Mitigating the Effects of E-learning in Higher Education Sector in Sri Lanka during the COVID-19 Pandemic

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Abstract— This study sets out to examine the efficacy of e-learning in the Sri Lankan higher education sector that was ignited by the emergency created by the COVID-19 pandemic. Drawing a random sample of 350 undergraduates from seven major universities of Sri Lanka through the means of a questionnaire, the study was set against the key benchmarks derived out of a review of literature that affects e-learning. The study unearthed that unsatisfactory internet access, inability to correspond to the prerequisites of relevant subjects, psychological concerns enumerating due to shift in learning strategies, increased concerns about COVID-19, and lackadaisical attitude towards learning from home front, to be the noticeable factors having a larger bearing on the efficacy of online learning process. The study thus advocates proper infrastructure facilities and customization of teaching and learning process according to the subject content to elevate the standards of the e-learning process in the Sri Lankan higher education sector.

Keywords: *e-learning, pandemic, higher education, Sri Lanka*

I. INTRODUCTION

For an online learning environment, it is common to consider it as an internet-based framework that facilitates the delivery of training to students who are physically distant from one another or in distinct time zones (Dempsey and Van Eck, 2002, p. 283). In unusual circumstances, like as the COVID-19 pandemic, eLearning has emereged as a backup educational system to continue the learning process at the institutional level. The pandemic has spread practically each nook and corner of the world, albeit the first official case in China was not confirmed and hospitalized until December 2019. (Huang, cited in Roman and Plopeanu, 2021).

The coronavirus pandemic has now exacerbated to a point where the World Health Organization (WHO) has declared a Public Health Emergency of International Concern (Lai et al., 2020) Because it is impossible to foresee when the epidemic will end, there are a variety of situations that can arise as a result of the lack of predictability. This status quo creates a great deal of uncertainty and confusion, which has an impact on economic, social, and political institutions, as well as individual relationships. All of these developments have a huge impact on people and their interactions with other individuals and institutions. In terms of education, the unanticipated health crisis caused more than 1.2 billion learners, or around 70% of total registered students, from 158 nations to be severely impacted by the global lockdown on May 15, 2020. (UNESCO, 2020a). Hundreds of millions of students around the world have been and continue to be marginalised by “social distancing” or “self-isolation” policies imposed by their governments, due to the inability to attend physical classes that could damage their academic performance (UNESCO, 2020a). It is evident that their learning patterns are heavily affected, especially when those pupils lack the necessary infrastructure for online learning. According to the same earlier survey, a low level of household wealth limits the level of access to technology since it is difficult to establish an internet connection, which is a formidable barrier to eLearning and a big source of exclusion, isolation, and inequality (UNESCO, 2020b).

The context in Sri Lanka is no different by means, for the first time in history, the education through elearning platforms was given foremost prominence. Even the primary and secondary schools in Sri Lanka resorted to elearning whereas the higher education had to be overhwhelmingly dependant on the elearning concept even by conducting the graduate examinations.

It is in this context that this study sets out to examine the efficacy of elearning education as self reported by a random sample of undergraduates of the state Universities in Sri Lanka tested against some selected variables pertaining to elearning. The study thus postulates on the hypothesis that the elearning in Sri Lankan higher education sector induced by educational lockdown has triggered certain difficulties for the students concerned. The study thus strives to unearth these issues in order to provide new knowledge to enhance the effectiveness of the elearning education in Sri Lankan higher education sector.

II. LITERATURE REVIEW

E-learning has been established as an effective means of delivering instructional content for years, and face-to-face communication is still widely regarded as important to the learning. Unlike traditional classroom purported benefits of distance education include reduced college tuition, better test scores, increased task engagement, and decreased attrition. An efficient infrastructure is required for effective eLearning (Zhang, cited in Roman and Plopeanu, 2021), which entails not only solid technical connections, but also professional management of courses, apps, and excellent pedagogical soundness (Costa, cited in Roman and Plopeanu, 2021). For an instance in Korea, proactive involvement in establishing a good infrastructure has had a significant impact on the efficiency of the eLearning platform (Teo, cited in Roman and Plopeanu, 2021). Furthermore, Liaw et al. (2007) and Selim (2007) show evidence for the favorable impact of teachers' attitudes on the degree of eLearning success. Low internet connectivity at home, according to Balfanz and Byrnes (2006), is equally damaging to eLearning achievement as bad internet infrastructure at schools (Nicholas, cited in Roman and Plopeanu, 2021).

