

Challenges And Opportunities In Online Education In Sri Lanka During The Covid-19 Pandemic: Evidence From The University Of Kelaniya

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Abstract.

The Sri Lankan government and the University Grant Commission (UGC) of Sri Lanka have encouraged every university and higher education institution to adopt online education methods in response to ongoing issues with the COVID-19 virus. This study examines the challenges and new opportunities in online education in Sri Lanka during the covid-19 epidemic. A qualitative approach was utilized to achieve the study's goals, and semi-structured interviews were conducted to gather data. The respondents were undergraduates and faculty members of the University of Kelaniya. Thematic analysis was performed to analyze the outcomes of the study. This research identified three major challenges and four significant opportunities in online education at the University of Kelaniya. The researchers also made several recommendations for an effective online education strategy based on the study's findings. The results provide essential guidance for modernizing conventional education and propose that Sri Lankan educational institutions reassess their learning methods.

Keywords: *Challenges, COVID-19, Higher Education, Online Education, Opportunities*

I. INTRODUCTION

With the spread of COVID-19 worldwide, its lousy influence victimized higher educational institutions (HEIs) in 188 countries, including Sri Lanka [1]. Many governments around the globe have taken steps to close their universities, colleges, schools, and other educational institutions to stop the spread of COVID-19. If the closings of educational institutions continue for a long time, it will badly affect the continuous education of more than a billion students worldwide. Higher educational institutions tried unconventional ways to provide continued access to education to diminish the impact of closings. Luckily, the closings of educational institutions did not entirely stop students' education. This unprecedented situation pushed educators and students to adopt an online mode of teaching and learning overnight. Online education has grown in popularity as a viable alternative to traditional classroom training, which can be identified as a subset of distant education that deals with internet learning, computer-based learning, and virtual classrooms [2].

Academic staff may need to change their teaching approaches utilized in the "conventional classroom" while adopting digital skills to reach remote students efficiently [3]. It provides opportunities for people who are incapable of pursuing education due to geographic and time constraints and another choice for those who like the flexibility of learning and the convenient delivery method of learning. Online learning allows students to learn conveniently without attending universities[1]. Even though this COVID-19 global pandemic urged educational institutes to transform their traditional teaching pedagogy into online teaching pedagogy, educators and learners often face difficulties with the online learning environment. As stated by Bao [4] most educators lack online teaching experience. The same author stressed that students often face difficulties such as missing appropriate learning resources, proper internet access, and a pleasant learning environment while at home. Delivering an excellent online course requires a good lesson plan, audio and video materials, and technical support teams.

Moving all the existing conventional courses online is a vast, disruptive shift. Many authors have found online learning challenging, especially in developing countries [5]–[7]. Drop-out rates in online learning are remarkably higher than conventional learning [8], [9]. Hence, investigating online learning barriers, which are particularly problematic for developing countries, is crucial. Concerning previous studies, few investigations have explored challenges and opportunities in online education during the COVID-19 pandemic, especially in the Sri Lankan context. Thus, this study focuses on the challenges and opportunities based on the evidence from the University of Kelaniya (UOK), one of the leading higher educational bodies in Sri Lanka. The researchers identified the research problem as the challenges and opportunities in online education in Sri Lankan state universities during the COVID-19 global pandemic. This research study focuses on those challenges, opportunities, and online education experiences in the University of Kelaniya, discussing how Sri Lankan universities can implement effective online education in future global crises.

II. LITERATURE REVIEW

Online Education during COVID-19 pandemic

As a result of spreading the epidemic of the COVID-19, the education systems around the world have been unexpectedly moved from the regular classroom environment to electronic-based devices and online applications [10]. As an immediate response to prevent the spread of COVID-19, many governments implemented the early shutting of secondary schools to protect school children from infecting COVID-19 because schools are the most vulnerable places to COVID-19 [11]. As a result, it was necessary to conduct all teaching and learning activities online using emergency remote education procedures [12]. Almost every country instantly picked online learning as a remedy, and teachers began to record and upload lessons into learning management web applications. Some educators use other supplementary online

learning sites like Google classrooms [1]. However, the same author stressed that many teachers were not well prepared to adapt to online teaching. On the other hand, students in many countries have weak perseverance in online learning, leading to ineffective learning [4].

Furthermore, universities' prevailing closure will significantly affect students' mental/physical well-being and motivation [13]. Education has been restarted as a technology-enabled, remote-based, online activity with zero physical presence in educational institutions [14]. As strategies to survive the current crisis, universities worldwide have promptly launched innovative teaching and learning methods, new student assessment methods and incorporated digital communication tools in their new learning pedagogy [15]. The concept of e-learning which uses electronic, information and communication technology for teaching, has already been considered for execution in higher education in Sri Lanka. Most universities and faculties have recently accommodated e-learning through Learning Management Systems (LMS) and video conferences applications [16]. For instance, a web application named ZOOM gets popularized and has made educators' lives more manageable because of its extra features for doing live online classes, webinars, and live meetings [17]. In the current world, most people are already familiar with these e-learning applications to prevent breakdowns of education significantly due to COVID-19.

Challenges in online education

A Previous study has found that lack of teacher training for online pedagogy, repetition of traditional teacher-centered learning, and fear of change are the main barriers to effective online learning [18]. In addition, the same authors stated that online education might create confidentiality issues. On the other hand, the biggest drawback in online education is the lack of co-curricular activities because it discourages meeting friends. Many students may face anxiety and panic due to online courses and assignments [19].

