

A REVIEW OF VIRTUAL LEARNING SYSTEMS

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ABSTRACT

A virtual learning system is a cost-effective management platform that is geared toward knowledge based acquisition with multiple user interaction. Virtual learning system is prompted by its flexibility and robustness that synchronizes various learning methodologies into a unified outcome of operations. Whereas the conventional learning scheme is restricted to physical learning system, and by the emergence of COVID19 pandemic this has challenged the process of learning due to the COVID protocol. In this paper, we give a review of virtual learning system as an evolving technology embedded with the frontiers of knowledge in a changing educational environment. In addition, the benefit and opportunities offered by the virtual learning system are enormous in educational system as it provides a robust platform for users. We also discuss some design approach, benefit of virtual learning system and challenges associated with online learning, significance of virtual learning, opportunities, and analysis of e-learning modes in the time of crisis. We also discuss some design approach, benefit of virtual learning system. We shall also discuss EdTech in times of pandemic, natural disasters and how it can help academic institutions to deal with challenges associated with online learning.

KEYWORDS: Technology, Virtual Learning, Robust, Synchronous, scheme, Platform

INTRODUCTION

A virtual online learning is a cost-effective solution that allows students to interact with instructors and classmates in real time. It is also a synchronous virtual classrooms learning system via web conferencing schemes, thereby increasing its usage in higher education settings. Synchronous components assist teachers and instructor in

promoting technology-enhanced learning on their campuses.

Population explosion and mass educational system in every region of the world brought greater challenges to this method of education. For instance, there is problem of inadequate number of human and material resources to cater for the education of the large population. The population of school age citizen in most places has grown

tremendously to the extent that only a small percentage can be offered admission. The student – lecturer and student-classroom ratios have grown to the extent that teaching and learning in the classroom have been less effective (Akintola and Akinyokun, 2011).

On-line distance learning is also known as virtual classroom, this type of learning system students' work on their own, at home, at the office or anywhere. They interconnect with faculty and other students through email, in electronic forums, videoconferencing and other forms of computer-based communication.

Virtual classroom platforms provide collaborative learning facility, which is an integral component of teaching and learning system as well as instant feedback with facilities like e-mail, wikis and bulletin board at the disposal of teacher and the students. Virtual classroom also provides two-way communication with faculties to incorporate many interactive features, for both on-line and off-line use thereby alleviating the lack of sense of belonging of remote students.

Online teaching and learning environments can be extremely unique from one another. Online learning environments can be classified into three dominant groups, completely web based, blended or hybrid setup, and traditional courses using web based supplements. Fully web based courses are conducted completely on the Internet with no face to face communication, all aspects of the course being conducted in an online learning setting. Hybrid courses comprises of both web based and classroom sessions, with a varying

degree of time allotted to the online and in class sessions, depending upon the nature of the class and discretion of the instructor.

The high cost of internet service and accessibility of the technology have generated a rush in the request for web based teaching and learning. Distance education is a fast increasing in most environments; it allows users the flexibility of operating outside of the constraints of time and place (Chaney, 2010).

United States Department of Education, (2010) Online learning is define as “learning which takes place partly or completely over the Internet” Virtual learning is interesting to a range of students and is becoming more conventional in settings from basic schools to high school and into tertiary education.

In this paper, we shall review virtual learning system as an evolving technology embedded with the frontiers of knowledge in a changing educational environment. In addition, the benefit and opportunities the system offers to users. We shall look at challenges associated with online learning, and analysis of e-learning modes in the time of crisis. We shall also discuss EdTech in times of pandemic, natural disasters and how it can help academic institutions to deal with challenges associated with online learning.

LITERATURE REVIEW

Virtual learning can also be referred to as; online learning, open learning, web-based learning, computer-mediated learning, blended learning, m-learning etc. they have in common the ability the ability for users' computer to

connect to a computer on a network, this offers the possibility to learn from anywhere, anytime, in any rhythm, with any means” (Cojocariu *et al.*, 2014).

According to Singh and Thurman, 2019, online learning is defined as “learning experiences in synchronous or asynchronous environments using different devices (e.g., mobile phones, laptops, etc.) with internet access. In these environments, students can be anywhere (independent) to learn and interact with instructors and other students”

The synchronous learning environment is structured in the sense that students attend live lectures, there are real-time interactions between educators and learners, and there is a possibility of instant feedback, whereas asynchronous learning environments are not properly structured. In such a learning environment, learning content is not available in the form of live lectures or classes; it is available at different learning systems and forums. Instant feedback and immediate response are not possible under such an environment (Littlefield, 2018).