Distance education may be successful if the subject effectively and efficiently interprets potential barriers (social interaction, administrative issues, student motivation, and time/support for studies) (Muilenburg and Berge, 2005). Additionally, self-regulation has been found to be critical to the efficiency and success of such practices (Yukselturk, cited in Roman and Plopeanu, 2021), as well as proper instructional design and rigorous educational planning (Hodges et al., 2020).

The successfulness of implementing e-learning requires the understanding of end-user acceptance process. Therefore, a set of factors should be provided to be considered when an E-learning activity is planned and proposed to E-learners in universities of Sri Lanka. Through a technology acceptance model it has been proven that the students following the computing degrees tend to focus more on perceived ease of use on elearning and the students‘ attitude has more influence on intention to use elearning. So it could be stated that providing more technological facilities with infrastructure would increase the positive attitude towards using e-learning among Sri Lankan university students and their behavioral intentions (Vidanagama, 2016).

The use of the internet is just a particular ICT application, but nevertheless a cornerstone application. Moreover, the problems faced due to intenet are symptomatic of the more general ICT issues for developing countries like Sri Lanka. Thus, the knowledge and competencies of ICT and the ICT literacy is a must to be advanced and developed within the Sri Lankan community. In order to approach for a digitalized society based on the internet and the technological infrastructure where online learning and teaching become a major activity, the ICT literacy and the skills of the community should be mandatorily be developed per Gunawardhana (2005).

Additionally, research has demonstrated that policies aimed at closures of schools and universities have exacerbated inequity and frustration among these students Additionally, these constraints have impacted the foundations of cognition, specifically socialization and

interaction. Academic assistance (Cigognini et al., cited in Roman and Plopeanu, 2021) and appropriate educational platforms (Isaeva et al., 2020) are viewed as critical components of an efficient online learning social process that is password protected.

As with any conventional educational form, eLearning education is believed to be entirely dependent on effective interpersonal interaction between all of the actors involved in the process (Bernard et al., cited in Roman and Plopeanu, 2021), in order to benefit from the exchange of knowledge and ideas (Cole and Engestrom, 1993). According to previous research, students who exhibit a proclivity for depressed behavior or pessimism may face formidable obstacles that impair their ability to cope with disturbing, novel, and anxious circumstances (Miceli and Castelfranchi, 2002), resulting in a lower level of achievement (Yates, 2002).

That is why, while the COVID-19 pandemic may be viewed as a challenge on effective education, particularly for these categories of students. However, the scenario also viewed as an opportunity to abandon established customs and paradigms in traditional education system in favor of more accessible, affordable, and technology-based learning systems globally (DePietro, 2020).

Student achievement and skills are clearly linked to the adoption of learning strategies (Pressley & Associates, 1990). Research in curriculum areas ranging from physics to literature and social studies to science has frequently demonstrated this link. Given the strong link between learning method and positive outcomes, it's no surprise that students who use learning strategies have a high level of self-efficacy, or the belief that they are competent learners (Zimmerman & Pons, 1986)

Learning cognitive strategies such as reasoning, analyzing, taking notes, summarizing, synthesizing, outlining, reorganizing information in order to develop stronger schemas (knowledge structures), and practicing in naturalistic settings are all examples of cognitive strategies that assist the learner in acquiring Knowledge. Furthermore, metacognitive strategies such as pre-planning a task, acquiring and organizing materials, setting up a study space and schedule, monitoring mistakes, and evaluating task success, as well as analyzing the success of any type of learning technique, are all used to manage the learning process in general.