Furthermore, the lack of appropriate learning aids and learning environments may become serious issues when students are isolated at home in a pandemic period like this. Besides, the inadequate balance between the technology and psychological elements needed by the learning process can block the teaching process and creates an imbalance [17]. Throughout this challenging period, the biggest problem is not whether online teaching and learning techniques can provide excellent education but how educational institutions will implement online learning on such a large scale [17]. However, the challenges posed by the COVID-19 pandemic opened a new era of online learning and remote education for everyone.

Opportunities in Online Education

Dhawan [17] stated that this crisis would create a new generation for learning, allowing individuals to consider the positive aspects of e-learning technology. As a result, this worldwide pandemic has provided chances for the countries to improve their education delivery system and shift their focus to create better technologies to

help education [1]. Educational institutions should help students develop a social presence and improve their capacity to reflect their personal qualities into the learning environment, eventually leading to their successful learning [18]. Online learning tools and video conferencing tools have advantages such as providing adequate education to even a thousand students at once, mobile learning, the possibility of watching past lectures, getting instant feedback from students, and easy arrangement of assignments [17].

Furthermore, the same author stated that the growing demand for e-learning provides a fantastic opportunity for educational technology start-ups to disrupt the conventional education industry through technical innovation. In addition, the further advantages of online education can be depicted as reducing the time and costs for education, flexibility to access many courses conveniently, opening new opportunities to join with experts worldwide, and easy adjustments to contents delivery of the subjects whenever in need. [20], [21]. Moreover, the privacy settings of the online learning modes may allow students, who do not usually prefer to participate in face-to-face classes due to their timid nature, to actively participate in online education where there is a zero physical presence [20]. Numerous academics believe that online learning can help alleviate the increasing costs of post-secondary education by sharing the cost across a much larger number of students rather than in a traditional class where there is a limited number of seats [22].

III. METHOD

This study adopted a qualitative approach to answer the research questions. As the researchers' preferred data collection technique, the semi-structured interview method was elected, which help researchers to make some space for additional follow-up questions. Individuals were considered as the unit of analysis. The population of this study contains undergraduates and educators who represent six faculties in the university: Faculty of Medicine, Faculty of Social Science, Faculty of Computing and Technology, Faculty of Humanities, Faculty of Science, and Faculty of Commerce and Management Studies. The purposive sampling method was selected for sampling in this study. Purposive sampling helps researchers use their verdicts to choose the most appropriate cases that are best suited to answer the research questions [23].

The researchers collected data from 14 respondents representing the entire university. Interviews were conducted for 40-50 minutes, and a maximum of 10 open-ended questions was asked from all, and the researchers requested them to provide a deep description for each question. The collected data from interviews were processed manually. The researchers used the "Thematic Analysis" method to analyze the data gathered from the interviews and identify patterns in the respondents' views. The findings of this study are genuinely based on participants' responses and not based on any potential bias or personal motivations of the researchers. This study did not use

respondents' real names to increase confidentiality. The collected data will be used only for academic purposes.

IV. DATA ANALYSIS

Challenges in Online Learning in Sri Lanka

Although e-learning has appeared as the biggest blessing during educational institution closing, it has also brought its collection of challenges. Researchers found three significant challenges from the University of Kelaniya that weaken online learning adaptation in Sri Lanka; Inadequate E-learning Facilities, Resistance to Change, and Inadequate Skills in E-Learning Pedagogy.

Theme 01

Inadequate E-Learning Facilities

The availability of sufficient ICT access for both teachers and students is the first and most important prerequisite for online education [24]. When people and organizations in developing countries adopt ICT, they may face telecommunications infrastructure problems with poor Internet connectivity [25]. For e-learning to succeed in underdeveloped countries, a robust IT infrastructure with some level of internet access is required [26]. During interviews, most students stated that they face insufficiencies of computer devices and internet connectivity.

"Regarding students' participation, mostly we see two issues. The one problem is the lack of computer or mobile devices and the other one is the connection. Internet connection is not available throughout the country". (Respondent 6)

"So, there is another bad thing. Some of the students have issues with the computer devices". (Respondent5)

A computer-owned household has at least a desktop or laptop computer. In the first six months of 2020, 22.2 percent of homes in the country own at least one computer [27]. It is a comparatively low percentage than other countries in the world. According to the same survey, the highest rate of computer-owned houses reports from the Western Province (33.8%) while Uva Province (13.5%) and Eastern Province (11%) report the lowest percentages. According to one of the educators, their students do not have adequate computer devices for online learning.

"We did a survey (...) In that process, we collected data district-wise. When we took the Western Province, we saw no problem with devices in the main cities. When we go to other cities far away from main cities, all difficulties in facilities and coverage are increasing (Respondent 12)

The unavailability of Internet access produces a new kind of digital divide where one group of people in society enjoy adequate access. In contrast, another group has zero or inadequate access to the Internet [28]. According to a study done by Hayashi et al. [29], a bad internet connection was the top challenge in online learning. As stated by students, researchers observed that areas beyond urban cities are poorly served with devices and internet connectivity.

