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Role of E-Learning for Teaching and Learning in the Higher Education Sector of Sri Lanka under Crisis Situations: A Review on the Challenges, Future Potential and Way Forward

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Abstract

Conventionally, education has been offered in classrooms, where students can interact directly with the teachers, respecting the physical presence. Recent advancements in technology play a key role in the development and expansion of the education sector. Therefore, similar to many countries in the world, the higher education sector in Sri Lanka is also progressively attempting to incorporate more E-Learning opportunities to elevate the learning process via facilitation of Blended Learning (BL) and Distance Learning (DL) opportunities. Despite the proven benefits and efficacy of E-Learning systems, limited administrative commitment, absence of adequate instructional/training programmes, gaps in technical expertise, poor telecommunication facilities, poor attitudes of students and educators, and gaps in technology readiness act as major barriers for the inculcation of E-Learning systems in Sri Lanka. However, the recent COVID-19 pandemic situation has depicted the significance of E-Learning systems in continuing higher education. Therefore, the majority of the higher education institutes have been compelled to move towards E-Learning concepts, while facing aforesaid challenges. The provision of soft-loans to empower necessary physical resources, enhancing the basic telecommunication facilities, motivation of students and academicians, and enhancing their core competencies for E-Learning through training programmes are essential to promote E-Learning opportunities in Sri Lanka. Thus, policymakers in education sector have to consider aforementioned aspects in designing a better and a sustainable E-Learning framework for higher education setup in Sri Lanka.

Keywords: E-Learning, Challenges and Potential, Crisis Situations, Higher Education, Sri Lanka

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Theories of Learning and Distance Learning

A process, which improves the performance of an individual through experience and knowledge leading to changes in knowledge, attitude, or behaviour, could be simply defined as learning [1]. According to the concepts of "New Learning", learning is an interactive process that involves five dimensions:

- Development of flexible and decontextualized proficiency rather than a reminiscence of facts and contexts specific application of skills
- Facilitating learning rather than mere transmission of information to students
- Promoting student engagement as active constructors of cognitive networks rather than receptors of information
- Enhancement of analytical and clinical skills to address different issues, rather than direct application of knowledge
- Enrichment of social environments to promote self-regulated learning from failures and experiences of other students.

Therefore, mere learning of content or information only addresses one part of the learning process, while development and practice of intellectual skills/analytical thinking, interpersonal/social skills, and soft skills, also play a key role. Therefore, learning is an interactive process, in which students play an active role in enhancing knowledge while interpreting and practicing the learned content with their experience and previous knowledge.

Distance Learning is a system or a process of providing education or any instructional arrangement, where teacher and student remain geographically dispersed. Complicated and busy lifestyles and crises have promoted distance learning in secondary and higher education in many countries. In general, distance learning is considered as a non-conventional teaching and learning approach, where a variety of tools such as web media, Learning Management Systems (LMS), interactive exercises, online seminar platforms, and discussion platforms, are utilized for teaching and learning [2].

Role of E-Learning in Blended Learning and Distance Education

The concept of Blended Learning (BL) emerged as a novel concept, which emphasizes the importance of diversifying the teaching and learning modes, through the use of technology and conventional approaches [3]. This concept encourages the use of conventional teaching and learning methods along with advancing novel technologies at appropriate levels, through a variety of techniques such as lectures, discussions, case studies, live-classrooms, physical learning etc. [4]. Therefore, BL is being considered as one of the most effective and widely accepted educational models for the next era in education [5].

The collective use of the internet, digital and multimedia technologies to facilitate and enhance the learning process in a computer-generated environment, has been defined as E-Learning [6]. Effective use of software and hardware for computer-assisted learning is recognized as computer-based E-Learning, while the use of the virtual environment and the internet is recognized as Internet-based E-Learning [7]. Due to the elevated accessibility, interactivity, and flexibility, E-Learning systems have been recognized as an effective and widely utilized tool in the BL process [7-8].

The E-Learning system developed by Murray Turoff in the 1980s, as a successor of a computer conferencing software developed by him in the 1970s, is considered as the first E-Learning system in the world [9]. This system had utilized a local area network along with a software interface known as "COSY", to facilitate communication between educators and students. With time, the University of British Columbia in Canada launched the first web-based university course in 1995. Subsequently, an interface

dedicated to online learning termed "WebCT" was introduced by Murray, which supported the delivery of pre-recorded learning materials and enhanced communication between teacher and students and among students [10]. Therefore, active involvement of students in the learning process was promoted through this platform, while enhancing team decision-making and communication skills.

