E-learning using Robust Information Technology

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ABSTRACT
The rapid evolution in information technology, software, and hardware equipment has greatly affected emerging and improving new education approaches called E-learning. Universities and stakeholders have stepped forward and started investing in this learning type to increase higher education revenue. On the other hand, students become greedy to join online learning regardless of geographical area, students' ethnicity, and age. The scholars showed that online learning outperformed face-to-face education to obtain knowledge and satisfy their needs. However, some challenges could face online learning, such as the sense of isolation as students are virtually connected and technology could be difficult for most students. This study highlights online literature, challenges, and, on top of that, giving recommendations to enhance a quality of e-learning.

1. INTRODUCTION

Online learning or E-learning refers to use of technological tools to post course content to students or learners who are available on the World Wide Web in a collaborative and interactive way [1-3]. The online learning has enhanced and advanced in its tools and quality due to a rapid development in computer and software engineering [4]. The online education approach ignores geographical distance that enable people from different countries and age levels to complete a whole degree without putting their feet in a campus. This approach is very suitable for students who have other responsibilities (i.e., full-time employment and family); students who live in rural communities or females who have restrictions to join an education institution in some countries. The educational institutions also obtain benefits from adoption this type of learning as it expanded the number of students who can access institutes easily and increases the institution's revenue with a low cost [5,6]. In contrast, stakeholders face different challenges due to a continuous growth of online learning and they must satisfy academic requirements with such population diversity. In addition, most intuitions compete with each other's and put more pressure on these organizations to provide a better quality of service for their members as in a traditional education. Various studies [7, 8] showed that student's registration in online learning programs has increased rapidly comparing with traditional education that decreased in number of student's enrolment. Seaman et al. in 2018 [9] claimed that about 32% of university students are take part in online learning. Many studies reported that a quality of online learning is similar to traditional one, a lot of studies claimed that distance

learning surpassed education in place. However, few studies showed less satisfaction for learners who study remotely than tradition learners.

This paper shows online learning in a literature review from a historical perspective and how it progresses during the last two decades. The popular tools used and helped in developing online learning. Also, this study reported opinions of studies about online learning versus traditional. On top of that, this paper informs stakeholders about main challenges that face online learning and presented recommendations for educators to improve teaching quality in online organizations.

2. LITERATURE REVIEW

Historically, online learning or e-learning started in 1981 in California by Western Behavioral Sciences Institute (WBSI) that offered a free education course for over 18 years old peoples [10]. The institute provided different programs that utilized video conference through professional lecturers and well-known university. Afterwards, primary and secondary schools practised online learning as well as different universities and colleges that offered courses for higher education. Florida's Nova South-eastern University was the first university that design a complete program for graduated students, and Jones International University was the first university that launched a full web-based application in 1996. With a rapid development of Internet, online learning becomes available for more people and consequently more steps were taken to improve a curriculum for all education levels [11]. During a last fourteen years, number of authors such as Elaine Allen and Jeff Seaman monitored a development of online learning and they continuously introduced reports [7]. Table I shows a progress of a college courses. Firstly, the courses were face to face without using any online technology. Afterwards, administrators introduced web-based or internet pages to deliver assignments and syllabus. Later on, a reasonable of course content was delivered online, usually conducts online discussion that decreased a need to face to face interaction. Finally, a majority of course content was delivered online.

A survey conducted by Seaman et al. [12] in 2013 for ten years old showed that only 34.5% of higher education institutes had adopted online learning in 2002; this percentage raised 62% in 2013 for institutes that introduced full online programs. The same authors claimed in 2018 that more than 6.3 million students have finished at least one online course [13]. Fig. 1 shows the number of students that registered in different types of higher education institutes. Other surveys [14-16] studied the types of students who attended traditional and online learning.

Table 1. College courses description.