"In our department, there are so many students living in rural areas. So, they could not get internet facilities well and hard to find the signals, so they were facing so many difficulties than from people live in Colombo district." (Respondent 13)

"(...) Although we live Colombo district, many students live in remote areas. So, they have many difficulties. Most of us have smartphones as well as laptops, but some do not have." (Respondent 2)

Some students have faced frequent power cuts, most on rainy days, and as a result, they could not maintain a steady focus on the lessons and the lectures. Hence, researchers witnessed that IT facilities in Sri Lanka are regular victims of lousy weather cycles and inadequate electricity supply.

"One day, while I was listening to the lectures, there was a power cut. So, I could not engage with the lectures, and it was hard to reconnect with the lecture because of the bad weather. It was a rainy day" (Respondent 13)

"(...) lecturers sometimes notice that students are not in the lecture. Once they reconnected, the teacher asked where they went then they said they had a power cut (Respondent 10)

Hence, the government's responsibility is to initiate new programs that provide educators and students equitable access to e-learning facilities to empower online education [30]. Regmi and Jones [31] stated that online learning is not suitable for all disciplines. Resource-Intensiveness is a common attribute in online medical education. Hence, there should be enough resources to implement online learning in a field like medicine. Inadequate technology infrastructure is a significant challenge in online medical education [32]. During the interviews, some medical students stated that they could not obtain clinical training properly during COVID 19. They firmly believed there should be some mechanism to address this problem in Sri Lanka.

"We had clinical lectures, where medical students get the ability to apply their knowledge and discuss with patients like that. But current online learning does not give the same experience for students. (...) We need some mechanism or technology to do students' clinical training as well. But in Sri Lankan context, we do not have that kind of technology like augmented reality." (Respondent 9)

"We are in the third year now, and we must go to the hospital for our clinical appointments. But those things could not be done because of the COVID-19 situation, and it is also a problem, but it will be rescheduled for next year. But I think we need to implement some technologies for this issue also like in foreign medical colleges" (Respondent 8)

It was evident that most students lack e-learning facilities such as not enough computer devices, not enough internet connectivity, incompatible technology for some disciplines, and frequent power failures. Researchers also observed that Sri Lankan telecommunication and broadband infrastructures are regular victims of lousy weather

cycles prevailing in Sri Lanka. People are not happy with the service provided by third-party Internet service providers in the country. Hence, inadequate e-learning facilities are a significant challenge in online learning.

Theme 02

Resistance to Change

Changes are made to keep the organization dynamic while improving organizational success. Thus, organizations that adapt to changes are entities that choose to survive. Resistance to change is a person's mindset or actions that can sabotage change objectives in an organization [33]. Undeniably, resistance to change is a hot topic in change management, and organizations should consider it seriously to take the benefits out of any transformation. According to Dhawan [17], many educational institutions were previously hesitant to abandon their old pedagogical methods, and they were left with little choice but to transition entirely to online learning. Some educators mentioned during interviews that they also had only that option.

"Because of the COVID-19, we cannot stop students' education, so we need to do continuous lectures online. That is why we shifted. (...) Because of this health crisis, we wanted to go for e-learning as the best solution." (Respondent 3)

"We must keep the university closed. But, we cannot keep the students at their home without doing any education, so we have to do this." (Respondent 5)

Even though university administration has taken necessary steps to start online learning, some students expressed their resistance to such a change and wanted physical education rather than virtual learning.

"No, no. I never wish to continue my entire final year online. I would like to attend university lectures soon after this situation. There are no special reasons, mostly because it is my final year. And this year will be the last time that I will be at university." (Respondent 8)

"No, I don't like it. I like to attend lectures face to face live. I need the live experience. Face-to-face lectures are better for me, I think. When I study something, I want it live, and online it is not live. (...) motivation is not enough when during the online." (Respondent 11)

Most students have a little sadness of losing the university social life they previously enjoyed. Consequently, students do not want to continue online education further. It is confirmed through the below statements

"In this online method, we cannot enjoy our university life. In physical lectures, we can have interpersonal relationships than online sessions with our university friends. But in online lectures, we are like robotics. We

are like machines. That's why we cannot be strong mentally and physically during these online sessions." (Respondent 13)

In online learning environments, both learners and teachers are often troubled by the technicalities when getting started [34]. Most Sri Lankan universities have no prior experience with pandemics such as COVID-19, and this is their first significant experience with changing the classroom environment and their educational techniques [19]. It is evident from the statements made by some educators that the resistance was arisen due to the fear of inexperienced things.

"Students also resist doing online exams. There was some conversation on how to do this. How to do the lectures online? We never tried before; We cannot do that; We want to do physical lectures like that." (Respondent 14)

One of the students highlighted that some educators did not like to conduct online sessions.

"(...) but when it comes to other lectures as an example, one teacher did not agree to do zoom session, he is the only one who did not appear in online" (Respondent 6)

Many educators in online learning contexts do not have pedagogical expertise for online teaching [35], [36]. As a result, they are less inclined to participate in online education. It has become clear that teachers must maintain a high level of involvement in online courses to adapt to online environments appropriately [36], [37].

One student liked to continue online education in the post-COVID-19 era too. But disagreed with online examinations as there are a lot of issues with students. It is evident that inadequate facilities in Sri Lanka prevent students from adapting to a new normal environment.