At present, Internet-based E-Learning platforms such as Learning Management Systems (WebCT Vista, Blackboard and Moodle, ATUTOR, etc.) and video conferencing technologies (ZOOM and Google classrooms, etc.) remain as most popular E-Learning platforms. Interestingly, the majority of higher education institutes in developed countries have already adopted E-Learning techniques for higher education [11]. Especially, most of the barriers in distance education have been adequately addressed by E-Learning platforms, elevating the efficacy of the modern teaching and learning process.

Distance Learning and Higher Education Sector in Sri Lanka

Higher education plays a key role in the sustainable development of a country and the global knowledge economy. Distance Learning, which ensures increased opportunities and accessibility to higher education, has become a major focal point in higher educational institutes of many countries. The higher education sector in the Asian region is denoting a phenomenal growth in open and distance learning. As a consequence of these developments, Asia now has more higher education institutes that offer a variety of open and distance learning opportunities, along with a relatively higher fraction of distance learners [12].

Considering the opportunities for higher education in Sri Lanka, admission for government universities has increased only up to 18% over the past few decades.

Therefore, less than 20% of the total number of qualified candidates received the opportunity of enrolling in a government university. Hence, securing a place in a higher education institute has become highly competitive, while the conventional university structure has failed to fulfill the increasing demand for higher education in Sri Lanka [13]. Yet the government of Sri Lanka intends to increase participation in higher education. Therefore, non-governmental universities and open universities remain as the most preferred alternative option for higher education for students failing to secure a place in the state universities. Under this context, distance learning plays a beneficial key role in catering to the demand, becoming a new effective alternative in Sri Lanka with an undefined enormous potential [14]. This further enables the development of a qualified workforce in Sri Lanka at a relatively low cost.

With regards to the concept of distance learning, open universities still partake in the domination of distance education. The Open University of Sri Lanka (OUSL), was established in 1980 with the aim of enhancing opportunities for higher education in Sri Lanka [15]. It is highlighted as the only state university functioning under distance learning methodologies. Currently, it caters more than 40,000 students via distance learning [16]. During the period of 2003-2009, the Sri Lankan government greatly invested in the application of ICT for distance learning ensuring more access to higher education [17].

Further, the Distance Education Modernization Project (DEMP), launched during the period of 2003-2010 under the funds received from the Asian Development Bank, aiming to popularize the use of modern technology in distance education sector of Sri Lanka. This project directly aimed to enhance opportunities for post-secondary education in Sri Lanka, while improving the overall quality of teaching and learning process through the distance education partnership

programme and capacity development of OUSL [17-18]. Subsequently, the Higher Education for Twenty-first Century (HETC) project prioritized and enhanced technology-based education at the higher education institutes in Sri Lanka [19].

These projects and the advancement of technology emphasized the necessity and significance of E-Learning approaches in distance learning within the higher education sector in Sri Lanka. This motivated majority of the higher education institutes to inculcate more E-Learning-based distance learning opportunities within their programmes. The recent COVID-19 pandemic crisis has further emphasized the necessity of a properly functioning E-learning system for both higher and secondary education sectors in Sri Lanka. Hence, almost all the state and non-government higher education institutes are taking sensible steps to adapt E-Learning methodologies to enable distance learning for their undergraduate and post-graduate programmes.

Current Trends in E-Learning at the Global and National Context

With the current trend towards student cantered learning, E-learning possess tremendous potential with continuous growth in the higher education sector [20]. Several recent studies have revealed that the Asia is denoting a leading growth rate (17.3%) in E-Learning with greater benefits in education as well as in commercial aspects [21-22]. Since the inception, E-Learning has denoted a rapid evolution in terms of technology and methods/tools [21, 23].

Unlike in the initial stages, where E-Learning was frequently used for different forms of learning through the Internet, computer-based communication, and learning, the modern E-Learning methods include a variety of platforms and methods that have co-evolved with concepts such as Blended Learning, Micro Learning, Mobile Learning, Open Education, Electronic

Performance Support Systems (EPSS) and Virtual Learning, etc.