Proportion of Content Delivered Online	Type of Course	Typical Description
0%	**Traditional**	**Course where no online technology used — content is delivered in writing or orally.**
1-29 %	**Web Facilitated**	**Course that uses web-based technology to facilitate what is essentially a face-to-face course. May use a learning management**

		system (LMS) or web pages to post the syllabus and assignments.
30-79 %	**Blended/Hybrid**	**Course that blends online and face-to-face delivery. Substantial proportion of the content is delivered online, typically uses online discussions, and typically has a reduced number of face-to-face meetings.**
80+%	**Online**	**A course where most or all of the content is delivered online. Typically have no face-to-face meetings.**

(Allen, Seaman, Poulin, & Straut, 2016, p. 7[7]).

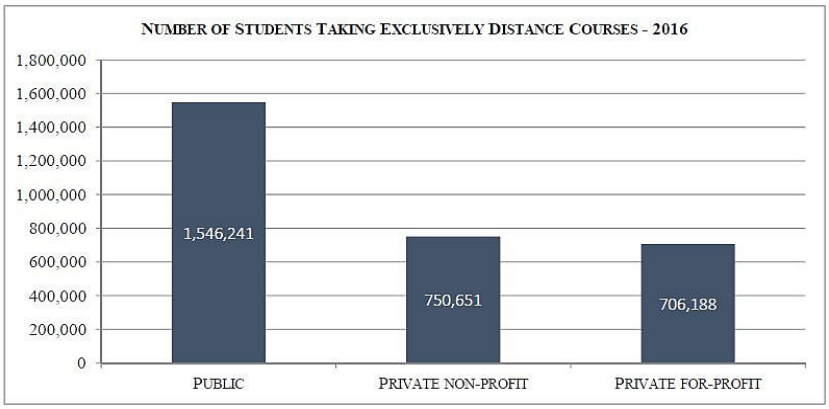

Fig 1. Number of students in various online institutions.

These surveys showed that most students who enrolled in online courses were older adults and their ages ranged between 22-50 years old. Besides, a report was published from Higher Education.com and Best College.com [8] indicated that most students who finished online courses were full-time employed and had families. In contrast to traditional learning and according to National Centre for Education Statistics, about half of full-time students and most part-time students have jobs [17]. In summary, these studies showed a necessity for online learning for both institutions that can expand the number of students without physical development such as classrooms and for students who can obtain credentials from far distances without losing their jobs, money, and keep them near their families.

3. ONLINE LEARNING VERSUS FACE TO FACE

Sussman and Dutter [18] analysed data for four years, and for the same courses materials, they compared both students' performance in different modes of learning. They found that student results in face-to-face learning were the same in online earning. Similarly, Thomas [19], Zhao et al. [20] and Dell et al. [21] concluded that the achievements of learners in both modes are the same. Russell analysed a lot of articles and reports about the differences between learning on campus and learning online. He wrote an article with the title "The No Significant Difference Phenomenon". Other studies such as [22, 23] also compared the performance of students on an economics course in traditional and distance learning. They found that online students were more likely to achieve tasks and showed high satisfaction than face-to-face students. Similarly, Dutton et al. [24] obtained the same

findings with students that were taught computer science. Dutton explained that online learners are older, more experienced, serious, and have family compared to young students in traditional universities.

In contrast, some studies [25, 26] found the opposite, the studies included students in macroeconomics course and they concluded from test scores that the learners in campus outperformed their peers in online learners.

The variations in authors' opinions regarding online learning's efficacy or face-to-face belong to methodological issues [27]. Firstly, a bias in the selection; the researchers could not randomly allocate students to participate in the questionnaire. The questionnaire usually contains a small number of students with no more two courses that lead to reflect wrong results [28-30]. Secondly, research was conducted by a course's lecturer and participants are more likely his students to make this comparison [28, 31].

4. E-LEARNING TOOLS

E-learning refers to a system that a lecturer or instructor delivers a subject to students who are available online and there are no face-to-face interactions; this definition was according to The National Centre for Education Statistics (NCES) [32]. The education institutions used different technology tools to deliver course content to their students. The following paragraphs describe these tools.