"But I am not agreeing with conducting exams online. It is not fair. Because most of the students have many kinds of issues, even they are participating in zoom lectures. So, it is not fair to have online exams for all students. Because there are signal problems, data connection problem and all." (Respondent 9)

Adaptation is an excellent strategy to sustain in a changing environment. COVID-19 has made the traditional learning environment completely obsolete, and to move forward, educational institutions must adapt e-learning pedagogy without any choice. Nevertheless, resistance to change the behavior of some students and some educators has significantly diverted the adaptation process to e-learning. Hence, researchers found that resistance to change is another major challenge to overcome in online learning.

Theme 03

Inadequate Skills in E-Learning Pedagogy

Any effective behaviors or practices intended to impart knowledge in the online learning environment are referred to as e-learning pedagogy [38]. Most

newcomers to the online learning methodology have almost no experience or preparation for the online mode of delivery [35], [39]. Some students stated that educators sometimes lack technical skills to prepare well for the online environment during interviews.

"At the beginning, some lecturers even do not know how to conduct an online lecture. They did not upload anything. They do not know how to give access to share the screen for a student. Sometimes students teach them to how to do it." (Respondent 8)

"(...) some were not familiar with the functions of zoom software. During the lectures, they got stuck. Apart from that, inabilities in sharing screens and not knowing how to enable others to share their screen, audio, and video misfunction are the most common issues. (Respondent 6)

One student stated that some old-aged educators do not possess sound technical knowledge in the pedagogy of e-learning environment.

"It is tough to do an online session with old-aged lecturers. They did not have an idea what to do in a connection error. They do not have that knowledge."

One study confirmed that educators should be given access to and proper training in digital technologies that support online learning. They need good support and training in online learning pedagogy [35].

It can be observed not only educators but also students are not well prepared to learn online. They do not know how to log to online video meetings, operate a learning management system (LMS), etc.

"Some students do not know how to operate LMS (...) the other thing is sometimes some students did not have some knowledge about that online session, especially me, I don't know how to connect even my laptop to the zoom session. All the time, I used to call my brother, and he is the one who helps me." (Respondent 11)

"The IT literacy of students is low. Some students did not remember the LMS password or LMS username. Some do not know how to log on to LMS. Now there was no problem with first-year students. But some second-year, third-year, final-year students did not log on and did not know how to log on." (Respondent 7)

One educator stated that students apply the same principles of traditional learning into an online learning environment which are incompatible. Thus, it seemed students need some training on e-learning behavior.

"Students need to change their way of learning. Most of the students are trying to follow the same approach as physical learning. They just want to collect notes and end the semester. So, they have the same mentality. They are applying the same thing in e-learning systems as well (Respondent 3)

According to the statements, even though the students and the educators are familiar with the university's Asynchronous Learning or Learning Management System (LMS), the new fully online learning environment is entirely new. It was evident that students and educators have been experiencing a lack of proper skills to manage and adapt to e-learning pedagogy. Hence, researchers found that inadequate skills in e-learning are very challenging in online learning.

Opportunities in Online Learning in Sri Lanka

Online education offers its own set of advantages, and everyone can exploit the best out of it. The University of Kelaniya responded quickly to this COVID 19 pandemic by digital transforming their academic activities. Adedoyin and Soykan [40] suggested that online learning can offer a clear roadmap to educators to take advantage of during their online journey. The more prolonged the COVID 19 pandemic continues, the more likely online learning becomes a suitable mode of learning and teaching. Hence, exploiting opportunities in online education will help to sustain during the pandemic. The researchers of the present study found four significant online learning opportunities in Sri Lanka; Flexible Learning, Global and Local Exposure, a Good Time for Blended Learning Modes, and a Platform for Creative Problem-Solving.

Theme 01

Flexible Learning

The traditional e-learning hymn of "anyone, anywhere, anytime" learning can be used to describe the flexibility in e-learning [41]. Flexibility addresses several matters, such as whether students are free to study and do exams independently and what mediums they have to get their learning materials [6]. Now students can learn from anywhere and anytime due to the availability of online learning. It is confirmed through the below statements by educators.

"I think it will be a good solution for students who are working most probably at interior offices. They can join online sessions either from boarding place, workplace, the university premises, or any other place. (...) especially for those who are engaging with their internships." (Respondent 1)

Another educator mentioned that students could decide the medium of learning material delivery according to their choice because the university uploads lessons and video recordings of the lectures. Students can access them at any time.

"Now lectures are recorded and uploaded. Everyone has 24 hours and seven days access to lectures. Whenever they want, they can access lectures. Once the LMS is updated with the recorded lessons, you can go through that one even when traveling. There is no require participating. In the physical discussion, you have to participate. but in an online environment, you can follow the courses according to your availability." (Respondent 3)

Theme 02

Global and Local Exposure

Many institutions across the globe offer their degree/certificate programs online to students worldwide, either through internal systems or through private virtual education web platforms such as Coursera, Edx, Future Learn, and others [42]. During interviews with educators, most of them believed that state universities could offer various online degree programs to different parts of the world with this growing online learning situation in Sri Lanka. As mentioned by one educator, state universities, including the University of Kelaniya, have the future potential to become global.