Currently many higher education institutes around the world have incorporated Learning Management Systems (LMS) for the administration, documentation, monitoring, and reporting of training programmes, classroom and online events [14]. Up to now, E-Learning has evolved through Multimedia based Learning, Technology-Enhanced Learning (TEL), Computer-Based Instruction, Computer Managed Instruction, Computer-Based Training, Computer-Assisted Instruction, Web-Based Learning, Virtual Learning Environment, M-Learning, Massive Open Online Courses (MOOC) up to Selective Open Online Courses (SOOC). The recent progression in telecommunications, wireless applications, social networking applications, web 2.0, and the Internet remain as the major reason behind this [20, 24].

The evolution of Web 1.0 into Web 2.0, which transformed the publishing web into the participatory web, resulted in a huge impact on E-Learning, which enabled users to deliver, create, share, remix, and exchange content to the Web. This is not solely considered as a technological revolution, but a social revolution as well [25-27], since this enabled the growth and development of social media or social networking such as My-Space, Facebook and Twitter. These social networking sites have enabled learners to become a part, interact with each other and construct their own knowledge. A variety of E-Learning tools such as Free Google Apps for Education (Chat, Classrooms, Goggle Notes), On-line study aids (Wikipedia, Yahoo answers and Answer U, etc.), Screen casing/Pod casing, and digital storytelling platforms have evolved at present [28].

Screen Casting, enables users to create screen casts directly from their browser, making them available online where viewers can stream them directly.

Meanwhile, Pod Casting enables the online publishing of video content and distribution. In addition, tools such as Moodle, Toolbox, Group Board, etc. are also being used by the higher education institutes in delivering online lectures, conducting online assessments, and live interactions with the students. Social media sites and social networking applications (Facebook, Twitter, WhatsApp Viber, etc.) have been recognized as the most frequently used platform for academic networking by the students in developing countries, while online learning systems such as (E-Learning Space/LMS) remain as the most used platforms E-Learning platforms [29-31]. At present, LMS/MOODLE, WhatsApp/Viber, and Zoom remain as the most popular E-Learning platforms used for distance learning in Sri Lanka.

Role of E-learning in the Learning Process under Crisis Conditions

E-learning is simply a platform and a system, which facilitates the learning process through the internet using electronic devices. Many developing countries in the past have underutilized E-Learning and set priorities on the traditional learning processes. However, recent global crisis conditions like COVID-19 have deeply threatened the traditional way of learning and education. Especially, this has been visualized in the education sector in many developing countries around the globe. The outbreak of the pandemic forced many primary, secondary, and tertiary education institutes to remain closed temporarily. Most cities have turned into phantom cities with the pandemic and this has been also common in educational institutions as well. This has greatly shaken up the education process at the global level making it more vulnerable to many consequences in the present as well as in the future. Hence, under this global crisis, the entire world was compelled to depend on E-Learning for education.

However, this has promoted learning communities to rethink on E-Learning, while depicting its lucrative side, which had been hidden for a long time. Therefore, E-Learning has been coined as a "Panacea" in the time of COVID-19 crisis. As predicted by many researchers and experts up to date, it is very ambiguous to start the normal teaching and education process sooner with the prevailing conditions. Irrespective of the type of crisis, the safety guidelines are preeminent. Simultaneously, global education is struggling to find its phase to deal with this challenging situation. Therefore, scenario planning is a much urgent need for the education system to facilitate its seamless flow in these crisis events [32].

Without a proper way of identifying the nature and roles of E-Learning, it might create an environment that would be uncomfortable for both learners and educators. Therefore, understanding the role of E-Learning is pivotal in many ways. Online pedagogy should have the characteristics of accessibility, affordability, and flexibility for its users [33]. Further, any type of learning process should reach out to both urban and rural communities equally through easy accessibility and in a blended way of delivery in order to reap the maximum benefits. Simultaneously, cost-effectiveness is another paramount criterion that should be embedded in the learning process.

Therefore, E-Learning platform is an ideal solution for aforementioned aspects as E-Learning facilitates the ability to exchange knowledge from anywhere, anytime, in any rhythm, with any means. In addition, it provides a more student-centered, innovative, and flexible learning environment for teaching and learning. E-Learning generates a synchronous learning environment for its users [34].