Memory-related methods help students connect one thing or concept to another. Various memory-based strategies enable learners to learn and recapture information in a logical sequence (e.g. acronyms), while other techniques create learning and recapture through sounds (e.g. rhyming), images (e.g. a mental image or the word meaning), a combination of sounds and images (e.g. a keyword approach) (e.g., on a page or blackboard).

Affective strategies have been demonstrated to be important in learning, such as evaluating one's mood and anxiety level, talking about feelings, praising oneself for successful performance, and adopting deep breathing or positive self talk. Social Strategies such as asking for clarification on a confusing issue, asking for assistance in completing a task) have also found to be important in learning. Thus, it is highly sceptical as to what extent elearning education in Sri Lankan higher education sector could correspond for the above stipulated learning strategies.

III. METHODOLOGY AND EXPERIMENTAL DESIGN

As per the findings of the International Association of Universities as stated in their Global Survey Report on the Impact of Covid 19 on Higher Education around the World, three basic variables have been validated to be affecting the efficacy of distance learning systems through the online platforms. The factors are namely the a) accessibility to the technological infrastructure, b) the distance learning competencies and c) the field of study. The study was set againts these benchmarks which were identified as emerging challenges to the e-learning practices (Marinoni et al., 2020).

The study employed hallmark features of a quantitative study while resorting to a random sample of 350 undegraduates studying in seven universities of Sri Lanka. A questionnaire consisting of questions under four sections was

administered among the undergrdautes to accumulate the required data for the study. The key variables tested through the questionnaire were stipulated into the sub sections as, the demographic factors of the students, accessibility to technological infrastructure, psychological concerns of the students, impact of the field of study on the effectiveness of e-learning and the overall perspective of the students on online education system. The sample of students were aggregated from multifarious fields of studies that included the Engineering & Surveying, Quantity Surveying, Architecture, Biology & Chemistry, Arts and Information Technology disciplines drawing representative sample from all the localties of the country.

The accumulated data were then analyzed in order to infer the impact of the technological infrastructure and their accessibility, the psychological concerns and the learning competencies of the undergraduates and the satisfaction of the undergrdatuates who are being engaged in elearning so far, in cognizance of their respective fields of studies to assess the efficacy of e learning within the context of Sri Lankan higher education system.

IV. RESULTS AND DISCUSSION

A. Accessibility to the Technological Infrastructure

The Covid19 pandemic situation has enforced most of the Higher Education Institutes around the world to shift to the e-learning practices confronted with many sudden and unfamiliar aspects of teaching and learning. This predicament has been a greater challenge for the educational Institutes concerned, teachers as well as for the students. It is a stark fact that the technological infrastructure and the access to the internet are essential prerequisites to participate in the e-learing process.

The International Association of Universities has evinced three different aspects pertaining to the implementation of online learning and has classified three different groups accordingly; (i) countries for which the shifting to online education is extremely unrealistic since the students do not have the necessary infrasture and the access to the internet from home. (ii) countries whose internet penetration and the technological infrasture among the academia and the students are adequate to establish a proper e-learning system. (iii) the countries having a partition between the students having the necessary infrastructure and the students who do not which makes it excessively difficult to cater equal opportunities to all the students. Sri Lanka comes under the third mentioned category which is the most frequent category in this group of classification. Hence, it is postulated the unavailability of the necessary infrastructure and the internet access for a set of students have to be overcome which was further testified by the findings of the study as follows;

The following chart exemplifies the nature of the technological devices used by the sample in study for elearning tasks . 46.8% of the students construed that they are capable of using a laptop/computer for their academic activities while 43.1% states that they resort to mobile phone devices for the online learning. 9% of the students states that they are selecting the device depending upon the situation. A marginal proportion of 0.3% states that they do not have the necessary infrastructure.

