion

This paper has discussed the evolution of e-learning from the correspondence courses to the virtual learning platforms. Since the beginning, e-learning has introduced significant developments in the field of learning and teaching and is still developing while coping up challenges. The progress of e-learning showed that e-learning had matured since 1990s with the invention of computer and web technology. Today, it is considered as an integral and valuable aspect of education and its impact can be seen in almost all institutes. Workshops, trainings, seminars, and conferences are replaced by webinars to meet the demand for education.

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