"Most of the developed countries have this online degree method. So, we can do those degrees without going to that country (...). If we can build this plan in our system, with this situation, we can effectively take those things globally with good quality." (Respondent 14)

The same educator mentioned that there is a possibility to expose Sri Lankan inherent knowledge to the global effortlessly via online learning methods.

"(...) If we can create online degree methods, it will be an advantage for us. Some subjects are inherent to us like Buddhist Culture, Pali, Sanskrit, Astrology, Architecture, and traditional arts. (...) If international students want to study those subjects, they can learn with this online method in their country. So, I think it will be a great chance for us as a third-world country. We can uncover to the global."

Another educator stated that the university could offer external online education for foreigners and local people who want to learn despite their job status. Eventually, it would be an excellent chance for people who love knowledge sharing.

"We must start some free funded online courses; we can start from O/L qualification. Students can join with state university degree program online after finishing their O/L examination. (...) Our Financial department started a financial literacy program. The goal of that kind of program is knowledge sharing. It is a great opportunity that raised with this global health crisis." (Respondent 7)

Theme 03

Good Time for Blended Learning Modes

As evident in [43, p. 96], Blended Learning can be clarified as the "thoughtful integration of classroom face-to-face learning experience with online learning." Blended learning combines face-to-face learning in the classroom with activities based on a learning management system [44]. The goal of adopting blended learning techniques is to find the right combination of face-to-face physical engagement and online access to knowledge. One educator provided a well-fitted description for blended learning.

"We develop materials and upload them into LMS, and students must follow that one. Then, they must come to the classroom, and they need to discuss that one. (Respondent 1)

Most respondents believed that the present situation had provided an excellent platform to popularize different blended learning approaches. During the interviews, educators appreciated the need for continuing blended learning practices in the university.

"We need to continue. Every university has a learning management system, and students and teachers need to be trained on that. The blended learning concept should be introduced to undergraduates." (Respondent 4)

As a consequence of the pandemic, the idea of Synchronous Online Learning (SOL) or Live Virtual Classroom (LVC), wherein teachers and students are both online at the same time but not in the same location, has gained popularity [44]. According to Power [45], blended online learning (BOL) is an emerging variant of blended learning (BL) that integrates LMS and LVC into an entirely online course. While Blended learning requires the learner to be physically in the classroom, blended online learning is fully conducted in an online environment. During the pandemic, the university has moved to this new blended mode. The difficulties of asynchronous learning (LMS), synchronous learning (face-to-face learning), and blended learning may all be addressed through blended online learning (fully online mode learning) [44]. One teacher agreed that blended online learning is an excellent strategy to take but must be evaluated.

"I think blended online learning will be the best. We must evaluate how students accept this fully online mode, how they are absorbing the knowledge, what kind of positive things that we can get based on that learning. we must think about that version of blended learning." (Respondent 12)

Theme 04

A Platform for Creative Problem Solving

Robinson [46] stated that everyone needs to be more creative when the world becomes more complex and challengeable. Harris [47] defined creativity as the ability to envision or discover something new. Researchers witnessed that students have conducted so many creative things online related to their subject matters and extra-curricular activities. According to an educator, an online learning environment made some space for creativity in problem-solving.

"Earlier, we had physical field visits. But we are searching for so many ways of how we get this experience during the COVID pandemic. The Department of Commerce came up with an excellent idea. They organized some virtual(online) field visits for the first time in Sri Lanka. If they can develop those technical and conduct skills via online platforms, we can do them better than physical events." (Respondent 12)

A creative online learning environment can be reinforced with instructor behaviors, attitudes, words, and assignments [48]. According to Muirhead [49], educators can also foster creativity online by creating innovative course activities. Hence, it is evident that

instructors can encourage student's creativity in an online learning environment. One educator stated that students had been assigned to initiate online events to find alternatives for physical events.

"We asked students to conduct and organize some online events which are related to academic subjects. Let us say banking, marketing, finance. So, they organize some online events. They learned some creative things, advertising. So now they well practiced with those virtual sessions." (Respondent 4)

It was evident that online learning has helped students boost their creativity and problem-solving capabilities in an online learning environment.

V. DISCUSSION

Despite the harshest effects of COVID-19 on higher education, the University of Kelaniya has begun online learning to continue university education without interruption. The primary criterion for measuring the efficacy of online learning should be the accessibility and usability of e-learning facilities [50]. It was evident from the current study that for an effective online education system, learners and educators need to have access to the right equipment at the right time. They need reliable internet connectivity also. Strong IT infrastructure is the main requirement for effective online education, and Sri Lanka still finds it a challenging goal. Even though the internet penetration in Sri Lanka is 47% [51], students who live in many rural areas have faced several problems with internet connectivity.

In their study, Jindal and Chahal [53] stated that although governments of developing countries are taking initiatives to build digital infrastructure, they are very challenging tasks in comparatively developed countries. In this case, the same author argued that unreliable internet connectivity and the lack of a stable power supply are the biggest problems in underdeveloped nations. It was evident educators who are not well trained in e-learning pedagogy might face difficulties in digital technologies. According to El-Seoud et al. [54], higher education educators must adapt and apply the technological developments in online learning. Educators must receive appropriate training on e-learning pedagogy, and it is better to form communities of practice where educators can share their experience in online education with other educators [35]. It was found that medical students cannot do clinical trials like before, and there is not an appropriate mechanism to address that problem. Rameez et al.