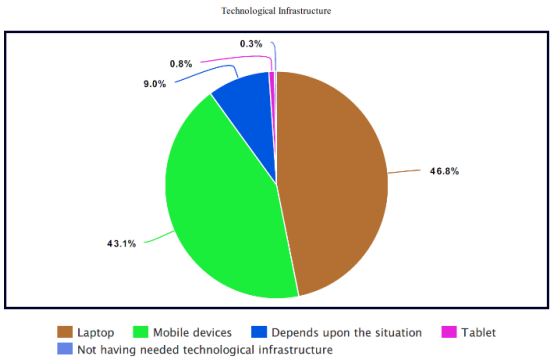

Figure 13: The accessibility of Technological infrastructure by the respondents

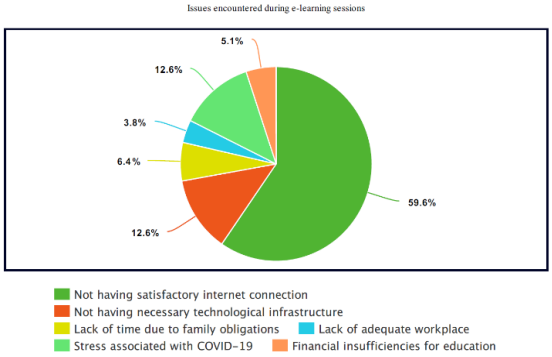

Figure 14: Issues encountered during e-learning sessions

From the undergraduates who state that they select the device, depening upon the situation, 37.8% states that the device is selected upon the type of activities/modules/subjects that they learn while a percentgage of 62.2% accounts to the fact that that the device is selected based on the network coverage, the access to the internet and the localities of the learner group concerned.

A frequency of 195 students which accounts to 59.8% of the sample underscores that the perennial problem that they confront during online learning is not having a satisfactory internet access whereas a frequency of 41 students amounting to 12.6% declares that not having the needed infrastructure devices is the main problem that they have faced. This result has proven the statement provided by Gunawardhana (2020), which is that, for a developing country like Sri Lanka, the imprudent internet connection and its associated facilities are the major drawbacks for the institutions to shift to e learning approaches.

In cognizance of online examinations, 48.3% conveys that not having a satisfactory internet access which was the major reason for them to underperform during online examinations and 18.1% states that they do not possess the necessary technological infrastructure needed for online examinations. This situation hence, has happened to be a critical scenario where a motivated and hard working students' performance during an exam can be hindered due to the unsatisfactory internet connection that the student possess or due to the fact that the student is incapable of acquiring the needed technological devices and infrastructure. Concurrently, a student with less ICT literacy as explained by Gunawardena, (2005), may underperform than expected at the examinations even though the student may occupy the relevant subject knowledge and the needed competencies.

The figure 3 and figure 4 exemplify the summary of the responses pertaining to the key issues that the students have encountered within online lectures and online examinations.

B. Distance Learning Competencies and Psychological Concerns

The findings of the review of the literarure of this study, highlighted that the impact of learner strategies and learner styles have an important bearing on the learner's capability to grasp what is being taught. Opting for the online education system has deterred these individual learner styles and strategies which cannot be corresponded in this elearning process unlike in a traditional classroom context(Luaran, Samsuri, Nadzri and Rom, 2014). In view of above, the

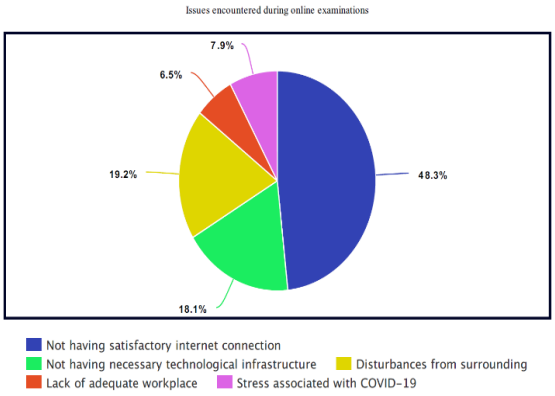

Figure 3: Issues encountered during online examinations

study encapsulates the cognitive aspect of elearning in this study and it was unearthed that the sample of the learners undergo certain psychological distress ignited by the pandemic condition which has an impact on their capacity to engage in online education effectively.