4.1. Learning Management Systems (LMS)

Learning management systems are a programs such as Blackboard, Desire2Learn, and Moodle, which are widely used in E-learning environments. They provide lecturers with a template to post course content such as lectures, discussion initiation, quizzes, and videos in central institution platform [33-35]. In addition, LMS enables the instructors to install a wide range of educational approaches and coursework tools to be in connection with their students in group or individual levels. The instructor can also monitor learners' involving in discussions, their activities and results [36]. The lectures in this kind of system could be restricted to use the tools that are available in the platform, and also the system could not be reachable remotely that may be affected on students who travel frequently.

4.2. Web-Based Applications

The Internet environment represents a rich area of massive web applications that can be more efficient for traditional and non-traditional learners to deliver course content, do assignments, and communication between students and lecturers [37]. Higher Education.com introduced a report and Best College.com in 2016 [8] showed that social media could be used as a stage to discuss among students, share course content, and receive alerts and announcements related to class events. In addition, social media such as Twitter and LinkedIn are utilized to create networking opportunities with professionals in the same field [38]. YouTube application, a very popular App, can be used by lecturers to embed video and course content via their channels to be accessible for students. Other applications such as Skype or Google Hangout provide a tow communication way in real-time through doing messages and videos [39].

5. CHALLENGES OF ONLINE LEARNING

There are number of challenges that face online learning when learners study coursework remotely. This section explains each of these challenges in more details.

5.1. Sense of Isolation

Many learners have concerns regarding involving new students and doing discussions even with instructors because they have no experience with such students on a college campus. The diversity of online learners creates a sense of isolation as they are older, over 25 years old, and have other responsibilities such as family and work. These commitments prevent learners from taking part in social activities and diving with others as they want [40-42].

5.2. Technology

The key player of successful and efficient online learning relies on the Internet and various technology tools. The knowledge of these tools is a challenge for both students and lecturers [43]. On the other hand, many students could not have hand expertise in using this type of technology as this study showed earlier that the learners have some responsivities and could leave the study stage for a long time. On the other hand, the lecturers try to embed new tools in virtual classes to enhance E-education; even stakeholders or intuitions regularly improve E-learning systems and obtain support from larger companies and experts. The continuous development and rapid growth in such technology put the students under high pressure. Success online learning depends on students' confidence and their ability to understand technical issues [44].

5.3. Institutional Concerns

The colleges and universities become aware that online learning is not an easy task as the shifting from traditional education and dealing with students on campus to virtual education with students sit remotely is a challenge [45]. This change requires an effort and time to train a staff who is not experienced in such an environment and money to provide an institution with equipment and related support for installing and troubleshooting. In addition, the institution could not retain the online learners in comparing with students in traditional education as the leaders cannot expect the reactions and how these learners feel regarding a virtual education [41]. Researchers have introduced many research efforts such as [42, 46, and 47] to recommend institutions and stakeholders for successful and efficient online learning. The researcher community suggested that the educational organizations adopt E-learning to provide this environment with adequate training, technical support, and appropriate technology. Next section highlights on some important factors that contribute in enhancing online learning.

6. RELIABLE ONLINE LEARNING

Many studies showed that stakeholders, which include institutions, educational organizations, agencies and universities, can influence or be influenced by online education systems. The studies [48-55] reported that these organizations help in effective and reliable online learning when they realize and understand the following factors:

6.1. Supporting and Accessing for 24/7

Online learning must be accessible 24 hours per day and for 7 days a week for all learners with technical support. Therefore, the learners can schedule own time with their commitments in which allow to continue in a study and complete a coursework easily. This

type of leaning as mentioned before is designed specifically for adult students who have other responsibility of work and family. Flexibility of online learning regarding time and distance is a key player for successful this technique, therefore, it is necessary to be active all the time and reachable by all learners [48]. In addition to full access of learning system, there is an important factor that could influence on distance education. This factor represents in tools and programs that inbuilt in learning management systems (LMS) or as web-based applications. The familiarity with these tools and programs is a key player to create an interaction between students, lecturers and faculty [49]. A summary of the previous discussion in improving 24/7 access with support [50] as follow:

- Content of learning and Interaction should be available anytime and anywhere.
- Support for a student and staff should be on demand.
- Online learning system should be satisfied by a student.
- Online learning system should be flexible and accessible.