Amidst this deadly virus spread such online platforms are needed where (a) video conferencing with at least 40 to 50 students is possible, (b) discussions with students can be done to keep classes organic, (c) internet connections are good, (d) lectures are accessible in mobile phones also and not just laptops, (e) possibility of watching already recorded lectures, and (f) instant feedback from students can be achieved and assignments can be taken (Basilaia *et al.*, 2020).

The expansion of online courses and enrollment in elementary, high school

and tertiary education has rapidly expanded, with no prove of reduction. Online learning appeals to diverse populations of students with ranging academic needs that traditional education classes are deficient or not capable of achieving. The demand for online courses is a derivative of the push “to deliver superior education to all students, regardless of location and time”. The need for flexible learning environments for potential learners who are hospitalized, have phobias linked to school environments. Single parents, have been expelled, dropouts seeking to gain a diploma and many other specific cases have led to a growth in the amount of distance learning courses and programs that are offered (Chaney, 2010).

Online education has the possibility to create educational openings for individuals who may have been confronted with unsurpassable hurdles due to expansion of online learning programs. Online courses have some many advantages, such as conducive learning environment to students who favour self-regulated learning. Self-regulated learners have a tendency to use numerous “cognitive and metacognitive approaches to achieve their educational aim” (You and Kang, 2014).

In virtual learning systems, students can improve on their self-regulated learning skills by frequently utilizing time management, review materials regularly, sought help from professors or peers, meet deadlines, and had the skill of metacognition in order to reflect upon their own learning (You and Kang, 2014). The benefit of flexibility in online courses cannot be exaggerated

owed to its prevalence reasons why students are attracted to online learning. Online learning allows for students to work at any time and place that is compatible with their learning needs. A large number of instructors and students commented on their ability to focus more of their attention on the content of the course and less on issues such as parking, traffic, and other problems that may arise when attending a traditional class environment (Thomson, 2010).

A study that was carried out by Dana Thomson during the 2008-2009 academic years, they produced qualitative discoveries that highlighted the significance and demand for flexibility and expands opportunity for students enrolled in online courses. Students are unable to take classes that are not offered in their schools; they can also work when they have free time or a lighter homework load in their school classes. In recent times, there has been a drive for the expansion of courses that dually offer secondary students with college credit and secondary school credit for course enrollment and successfully completion (Thomson, 2010).

The competitiveness of education, most especially in higher education or post-secondary education, demands more opportunities for learners to discover future opportunities in different courses in various degree programs at a multitude of colleges and universities. Institutions should frequently face the challenges of expanding opportunities for students while being confronted with a decreasing budget year after year. Projected cost models have established that “a hybrid model of teaching in large

preparatory courses has the possible to meaningfully ease teaching compensation costs in the long run” (Bowen *et al.*, 2014).

An online environment may be referred to as “interactive learning online” (ILO). ILO refers “to very refined, interactive online courses in which machine-guided teaching can be replaced with some (however not frequently wholly) outdated, face-to-face instruction”. ILO gathers data from a large number of learners and uses the data collected to provide response and control that is directed at a particular student. It also provides instructor with student progress tracing, which allows instructors to provide student with “more targeted and effective guidance” in order to successfully interact with new knowledge. Machine guided instruction does not appear to be replacing face-to-face instruction, but it does seem to be a tool that instructors can utilize for rapid feedback and student tracking (Bowen *et al.*, 2014).

You and Kang, 2014, noted that self-regulation is an important constituent to a successful online course program. Therefore, non-self-regulated students tend to demonstrate academic delay, increased inefficiency, and use less intellectual and metacognitive approaches to achieve their learning aims.

Thomson 2010 recommended that course designers “to take advantage of the benefits that the online setting can offer” and “to reduce the exact challenges in their environment”. Courses must be well structured from the very beginning, provided that the students with detailed instructions and expectations. Instructors should

anticipate areas of potential mix-up and discharge vague directives prior to starting the course and the courses should have a detailed syllabus, course calendar, useful links, and course information that is chunked into digestible pieces. Communication is notably one of the most crucial elements to an effective online course.

Educational objectivity is a problem that is often called into demand. In classifying academic consistency or lack of an online course, it is critically significant to identify the various diversities of designs that online education can be conveyed, the multitude of topics online courses can impart, and the ever-growing population of learners. In regard to education, “the online learning marketplace reflects the diversity of American higher education itself” (Bowen *et al.*, 2014).