[52] confirmed that educators often face some issues when conducting practical classes for Science, Technology, and Engineering disciplines. Therefore, the researchers highlighted the importance of having proper technologies in the universities. The government and the universities should focus on applying modern technological methods to perform clinical practice in medical education (e.g., augmented reality in healthcare, virtual laboratory methods). This suggestion is essential for long-term online education planning. The Government of Sri Lanka and related agencies should focus on supplying laptops or other devices, cellphones and

giving students cheap, uninterrupted, high-speed Internet connection to ensure equal opportunities for higher education. Moreover, the administration of the Universities can provide students loan schemes to purchase laptops or smartphones.

Sri Lankan state universities should redesign and restructure course modules, curriculums, and lecture materials to suit online needs. Educators have suggested that educators give massive attention to learners' needs, skills, and interests when designing courses. The technique was initially called Learner-Centered Design (LCD) [55]. The LCD method believes that the learning environment should be formed with the knowledge of learners' characteristics, how they are learning, under what pressures they are engaging in learning, what barriers they are experiencing, and how they feel comfortable with the e-learning tools [50]. Hence, it is vital to understand the learner first and then develop an appropriate e-learning pedagogy. An evaluation of the mechanisms for the e-learning education system is a scheduled task in Sri Lanka.

VI. ACKNOWLEDGMENTS

Although online learning was a lifeline during the COVID19 time, it has become an unavoidable component of higher education's teaching-learning activities. Based on the findings of this study, telecommunication companies can evaluate the disparity of network coverage within the country and should launch short-term and long-term plans to establish a broader network coverage. Education policymakers can refer to this study as a starting point for developing a more severe and national e-learning mechanism. This study will guide the University of Kelaniya and other universities, lecturers, schools, and teachers to formulate long-term policy plans on e-learning methods and use these research findings as a guideline to develop crisis management plans with contingency planning for another future global or global domestic crisis.

REFERENCE

- [1] C. M. Toquero, "Challenges and Opportunities for Higher Education Amid the COVID-19 Pandemic: The Philippine Context.," *Pedagog. Res.*, vol. 5, no. 4, pp. 2468–4929, 2020.
- [2] T. A. Urdan and C. C. Weggen, *CORPORATE E-LEARNING: EXPLORING A NEW FRONTIER*. Equity Research , 2000.
- [3] J. Keengwe and T. T. Kidd, "533 Towards Best Practices in Online Learning and Teaching in Higher Education," *MERLOT J. Online Learn. Teach.*, vol. 6, no. 2, pp. 533–541, 2010.
- [4] W. Bao, "COVID-19 and online teaching in higher education: A case study of Peking University," *Hum. Behav. Emerg. Technol.*, vol. 2, no. 2, pp. 113–115, Apr. 2020, doi: 10.1002/HBE2.191.
- [5] G. Dhanarajan, "Distance Education: Promise, performance and potential," <https://doi.org/10.1080/02680510124465>, vol. 16, no. 1, pp. 61–68, 2001, doi: 10.1080/02680510124465.

- [6] A. Andersson, "Seven major challenges for e-learning in developing countries: Case study eBIT, Sri Lanka," *Int. J. Educ. Dev. using ICT*, vol. 4, no. 3, pp. 45–62, 2008.
- [7] M. Rajesh, "A Study of the problems associated with ICT adaptability in Developing Countries in the context of Distance Education," *Turkish Online J. Distance Educ.*, vol. 4, no. 2, 2003, Available: <https://tojde.anadolu.edu.tr/tojde10/articles/Rajesh.htm>.
- [8] O. Simpson, "The impact on retention of interventions to support distance learning students," <https://doi.org/10.1080/0268051042000177863>, vol. 19, no. 1, pp. 79–95, 2004, doi: 10.1080/0268051042000177863.
- [9] D. Eastmond, "Realizing the promise of distance education in low technology countries," *Educ. Technol. Res. Dev.* 2000 482, vol. 48, no. 2, pp. 100–111, Jun. 2000, doi: 10.1007/BF02313405.
- [10] V. D. Soni, "Global Impact of E-learning during COVID 19," *SSRN Electron. J.*, Jun. 2020, doi: 10.2139/SSRN.3630073.
- [11] E. J. Sintema, "Effect of COVID-19 on the Performance of Grade 12 Students: Implications for STEM Education," *Eurasia J. Math. Sci. Technol. Educ.*, vol. 16, no. 7, Apr. 2020, doi: 10.29333/EJMSTE/7893.
- [12] J. Code, R. Ralph, and K. Forde, "Pandemic designs for the future: perspectives of technology education teachers during COVID-19," *Inf. Learn. Sci.*, vol. 121, no. 5–6, pp. 409–421, Jul. 2020, doi: 10.1108/ILS-04-2020-0112.
- [13] R. Raaper and C. Brown, "The Covid-19 pandemic and the dissolution of the university campus: implications for student support practice," *J. Prof. Cap. Community*, vol. 5, no. 3–4, pp. 343–349, Nov. 2020, doi: 10.1108/JPCC-06-2020-0032.
- [14] A. Harris, "COVID-19 – school leadership in crisis?," *J. Prof. Cap. Community*, vol. 5, no. 3–4, pp. 321–326, Nov. 2020, doi: 10.1108/JPCC-06-2020-0045.
- [15] D. Clow, "What should universities do to prepare for COVID-19 coronavirus? | Wonkhe," 2020. <https://wonkhe.com/blogs/what-should-universities-do-to-prepare-for-covid-19-coronavirus/>.
- [16] I. Ratnapala, "Adopting E-Learning for University Education in Sri Lanka: Peradeniya Perspective," in *Peradeniya University International Research Sessions (iPURSE)*, 2014, vol.18, Available: https://www.researchgate.net/publication/263698189_ADOPTING_E-LEARNING_FOR_UNIVERSITY_EDUCATION_IN_SRI_LANKA_PERADENIYA_PERSPECTIVE.
- [17] S. Dhawan, "Online Learning: A Panacea in the Time of COVID-19 Crisis;," <https://doi.org/10.1177/0047239520934018>, vol. 49, no. 1, pp. 5–22, Jun. 2020, doi: 10.1177/0047239520934018.
- [18] C. Greenhow and A. Chapman, "Social distancing meet social media: digital tools for connecting students, teachers, and citizens in an emergency," *Inf. Learn. Sci.*, vol. 121, no. 5–6, pp. 331–342, Jul. 2020, doi: 10.1108/ILS-04-2020-0134.
- [19] T. Izumi, V. Sukhwani, A. Surjan, and R. Shaw, "Managing and responding to pandemics in higher educational institutions: initial learning from COVID-19," *Int. J. Disaster Resil. Built Environ.*, vol. 12, no. 1, pp. 51–66, Jan. 2020, doi: 10.1108/IJDRBE-06-2020-0054.
- [20] A. Sun and X. Chen, "Online Education and Its Effective Practice: A Research Review," *J. Inf. Technol. Educ. Res.*, vol. 15, pp. 157–190, 2016.