In cognizance with above, it was ascertained the undergraduates level of worriness and stress associated with the pandemic situation of the country. The 350 undergraduates were querried to scale their distress associated with Covid19 on a scale of 1-5 where 1 indicated that the distress is very low and 5 indicated that the respondents are highly concerned. The findings show the

following frequencies and the descriptive statistics

Table 1: Descriptive Statistics of Psychological Distress

Descriptive Statistics					
	N	Min	Max	Mean	Std. Dvn.
Psychol o--gical Distres s	350	1	5	4.42	0.869

Table 2: Psychological Distress Associated with COVID-19

Psychological Distress		Frequency	Valid Percent	Cumulative Percent
Valid	1	2	.6	.6
	2	10	2.9	3.4
	3	47	13.4	16.9
	4	70	20.0	36.9
	5	221	63.1	100.0
	Total	350	100.0	

Thus, the students have expressed an average of 4.42 has their level of concern towards the covid19 situation. Concurrently, a frequency of 40 undergraduates amounting to 12.3% indicates that due to the stress associated with the Covid19 pandemic was the main reason for them to not attentively enagage in the online lectures and 7.9% of them claim that it was the main reason which affected their low performance during the online examinations. When examined further, the sideline remarks made by the students, revealed that this physchological quagmire entails factors such as the lackadaisical attitude of learning from home, familial commitments due to pandemic, not being able to resort to their usual learning styles & strategies unlike in the traditional classroom setup etc.

Hence, it was understood that the psychological concern of the undergraduates is a mandatory fact to be considered when the effectiveness of elearning is considered. This predicament essentially underscores the vital requirement to conduct further research pertaining to the teaching and learning styles in the domain of elearning.

C. Field of Study

The potency of elearning is profoundly dependent on the respective field of studies. The learning process of various
disciplines varies according to the reliance on content of the subject matters concerned such as use of specific technical equipment, use of laboratories, field work , design work and so on.

Given the above essential preequisties that entail multifarious fields of study, it is conspicuously evident that the efficacy of elearning largely depends on the extent to which such learning process could accommodate the requirements of the subjects matters concerned.
The sample of the undergrdauates to this study were gathered from several fields of study concerning this issue. The undergraduates were hence from Engineering & Surveying, Quantity Surveying, Architecture, Biology & Chemistry, Arts and Information Technology desciplines.

These respondents have expressed their satisfaction towards the effectiveness of elearning process on a scale of 1 to 5, based on their partuclar area of study and the descriptives of the responses can be summarized as follows:

Table 3: Descriptive Statistics of effectivess of e-learning pertaining to the field of study

Descriptive Statistics					
	N	Min	Max	Mean	Std. Dvn.
Biology/ Chemistry	55	1	5	2.5455	1.13559
Engineering/ Surveying	52	1	4	2.1346	0.97073
QS	65	1	5	3.2308	1.12873
Architecture	42	1	4	1.7143	0.74197
Arts	75	1	5	3.4133	1.05386
IT	60	2	5	3.9667	0.71228

As testified by the above data, the Information technology undergraduates for whom the lectures and activities are largely computer aided, records a higher level of satisfaction towards elearning which is averaged around 4; the highest mean value obtained. In terms of the Architecture undergraduates whose studies are mainly based on design based works, records a satisfaction level with a marginal mean value of 1.7 which was the least that could be noted. Moreover, the Biology and Chemistry undergrdauates records a satisfaction level of 2.5 owing to the fact that most of their modules are laboratory based whereas the Engineering/Surveying undegraduates express their unsatisfaction to the online lectures with a mean satisfactory level of just 2.1. Gunawardhana (2005), has stated that the insuffiencent knowledge and competencies on ICT and technological devices can also become a challenge when the elearning systems are approached. This statement has also been verified through this study, where the undergrdauates of Computing and Information Technology desciplines whose studies are basically associated with technology, has shown a higher degree of satisfaction towards elearning practices implemented in Sri Lanka.