In the work of (Oswal and Meloncon, 2014), educational technology represents the dominate culture, therefore limiting individuals who are not included in the dominate culture. Another restriction that has been brought to the forefront is the issue of the ‘have’ versus the ‘have-nots’. Technology is an area that can be easily taken for granted when it is intertwined into daily life, but for many, technology is not vastly used due to the lack of monetary means to gain access. Increasing the ratio of computers and other electronic devices to students will ultimately lead to the disadvantaged gaining access to the global knowledge that is available on the internet.

According to Thomson 2010, an online learner’s experience learning curve is first becoming acclimated why

students ask questions in various forums, instead of in a traditional face-to-face, classroom setting. Online learning has been one option presented for meeting the rate of learning for gifted students. Oswald and Meloncon (2014), online learning has the ability to break barriers associated with disabled students, which have restricted individuals from an equitable education in the past. This system has established a learning environment that is conducive for all participants, the students’ needs must be put first to establish courses that are accessible for all learners. In education an estimated one in ten students has some form of disability.

Online learning could be the only way students can independently access courses and course-materials. This may be a dominant way to accessible online distance education. An increasing percentage of students with disabilities reveal the ever increasing need for alternatives to traditional school settings (Oswal and Meloncon, 2014). Harshit *et al.* (2012) presented an intranet-based virtual classroom system that improves the interactions between students and teachers. The system presents a new design for e-learning and eliminates some of the difficulties of the current systems as well as increase the communication among instructor and students with the impression of a real life classroom.

In the work of (Mahesh *et al.*, 2011), they developed a system which provides live streaming of lectures, it also allow assignments, questions and answers to be uploaded. The virtual classroom system incorporates several modules for live video lecture, whiteboard technology, chat-room and it also have

teacher-students feedback modules, and it combines a synchronous learning via live streaming video, audio and chats over the Internet. This is also blended with asynchronous online interaction and an assembly of works which simulates a real life scenario. The system has an advantage of a failure to incorporate notifications email and mobile phone through short message service (SMS) is the major limitations of the system. Lertkulvanich *et al.* (2010), created a virtual classroom system which uses virtual image creation method. The system consist of three classrooms: the first classroom is for model that comprises of video clips guidelines for lecture and practice and online live lectures while the second classroom is a library which links the e-learning websites regarding radiographic testing. The third classroom is a workroom for detecting research results. These three classrooms were designed to be virtual, which uses computer graphic procedure.

Obasa (2010) developed architecture for an integrated system which delivers lectures in a virtual environment. The architecture describes system components presented with the techniques and recommendations for the execution of the designed system. The architecture is multi-tier, modular, and scalable and built for adaptability to database middleware suite. The system functionalities are application and delivered within the web services, and communicate via industry standard Extensible Mark-up Language (XML), messaging and access is strictly via a web browser.

A virtual classroom which uses Real-Time Messaging Protocol

(RTMP), it uses a sophisticated TCP-based real-time networking protocol that supports efficient exchange of messages, synchronized data, audio, and video. This system enables teachers and students to publish streaming audio, video and other data messages to present streaming media with interaction or navigation. On the Internet, the system allows students immediate interaction with teachers with a real classroom impression. A web-based collaborative system that serves as an add-on feature to the learning system for a post class sharing of resources by the teacher and student is also proposed by (Wichian 2011).

Ibam (2012) proposed a web-based virtual classroom system based on e-pedagogy with improved features for cooperation between participants (teachers and students) in a web-based learning environment. Teacher, course, student and learning performance shaped is the key objects used in developing the method model, the structures include course outline, presentation, resources, assessment/opinion poll, chat, hands-up, students' list, course material and cooperate, all harnessed to achieve experiential learning among students.

In the work of (Hsu 2011), he discovered that the primary steps towards building and implementing a successful concept of a virtual classroom are presented in the following way, information assessment, planning, design, implementation, and maintenance, a virtual classroom is implemented in easy phases. Failure to follow these steps can ultimately lead to poor, incomplete, inadequate and

ineffective solutions to Internet based distance education.

Benefit of Online Learning

According to (Carey, 2020), There was an overnight shift from a normal classrooms into e-classrooms, during this outbreak of COVID 19, that is, educators have shifted their entire pedagogical approach to tackle new market conditions and adapt to the changing situations. During this tough time, the concern is not about whether online teaching–learning methods can provide quality education; it is rather how academic institutions will be able to adopt online learning in such a massive manner.

In the works of Liguori and Winkler, 2020, they show that academic institutions would not be able to transform all of their college curricula into and online resource overnight. Distance, scale, and personalized teaching and learning are the three biggest challenges for online teaching. They also show that it is only through innovative solutions that can help deal pandemic outbreak.