- [21] D. Finch and K. Jacobs, "Online Education: Best Practices to Promote Learning,;" <http://dx.doi.org/10.1177/1071181312561114>, pp. 546–550, Sep. 2012, doi: 10.1177/1071181312561114.
- [22] T. Nguyen, "The Effectiveness of Online Learning: Beyond No Significant Difference and Future Horizons," *MERLOT J. Online Learn. Teach.*, vol. 11, no. 2, 2015.
- [23] M. Saunders, P. Lewis, and A. Thornhill, *Research Methods for Business Students*, 7th ed. Pearson Education Limited, 2015.
- [24] K. A. Soomro, U. Kale, R. Curtis, M. Akcaoglu, and M. Bernstein, "Digital divide among higher education faculty," *Int. J. Educ. Technol. High. Educ.* 2020 171, vol. 17, no. 1, pp. 1–16, Apr. 2020, doi: 10.1186/S41239-020-00191-5.
- [25] M. Kapurubandara and R. Lawson, "Barriers to adopting ICT and e-commerce with SMEs in developing countries : an exploratory study in Sri Lanka," *Univ. West. Sydney, Aust.*, vol. 82, no. 1, 2006.
- [26] K. Gunawardana, "An Empirical Study of Potential Challenges and Benefits of Implementing E-Learning in Sri Lanka," *SSRN Electron. J.*, Jun. 2005, doi: 10.2139/SSRN.2931993.
- [27] Department of Census and Statistics, "Computer Literacy Statistics – 2020," 2020. <http://www.statistics.gov.lk/PressReleases/ComputerLiteracystatistics-2020-Firstsixmonths>
- [28] Y. Chang, S. F. Wong, and M. C. Park, "A three-tier ICT access model for intention to participate online: a comparison of developed and developing countries," *Inf. Dev.*, vol. 32, no. 3, pp. 226–242, Jun. 2016, doi: 10.1177/0266666914529294.
- [29] R. Hayashi, M. Garcia, A. Maddawin, and K. P. Hewagama, "Online Learning in Sri Lanka's Higher Education Institutions during the COVID-19 Pandemich," *ADB Briefs*, pp. 1–12, 2020.
- [30] P. Resta and T. Laferrière, "Digital equity and intercultural education," *Educ. Inf. Technol.*, vol. 20, no. 4, pp. 743–756, Dec. 2015, doi: 10.1007/S10639-015-9419-Z.
- [31] K. Regmi and L. Jones, "A systematic review of the factors – enablers and barriers – affecting e-learning in health sciences education," *BMC Med. Educ.* 2020 201, vol. 20, no. 1, pp. 1–18, Mar. 2020, doi: 10.1186/S12909-020-02007-6.
- [32] S. Frehywot *et al.*, "E-learning in medical education in resource constrained low- and middle-income countries," *Hum. Resour. Heal.* 2013 111, vol. 11, no. 1, pp. 1–15, Feb. 2013, doi: 10.1186/1478-4491-11-4.
- [33] A. Chawla and E. Kevin Kelloway, "Predicting openness and commitment to change," *Leadersh. Organ. Dev. J.*, vol. 25, no. 6, pp. 485–498, Sep. 2004, doi: 10.1108/01437730410556734.
- [34] D. L. Conrad, "Engagement, Excitement, Anxiety, and Fear: Learners' Experiences of Starting an Online Course," http://dx.doi.org/10.1207/S15389286AJDE1604_2, vol. 21, no. 1, pp. 205–226, 2002, doi: 10.1207/S15389286AJDE1604_2.
- [35] M. A. Gabriel and K. J. Kaufield, "Reciprocal mentorship: an effective support for online instructors," <https://doi.org/10.1080/13611260802233480>, vol. 16, no. 3, pp. 311–327, 2008, doi: 10.1080/13611260802233480.
- [36] L. Schrum, "A Proactive Approach to a Research Agenda for Educational Technology," <http://dx.doi.org/10.1080/15391523.2005.10782434>, vol. 37, no. 3, pp. 217–220, 2005, doi: 10.1080/15391523.2005.10782434.