Synchronous learning is characterized by real-time interactions between teachers and students, along with the ability of instant feedback. Simultaneously, E-Learning also facilitates an asynchronous environment, where there are no real-time interactions [35]. More importantly, E-Learning platforms act

as a relatively cheaper mode of education, since it requires a lower cost of transportation and accommodation, resulting a lower overall cost for institution-based learning.

Another prominent role of E-Learning is its ability to facilitate a large number of students from different parts of the world at any time. Most of the tertiary/higher education institutes have fully digitalized their education systems. Especially E-Learning facilitates the multiplicity in the learning process for educators [36]. On the other hand, this encourages even to personalize or customize the education process. In addition, E-Learning creates opportunities for multi-stakeholders to involve in the education process by widening its reach without limitations. Both learners and educators are able to opt for preferable time slots with their busy schedules. Also, E-Learning enhances the efficacy of knowledge [37]. Even if there is a scarcity of educators during a crisis event, E-Learning could still facilitate learning communities to achieve their objectives without discontinuing the process.

Objectives of the learning process could be accomplished in the shortest time and hence, the impact of E-Learning is vast. Even though some believe that E-Learning does not facilitate communication between the educator and the learner, if used effectively it helps to overcome challenges that may hinder active participation of students, including the fear of talking in front of other learners. Therefore, E-Learning could be used wisely to motivate students to interact with others, to exchange and respect different points of view.

In overall, E-Learning defies the typical constraints of distance, cost, and wasting of time. Hence, E-Learning is the best alternative currently available for distance learning. E-learning applications and concepts are not limited to a certain level of education or discipline and thus provide universal assistance for all levels of education.

The option of enabling self-learning or independent learning breeds an empowered student community [38]. Especially receivers could engage in the learning process according to their own phase rather than following a command of chain in a typical classroom environment. Diversity is one of the biggest advantages of E-Learning. This delivers many opportunities to different learning communities at any given time. Currently, the entire globe is witnessing the implementation of E-Learning. Therefore, it's time for experts to re-think education strategies and work on improving E-Learning for the betterment of many. In the crisis condition, E-Learning has become a must and a valuable concept. In another word, E-Learning is one size that fits all.

Role of ICT on Adoption and Promotion of E-Learning in Sri Lanka

Practically all aspects of modern life have been influenced with the improvement of ICT and its allied branches. ICT has given accessibility to much more rich information in all spheres, including the education sector. Importantly, education is one of the prominent sectors in Sri Lanka, which has adopted number of novel technologies recently, in order to enhance its overall efficiency and effectiveness. Adopting ICT appliances are vital in the promotion of E-Learning due to its enhanced capability of offering a high-quality learning experience to both educators and learners [39].

A successful E-Learning platform depends on both technology and its infrastructure setup. However, most Sri Lankan education institutes are still in the primary stage with respect to both ICT technology and its infrastructure. Simultaneously, it is important to understand that, the E-Learning Systems (ELS) are now playing a key role beyond teaching since it enables access to learning resources without any limitations in time or location. Hence, learning systems have undergone a rapid transformation recently promising much more deliverables, in terms of both tangible

and intangible outputs [40]. Since the internet has been widely used by many users, the promotion of E-Learning should be initiated through the internet and internet-based distance education is considered to be the greatest common E-Learning technological implementation of ICT.

Implementation and maintenance of a sound E-Learning system is not a simple task and it requires a strong Management Information System (MIS). Therefore, MIS is the foundation of an E-Learning system. Video conferencing, interactive discussions, accessibility to sessions, and the possibility of reviewing already stored and recorded content are important features of many E-Learning systems. However, it is recommended to have a solid Learning Management System (LMS) to up and run such activities. Many higher education institutes in Sri Lanka are struggling to fulfil this requirement and to maintain static websites, where only single or few features are available. This vastly limits the capacity and capabilities of E-Learning platforms making it tedious among the learning community [41]. ICT-based learning systems are currently becoming more and more popular while assuring quality requirements. The use of ICT in E-Learning could immensely improve social, vocational, catalytic, and pedagogical aspects [42]. Hence, the innovativeness could be easily embedded within the E-Learning systems through ICT.