There is a requirement of a quick shift to online learning mode; therefore, the products by Google can be really useful under such problematic situations; they are (a) Gmail, (b) Google Forms, (c) Calendars, (d) G-Drive, (e) Google Hangouts, (f) Google Jam board and Drawings, (g) Google Classroom, and (h) Open Board Software (not a Google product, helps in recording meetings in the form of files). These tools can successfully be used as an alternative for face-to-face classes (Basilaia *et al.*, 2020).

Natural calamities such as floods, cyclones, earthquakes, hurricanes, and

so on, knowledge delivery become a challenging task. These hazards disrupt the educational processes in schools and colleges in several ways. Sometimes, it leads to closure of schools and colleges which creates serious consequences for students and deprives them of their fundamental right to education and poses them to future risk. “100 million children and young people are affected by natural disasters every year. Many students and teachers also face psychological problems during crisis; there is stress, fear, anxiety, depression, and insomnia that lead to a lack of focus and concentration, (Di Pietro, 2017).

Large numbers of schools and colleges were destroyed and thousands of students were affected by these natural calamities. Their education got disrupted in midway. “Disruption of education can leave children at risk of child labor, early marriage, exploitation, and recruitment into armed forces” (Baytiyeh, 2018). When disasters and crises (man-made and natural) occur, schools and colleges need to be resilient and should find new ways to continue with teaching–learning activities (Chang-Richards *et al.*, 2013).

Webex helped professors in designing their instructional programs and sharing notes and presentations with students. In some universities, e-learning strategies and techniques were used in teaching and learning during the outbreak of COVID19. They integrated themselves in an e-learning world. The value of the face-to-face instruction method cannot be reduced, but e-learning can be used together with the traditional methods to bring in efficiency, effectiveness, and competitive edge over other

competitors by imparting quality education, (Barboni, 2019).

In February 2011, a 6.3 magnitude earthquake shook Christchurch and the University of Canterbury collapsed. Information technology and online learning helped the university to restart its operations and gave them a second life, (Todorova and Bjorn-Andersen, 2011).

In the last few years, e-learning has started gaining popularity in India. Many platforms provide affordable courses to students via Massive Open Online Courses. The challenges posed by the Corona Virus pandemic introduced everyone to a new world of online learning and remote teaching. Instructors indulged in remote teaching via few platforms such as Google Hangouts, Skype, Adobe Connect, Microsoft teams, and few more, though ZOOM emerged as a clear winner. Also, to conduct smooth teaching-learning programs, a list of online etiquettes was shared with students and proper instructions for attending classes were given to them (Saxena, 2020).

Online learning generally has a lot of opportunities available but this time of crisis, there was an increase in online learning activities as most academic institutions had to switch to this model. Online Learning, Remote Working, and e-collaborations exploded during the outbreak of Corona Virus crisis (Favale *et al.*, 2020).

E-learning Challenges

There are n number of technologies available for online education but sometimes they create a lot of difficulties. These difficulties and problems associated with modern technology range from downloading

errors, issues with installation, login problems, problems with audio and video, and so on. Sometimes student finds online teaching to be boring and un-engaging. Online learning has so much of time and flexibility that students never find time to do it. Sometimes, online content is all theoretical and does not let students practice and learn effectively.

In a study conducted by Parkes *et al.* (2014), they found out that students were not sufficiently prepared to balance their work, family, and social lives with their study lives in an online learning environment. Students were also found to be poorly prepared for several e-learning competencies and academic-type competencies. Also, there is a low-level preparedness among the students concerning the usage of Learning Management Systems

Online learning faces many challenges ranging from learners' issues, educators' issues, and content issues. It is a challenge for institutions to engage students and make them participate in the teaching-learning process. It is a challenge for teachers to move from offline mode to online mode, changing their teaching methodologies, and managing their time. It is challenging to develop content which not only covers the curriculum but also engage the students (Kebritchi *et al.*, 2017).

The quality of e-learning programs is a real challenge. There is no clear stipulation by the government in their educational policies about e-learning programs. There is a lack of standards for quality, quality control, development of e-resources, and e-content delivery. This problem needs to

be tackled immediately so that everyone can enjoy the benefits of quality education via e-learning (Cojocariu *et al.*, 2014). One should not merely focus on the pros attached to the adoption of online learning during the crises but should also take account of developing and enhancing the quality of virtual courses delivered in such emergencies (Affouneh *et al.*, 2020).

A lot of time and cost is involved in e-learning. It is not as easy as it seems, a considerable amount of investment is needed for getting the devices and equipment, maintaining the equipment, training the human resources, and developing the online content. Therefore, an effective and efficient educational system needs to be developed to impart education via online mode.