- [37] S. Reushle and M. Mitchell, "Sharing the journey of facilitator and learner: Online pedagogy in practice," *J. Learn. Des.*, vol. 3, no. 1, pp. 11–20, Feb. 2009, doi: 10.5204/JLD.V3I1.45.
- [38] W. N. Mehanna, "e-Pedagogy: the pedagogies of e-learning," *Res. Learn. Technol.*, vol. 12, no. 3, pp. 279–293, Sep. 2004, doi: 10.3402/RLT.V12I3.11259.
- [39] W. W. Fish and L. E. Wickersham, "Best Practices for Online Instructors: Reminders," *Q. Rev. Distance Educ.*, vol. 10, no. 3, pp. 279–284, 2009.
- [40] O. B. Adedoyin and E. Soykan, "Covid-19 pandemic and online learning: the challenges and opportunities," <https://doi.org/10.1080/10494820.2020.1813180>, 2020, doi: 10.1080/10494820.2020.1813180.
- [41] G. Casella, G. Costagliola, F. Ferrucci, G. Polese, and G. Scanniello, "A SCORM Thin Client Architecture for E-Learning Systems Based on Web Services," *Int. J. Distance Educ. Technol.*, vol. 5, no. 1, pp. 19–36, Jan. 2007, doi: 10.4018/JDET.2007010103:
- [42] N. P. Morris, M. Ivancheva, T. Coop, R. Mogliacci, and B. Swinnerton, "Negotiating growth of online education in higher education," *Int. J. Educ. Technol. High. Educ. 2020 171*, vol. 17, no. 1, pp. 1–16, Nov. 2020, doi: 10.1186/S41239-020-00227-W.
- [43] D. R. Garrison and H. Kanuka, "Blended learning: Uncovering its transformative potential in higher education," *Internet High. Educ.*, vol. 7, no. 2, pp. 95–105, Apr. 2004, doi: 10.1016/J.IHEDUC.2004.02.001.
- [44] P. J. Fadde and P. Vu, "Blended Online Learning : Benefits , Challenges , and Misconceptions," *Online Learn. Common misconceptions, benefits challenges*, 2013.
- [45] M. Power, "The Emergence of a Blended Online Learning Environment," *MERLOT J. online Learn. Teaching*, vol. 4, no. 4, pp. 503–514, 2008.
- [46] K. Robinson, *Out of our minds : learning to be creative*, 2nd ed. Capstone Press, 2011.
- [47] R. Harris, "Introduction to Creative Thinking," 1998. <http://www.virtualsalt.com/introduction-to-creative-thinking/>
- [48] J. Richards and C. Schubert-Irastorza, "Valuing creativity in online teaching," *J. Res. Innov. Teach.*, vol. 6, no. 1, 2013.
- [49] B. Muirhead, "Encouraging creativity in student online work," *Int. J. Technol. Distance Learn.*, vol. 1, no. 12, pp. 3–8, 2004.
- [50] M. P. Penna, V. Stara, and M. De Rose, "The failure of e-learning: why should we use a learner centred design," *J. e-Learning Knowl. Soc.*, vol. 3, no. 2, pp. 127–135, 2007, doi: 10.20368/1971-8829/254.
- [51] S. Kemp, "Digital 2020: Sri Lanka — DataReportal – Global Digital Insights," *Digital 2020: Sri Lanka*, 2020. <https://datareportal.com/reports/digital-2020-sri-lanka>
- [52] A. Rameez, M. A. M. Fowsar, and N. Lumna, "Impact of Covid-19 on Higher Education Sectors in Sri Lanka: A Study based on South Eastern University of Sri Lanka," *J. Educ. Soc. Res.*, vol. 10, no. 6, p. 341, Nov. 2020, doi: 10.36941/jesr-2020-0132.
- [53] A. Jindal and B. Chahal, Pal, "Challenges and Opportunities for Online Education in India," *Pramana Res. J.*, vol. 8, no. 4, 2018, Available: https://www.researchgate.net/publication/343381025_Challenges_and_Opportunities_f_or_Online_Education_in_India.
- [54] M. S. A. El-Seoud, I. A. T. F. Taj-Eddin, N. Seddiek, M. M. El-Khouly, and A. Nosseir, "E-Learning and Students' Motivation: A Research Study on the Effect of E-Learning

- on Higher Education,” *Int. J. Emerg. Technol. Learn.*, vol. 9, no. 4, pp. 20–26, Jun. 2014, [Online]. Available: <https://online-journals.org/index.php/i-jet/article/view/3465>.
- [55] SolowayElliot, GuzdialMark, and H. E., “Learner-centered design,” *Interactions*, vol. 1, no. 2, pp. 36–48, Apr. 1994, doi: 10.1145/174809.174813.