Challenges Faced in Promoting E-Learning within Sri Lanka and Strategies to Cope
Satisfaction on E-Learning could be greatly influenced by a variety of factors including social characteristics, technological readiness of students and teachers, institutional policies and government or institutional commitment etc. [43-44]. Among social characteristics, age, previous knowledge on ICT, attitudes toward new technologies and learning/teaching style of students and educators may exert a powerful influence on the acceptance of E-Learning [31, 45]. Numerous studies have

emphasized that the degree of ICT knowledge of both students and educators, is significantly influencing the acceptance of E-Learning approaches [46-47], while few studies have opposed this claim [48].

The technology readiness of the students and teachers/lecturers also play a key role in acceptance and satisfaction on E-Learning [49]. Under this, the degree of familiarity with E-Learning systems and ICT, availability of physical hardware (computers, laptops, tablets or mobile phones, etc.), and accessibility to the internet could influence the use of E-Learning among student and teacher community. Especially, the limitations in the internet facilities (poor bundle width, cost of the connection, issues in coverage, and connectivity) has been recognized a major barrier in promoting E-Learning in Sri Lanka [44]. Therefore, the government of Sri Lanka must focus on empowering the rural communities with adequate physical infrastructure facilities related to telecommunications through appropriate funding and policy interventions. Several recent studies have revealed that smartphones are being used as the most commonly preferred device for E-Learning [50-51]. In addition, soft-loan schemes could be used to support the poor income families to purchase required physical devices for E-Learning. At present, the undergraduates in Sri Lanka are provided with soft-loan schemes to purchase laptops to facilitate their learning process.

Understanding the role of ICT is important to address such issues. ICT for E-Learning is not simply about use of high-tech equipment or applications. The main role of the ICT should be the creation of an enabling environment for E-Learning platform for its intended function [49]. ICT should enable E-Learning through generating required functions such as gathering, distributing, and communicating information through computers and computer-based networks. Facilitators should be also there within the system, in order to operate and coordinate the

entire procedure. Combination of both of these aspects promotes E-Learning within the learning community. This should also be aligned with the national policy frameworks as well. Policies are the foundation to implement such processes and without policies, ground-level implementation is not realistic. Intuitional support is also required to monitor and evaluate the procedures time to time.

Another main challenge for E-Learning in Sri Lanka is poor delivery of the intended output to the student community. Even though E-Learning is becoming a popular concept in the country, degree of E-Learning utilization among primary, secondary and tertiary education categories remains not equal and lack of adequate ICT appliances is one major reason behind this. In addition, the academic discipline, for which E-Learning is used, and the academic year of the students could also influence the acceptability of E-Learning. The limited diversity in E-Learning methodologies used in Sri Lanka could be recognized as the key reason behind the aforementioned issues. Enabling a mixed learning environment with more attractive and efficient E-Learning practices is essential. The development of ICT on the other hand inspires E-Learning and its environment. Therefore, ICT and E-Learning are like two sides of the same coin.

Current performance of E-Learning systems could be greatly enhanced through identifying possible weaknesses in the prevailing ICT facilities. Therefore, the support of ICT is important to enhance the E-Learning diversity in Sri Lanka. A variety of teaching approaches (lectures, interactive sessions, quizzes, interactive learning exercises, video tutorials, etc.) and attractive web-based learning models could be incorporated into E-Learning systems to ensure the provision of a BL experience to the undergraduates [5].

Regardless of the proven efficacy of E-Learning for distance education, such E-Learning systems should be designed carefully with attention on emotional and social requirements of students and teachers/lecturers [52]. The learning community should be able to feel the realness of the learning process within the created virtual environment to achieve the intended objectives of the system. For this, the degree of self-motivation, self-management, self-control, and time management of educators and students should be considered ad well respected [53]. Thus, the right mix of technology, infrastructure with the right mix of expertise may aid to develop a proper E-Learning platform in the country. Therefore, the role of ICT is of utmost importance to adopt and promote E-Learning. The online environment must permit different technical platforms, organizational models, and pedagogical beliefs [54].

Another study conducted by Andersson [55] has recognized poor attitudes of teachers/facilitators, nature of teaching and learning activities, limited accessibility and flexibility, poor student support, attitudes and academic confidence as key barriers for inculcating E-Learning in Sri Lanka. Building up positive attitudes among students and educators towards E-Learning through awareness programmes and empowering them with necessary core-skills and physical resources is important to overcome such issues [56].