Thus in an ascending order, the satisfaction of the respondents varied from Architecture, Engineering/Surveying, Biology/Chemistry, Quantity Surveying, Arts and Information Technology.

V. CONCLUSION AND RECOMMENDATIONS

With the viral outbreak of the novel coronavirus:SARS-Cov2 and the associated infectious respiratory disease named COVID-19, the World Health Organization (WHO) officially announced a situation of a global pandemic on 11th March 2020. Ever since more than 3.4 billion people, representing a total of 43% of the world population were locked down within 80 countries and territories across the world (Marinoni et al., 2020).

The distruption caused by COVID-19 on school and higher education was immense as all schools and higher education institutes of 185 countries had to be closed affecting a total of 1,542,412,000 learners worldwide (Marinoni et al., 2020). In concern with the above situation, most of the higher education institutes of the affected countries had to shift to the distance learning methods which was essentially involved with elearning practices. The feasibility of this transition from the physical in class education system to online distance learning system can be compartmentalized into several interconnected dimensions which can be named as i. Technologocal Infrastructure, ii. Distance Learning Competencies and Psychological Concerns, and iii. The Field of Study.

Through this study, efforts were taken to examine, the impact of the above mentioned variables on the elearning practices of the undergraduates within the Sri Lankan Higher Education System. Thus, a questionnaire survey was conducted with a sample of 350 undergradtuates from diversified fields of study, through which data were gathered from the students perspective and were analysed to generate conclusions. The ultimate objective of this study was to ascertain the perspectives of the students regarding their elearning experience and related issues which can be eventually employed to develop an advanced, efficient and effective education system.

The findings of this study exemplified that the biggest problem faced by the undergratuates in Sri Lanka is the access to the internet where the respondants claimed that most of the parts of the country does not contain a viable network connection. This situation is a key challenge that should be addressed by the decision makers of the country with the intent of providing learners across the country with a satisfying network coverage and related infrastructure facilitices. Apart from that, the field of study was understood to be a key problem faced by the undergraduates. More specifically, as stated by the respondents and as proven and validated through statistics, the elearning system of Sri Lanka is only seen to be favorable to few disciplines of study which are most computer aided and theory based. The Practical and lab based dsciplines are still struggling with finding an optimum elearning approach which is a challenging matter to be concerned. Thereby, further studies should be encouranged on subject/module specific pedagogies and

assessing related delivery modalities in online learning platforms.

Concurrently, the undergraduates themselves have suggested the factors such as conducting the lecture sessions with a small group of students and a smaller lesson content which can be delivered with a satisfying student-teacher interaction. Thereby, it can be observed that the distance teaching and learning necessitates a distinct pedagogy, rather a systematic transition from face-to-face to distance teaching and learning. It is difficult for higher education to make this abrupt and unprepared shift, thus there should be a determined action plan in the higher education sector to develop the teaching capacities of the academic staff concerned in order to assimilliate them towards online teaching & learning platforms.

Hence, this unplanned situation can be adopted as an oppotunuity to inculcate the critical thinking capacities of the humankind in creating and innovating flexible teaching and learning pedagogies applicable for distance learning situations which will subsequently lead the teaching-learning process to a new horizon in the sphere of education. The study thus eventually recommends government initiatives to upgrade the required infrastructure facilities and related resource development for elearning in Sri Lanka, and implementation of investment projects for the capacity building of all stakeholders involved in this process including staff and the learnerns. This will eventually improve the options for learners to access lifelong learning opportunities as well as the ability to work from a distance which will inavirably make an positive impact on the development of the country and its economy in the time to come.

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ABBREVIATIONS AND SPECIFIC SYMBOLS

COVID	:Coronavirus Disease
ICT	:Information & Communication Technology
WHO	:World Health Organization
UNESCO	:United Nations Educational, Scientific and Cultural Organization

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