6.2. Beneficially of Online Learning

According to studies in computer science and information technology that have indicated a perceived usefulness is an import factor that give a user a motivation to use/and or accept information applications [51]. In online learning, perceived usefulness could be defined as a degree that a student or learner believe that E-courses will grant him or her a requirement education to obtain a job. An employer seeks skilled workers who have hand experience or education involves what the employer want such as CCNA or CompTIA certificates. The educational institutions should be aware to this factor when they set online courses and ensure that these courses give a learner a value to be enthusiastic with online learning system [52]. The following points sum up the above paragraph about usefulness of online learning [50]:

- Enhance and develop a performance of online learning academically.
- Online learning should be valuable and comfortable for a student.
- The usage of an online system should be improved continuously.
- Prepare a student to obtain a job after graduation.

6.3. Acceptance of Online Technology

Technology acceptance by a user is also an important factor of successful online learning. Different methods have been proposed to predict whether a user accept a new system or not, the most model that have been taken attention by researchers community is the Technology Acceptance Model (TAM) [53]. Perceived ease of a web-based application or system influence on the acceptance or rejection of that App [52]. Underneath a summary about a main factors of technology acceptance [50].

- Online learning system should be effortless.
- A student can navigate online tools easily.
- Online tools should be less strain physically.
- Moving within web application should be intuitively.

6.4. Technique of Measurement and Feedback

It is an essential to measure online leaning efficiency and whether it sets educational requirements and learning goals as in tradition learning. Therefore, any online learning system must be provided with tools and a mechanism to record and read levels of teaching and engagement of students continuously and immediately [54]. In other words, a measurability is a mechanism to test a student understanding and a communication state between learner and instructor. Known tools are quizzes, task achievements etc. that show performance of students in the other side. There are web sites of learning such as Magoosh and Benchprep that contain botnet tools to measure student's acceptance on coursework and track their performance [55]. The outlines for opinions of authors [50] about measurability and feedback mechanisms as follows:

- Participation and performance should be monitored to improve online system.
- How a student engage with online learning.
- Online contents should be measurable.
- Testing online system constantly and should be understandable from a student.
- Determine technique of measurement.

7. Conclusion and Future work

Online learning gives the student a great opportunity to complete an entire degree without stepping foot on the college campus. In addition, it gives an opportunity for stakeholders and universities to increase learners' accountability with marginal costs and huge revenue. However, keeping this model to retain the same academic requirements in traditional education and obtaining scientific knowledge becomes a challenge. Main challenges are a sense of isolation due to the diversity of online learners, the continuous development and rapid growth in such technology, and the leaders cannot expect the reactions and how these learners feel regarding a virtual education.

Therefore, for future work and recommendations for better online learning systems, this work insists on finding of previous studies to four factors. First, accessibility to online learning for 24/7 with technical support that enables the learners to schedule own time with their commitments in which allow to continue in a study and complete a coursework easily. Second, perceived usefulness that reflects a student's motivation and his or her believe that E-courses will grant them a requirement education to obtain a job. Third, perceived ease of a web-based application or system influence on the acceptance or rejection of that App. The learner should believe that using online tools and navigating courses on the web is easy and effortless. Forth, quality measurements should be considered for both higher education institutions and students through developing a virtual tool to simulate real classrooms. The educators must be aware that continuous learning needs much effort to guarantee education efficacy through a collaborative and interactive way.

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