System Design

The design of a virtual classroom system consists of several modules which help it to meet up with its designed objectives. The assignments module enables teachers to grade and provide comments for uploaded files

and assignments created on and off line, the chats module allows participants to have a real-time synchronous discussion via the web while the glossaries module enables participants to create and maintain a list of definitions in a way similar to the dictionary. The modules for lessons, quizzes and wiki are made up of contents that make them to function optimally in interesting and flexible ways.

A whiteboard is also presented as a main presentation window for writing and displaying of images. The audio features allow participation in conversations during a classroom session using microphones and speakers (or headset) via Voice over Internet Protocol (VoIP) while the video features allow the transmission and receipt of video broadcasts in real life and interactive manners. Coordinated approach will be used in the system development. The Block diagram shows the different activities which will take place in the system (Figure 1).

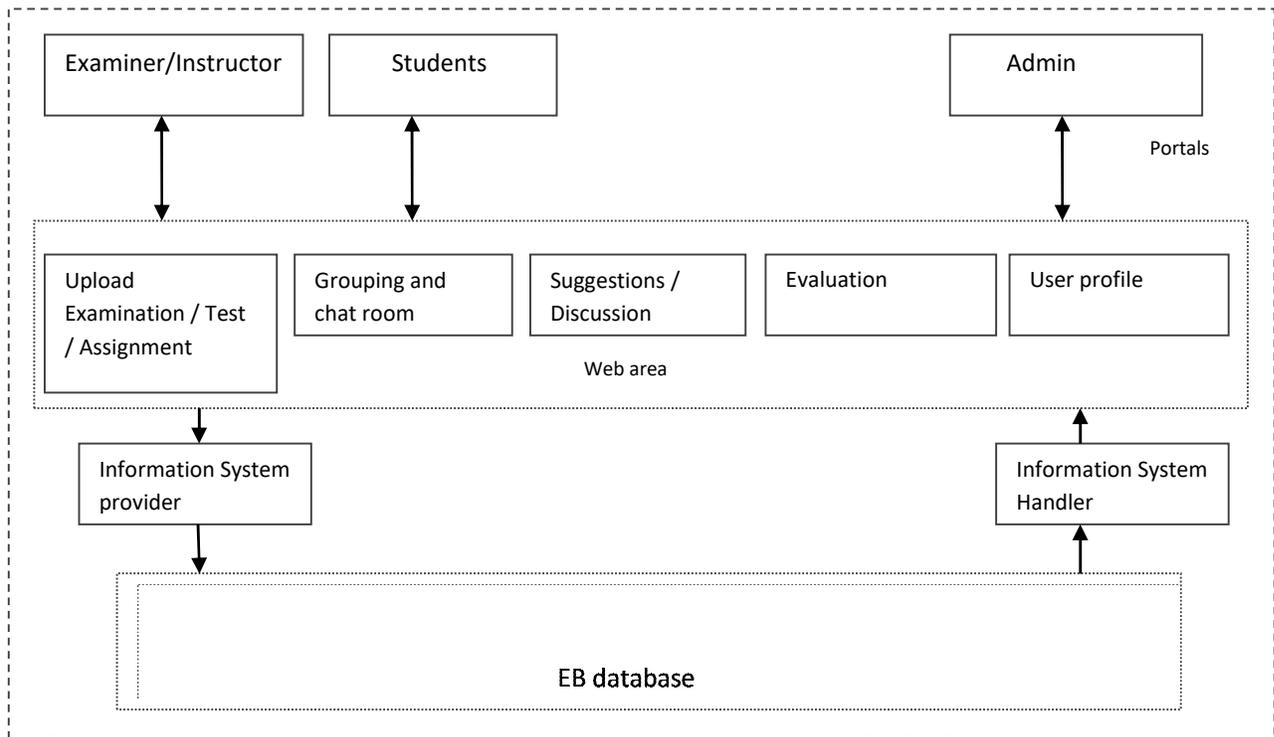


Fig. 1: Block Diagram of the Proposed Model

CONCLUSION

Virtual learning has is progressively gaining access in most institutions, and to the far reaching environment of online learning. The initiative to increase technology in most private schools in Nigeria, and public schools should follow suit. It has increase accessibility for students to access online courses in different subjects' areas. This system allows students taking this program to also work; this increases the competitiveness of the program. In this paper, we discuss different literatures on online learning, the effects of online learning and strategies to help students in an online learning environment. We also discuss strategies to support online learners to better assist learners in becoming more acclimated in their learning

environment so that they can benefit more from the system.

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