Further, motivating few groups to use E-Learning systems effectively in their teaching and learning process, may lead them to act as catalysts persuading their peers to adopt E-Learning [57]. Therefore, conducting proper training programmes and awareness sessions on E-Learning techniques is essential in Sri Lanka. For this, the active involvement of higher education institutes and the government is vital. In addition, the provision of such training sessions would encourage the educators to use diverse E-Learning tools in the teaching process, capturing the attention of the students. In addition, this would enhance the active involvement of the students.

Several other studies have revealed a level of hesitancy among academicians to support E-Learning platforms, limited administrative support, higher workloads, and limitations in available physical resources, as barriers for promotion of E-Learning [58-59]. Therefore, the administration of the higher education institutes should monitor the progress of the E-Learning systems and they have to play an active role in the process. Empowerment of the students and educators with basic physical resources, provision of administrative support and enhancement of core competencies required for effective use of E-Learning tools are such vital roles expected. The government of Sri Lanka can also support such activities through policy level interventions, which will be beneficial for the country, especially during a crisis condition like COVID.

Recommendations & Way Forward

Despite the perceived benefits of conventional physical teaching and learning practices, the advancement of technology and evolution of sophisticated human lifestyles, requires for more flexible, accessible education tools. E-Learning provides an ideal solution for above requirements, with its unique flexibility, low-cost, higher accessibility and ability of providing a Blended Student-Centered Learning experience. At present, many countries of the world are increasingly inculcating E-Learning methods for secondary and higher education. Meanwhile, the higher education sector of Sri Lanka is also progressively attempting to adopt E-Learning into the teaching and learning process. Especially, the role played by E-Learning platforms during COVID-19 pandemic situation for continuation of education processes in the country is remarkable.

However, numerous barriers such as poor administrative commitment, gaps in technical expertise and telecommunication facilities, poor attitudes of students and educators, and lower degree of technology readiness, have restricted the efficacy and

popularization of E-Learning systems in Sri Lanka. The provision of soft-loans to empower necessary physical resources, enhancing the basic telecommunication facilities, motivation of students and academicians, and enhancing their core competencies for E-Learning through training programmes are essential to promote E-Learning opportunities in Sri Lanka. For this, policymakers in the education sector should consider aforementioned aspects in designing an ideal and variable E-Learning framework for the higher education sector in Sri Lanka.

CONFLICT OF INTEREST

The authors declare that there are no conflicts of interest.

AUTHORS' CONTRIBUTIONS

LU: Conceptualized the study and wrote the manuscript. NS: Wrote the manuscript. VK: Wrote the manuscript. UL and AH: Reviewed the manuscript. All authors read and approved the manuscript.

REFERENCES

1 Ambrose SA, Bridges MW, DiPietro M, Lovett MC, Norman MK. How learning works: Seven research-based principles for smart teaching. John Wiley & Sons; 2010.

2 Isman A, Dabaj F. Diffusion of distance education in north cyprus. Turkish Online Journal of Distance Education. 2005 Oct 1; 6(4): 59-65.

3 Owston R, York D, Murtha S. Student perceptions and achievement in a university blended learning strategic initiative. The internet and higher education. 2013 Jul 1; 18: 38-46.

4 Watson J. Blended Learning: The Convergence of Online and Face-to-Face Education. Promising Practices in Online Learning. North American Council for Online Learning. 2008 Apr.

5 Bauk S, Šćepanović S, Kopp M. Estimating students' satisfaction with web-based learning system in blended learning environment. Education Research International. 2014 Apr 22; 2014.

6   Abbad MM, Morris D, De Nahlik C. Looking under the bonnet: Factors affecting student adoption of e-learning systems in Jordan. International Review of Research in Open and Distributed Learning. 2009; 10(2).

7   Algahtani A. Evaluating the effectiveness of the e-learning experience in some universities in Saudi Arabia from male students' perceptions (Doctoral dissertation, Durham University).

8   Fry K. E-learning markets and providers: some issues and prospects. Education & Training. 2001 Jun 1.

9   Hiltz S, Turoff M. The Network Nation. Cambridge, MA: MIT Press. 1980.

10   Bates AW. Technology, E-learning and Distance Education. Second Edition. Routledge Taylor and Francis Group. 2005.

11   Britain S, Liber O. A framework for pedagogical evaluation of virtual learning environments. Educational Cybernetics: Reports. 2004.

12   Perera MT, Abeysekera N, Sudasinghe, SRSN, Dharmaratne I. Predictive Drivers of Students Satisfaction in Open Distance Learning in Sri Lanka. 2018.

13   Hewapathirana C. Expanding Higher Education: Does the Open University of Sri Lanka Adequately Provide Distance Education Opportunities? International Journal of Social Science and Humanity. 2021 Feb; 11(1).

14   Gunawardhana LK. Review of E-Learning as a Platform for Distance Learning in Sri Lanka. Education Quarterly Reviews. 2020 May 8; 3(2).

15   Kalpage DCST. University education. Seminar Report on National Science Council of Sri Lanka. 1990.

16   Gunawardhana LK. Review of E-Learning as a Platform for Distance Learning in Sri Lanka. Education Quarterly Reviews 3, no. 2 2020.

17   Liyanagunawardena T, Adams A, Rassool N, Williams S. Blended learning in distance education: Sri Lankan perspective. International Journal of Education and Development using ICT.

2014 May 6; 10(1).

18   Loxley W, Ho S, Vandenabeele C, Gutierrez L. Report and recommendation of the president to the Board of Directors on a proposed loan to the Democratic Socialist Republic of Sri Lanka for the distance education modernization project. Manila: Asian Development Bank.2003.

19   Rashida MF. E-learning in higher education institutions and its determinants. Journal of Education and Practice. 2017; 8(28): 76-80

20   Naresh B, Reddy BS. Challenges and opportunity of E-learning in developed and developing countries-a review. International Journal of Emerging Research in Management &Technology. 2015; 4(6): 259-62.

21   Jung I, Latchem C. Assuring quality in Asian open and distance learning. Open Learning: The Journal of Open, Distance and e-Learning. 2007 Nov 1; 22(3): 235-50.

22   Carabaneanu L, Trandafir R, Mierlus-Mazilu I. Trends in E-Learning. Department of Mathematics and Computer Science Technical University of Civil Engineering Bucharest, Romania. 2006.

23   Aslam A. Application of ODL methodologies in non-formal settings and quality assurance. 2006.

24   Yang HH. New world, new learning: trends and issues of e-learning. Procedia-Social and Behavioral Sciences. 2013; 77: 429-442.

25   Downes S. E-learning 2.0. E-Learn Magazine. 2005.

26   Davis B, Carmean C, Wagner ED. The evolution of the LMS: From management to learning. Santa Rosa. 2009.

27   Kaplan AM, Haenlein M. Users of the world, unite!: The challenges and opportunities of social media. 2010.

28   Kumaran KS, Nair VM. Future trends in e-learning. In 2010 4th International Conference on Distance Learning and Education. 2010: 170-173.

29   Prensky M. Digital natives, digital immigrants part 2: Do they really think differently?. On the horizon. 2001.

30 Philip D. The knowledge building paradigm: A model of learning for net generation students. Innovate: Journal of Online Education. 2007; 3(5).

31 Nurakun Kyzy Z, Ismailova R, Dündar H. Learning management system implementation: a case study in the Kyrgyz Republic. Interactive Learning Environments. 2018 Nov 17; s26(8):1010-22.

32 Liguori E, Winkler C. From offline to online: Challenges and opportunities for entrepreneurship education following the COVID-19 pandemic. Entrepreneurship Education and Pedagogy. 2020 Oct; 3(4): 346-51.

33 Dhawan S. Online learning: A panacea in the time of COVID-19 crisis. Journal of Educational Technology Systems. 2020 Sep; 49(1): 5-22.

34 Singh V, Thurman A. How many ways can we define online learning? A systematic literature review of definitions of online learning (1988-2018). American Journal of Distance Education. 2019 Oct 2; 33(4): 289-306.

35 Tull S, Dabner N, Ayebi-Arthur K. Social media and e-learning in response to seismic events: Resilient practices. Journal of Open, Flexible and Distance Learning. 2017 Jan; 21(1): 63-76.

36 Arkorful V, Abaidoo N. The role of e-learning, advantages and disadvantages of its adoption in higher education. International Journal of Instructional Technology and Distance Learning. 2015 Jan; 12(1): 29-42.

37 Basilaia G, Dgebuadze M, Kantaria M, Chokhonelidze G. Replacing the classic learning form at universities as an immediate response to the COVID-19 virus infection in Georgia. International Journal for Research in Applied Science and Engineering Technology. 2020 Mar; 8(3): 101-8.

38 Bostrom R. E-learning: Facilitating learning through technology. Georgia, Association for Information Systems. 2003.

39 Al-Shargabi B, Sabri O, Aljawarneh S. The adoption of an e-learning system using information systems success model: a case study of Jazan University. PeerJ Computer Science. 2021 Oct 4; 7: e723.

40 Martins J, Branco F, Gonçalves R, Au-Yong-Oliveira M, Oliveira T, Naranjo-Zolotov M, Cruz-Jesus F. Assessing the success behind the use of education management information systems in higher education. Telematics and Informatics. 2019 May 1; 38: 182-93.

41 Affouneh S, Salha S, Khlaif ZN. Designing quality e-learning environments for emergency remote teaching in coronavirus crisis. Interdisciplinary Journal of Virtual Learning in Medical Sciences. 2020 Jun 1; 11(2): 135-7.

42 Pavel AP, Fruth A, Neacsu MN. ICT and e-learning–catalysts for innovation and quality in higher education. Procedia economics and finance. 2015 Jan 1; 23: 704-11.

43 Nkonge B, Geuldenzolph L. Best practices in online education: Implications for policy and practice. Business Education Digest. 2006; 15: 42-53.

44 Thowfeek M, Hussin H. Instructors' perspective on e-learning adoption in Sri Lanka: A preliminary investigation. Communications of the IBIMA. 2008 Dec 1; 6(3): 124-30.

45 Pinho C, Franco M, Mendes L. Application of innovation diffusion theory to the E-learning process: higher education context. Education and Information Technologies. 2021 Jan; 26(1): 421-40.

46 Cantoni V, Cellario M, Porta M. Perspectives and challenges in e-learning: towards natural interaction paradigms. Journal of Visual Languages & Computing. 2004 Oct 1; 15(5): 333-45.

47 Chen NS, Wei CW, Chen HJ. Mining e-Learning domain concept map from academic articles. Computers & Education. 2008 Apr 1; 50(3): 1009-21.

48 Naveh G, Tubin D, Pliskin N. Student LMS use and satisfaction in academic institutions: The organizational perspective. The internet and higher

education. 2010 Jun 1; 13(3): 127-33.

49 Haththotuwa PM, Rupasinghe RA. Adapting to online learning in higher education system during the covid-19 pandemic: a case study of Universities in Sri Lanka. Sri Lanka Journal of Social Sciences and Humanities. 2021 Aug 1; 1(2): 147-52.

50 Ngampornchai A, Adams J. Students' acceptance and readiness for E-learning in Northeastern Thailand. International Journal of Educational Technology in Higher Education. 2016 Dec; 13(1): 1-3.

51 Corrin L, Lockyer L, Bennett S. Technological diversity: An investigation of students' technology use in everyday life and academic study. Learning, Media and Technology. 2010 Dec 1; 35(4):387-401.

52 Picciano A. Blending with purpose: The multimodal model. Journal of the Research Center for Educational Technology. 2009 Oct 30; 5(1): 4-14.

53 Halkic B, Arnold P. Refugees and online education: student perspectives on need and support in the context of (online) higher education. Learning, Media and Technology. 2019 Jul 3; 44(3): 345-64.

54 Salehi H, Shojaee M, Sattar S. Using E-Learning and ICT courses in educational environment: a review. English Language Teaching. 2015; 8(1): 63-70.

55 Andersson A. Seven major challenges for e-learning in developing countries: Case study eBIT, Sri Lanka. International journal of education and development using ICT. 2008 Oct 25; 4(3): 45-62.

56 Vidanagama DU. Acceptance of E-Learning among Undergraduates of Computing Degrees in Sri Lanka. International Journal of Modern Education & Computer Science. 2016 Apr 1; 8(4).

57 Rogers EM. Diffusion of innovations. Free Press. New York. 2003; 551.

58 Keengwe J, Kidd TT. Towards best practices in online learning and teaching in higher education. MERLOT Journal of Online Learning and Teaching. 2010 Jun 1; 6(2): 533-41.

59 Nelson SJ, Thompson GW. Barriers perceived by administrators and faculty regarding the use of distance education technologies in preservice programs for secondary agricultural education teachers. Journal of Agricultural Education. 2005 Jan 1; 46(4): 36.