Review of Prevailing Trends in Online Learning amidst COVID-19 Pandemic: Empirical Study in Higher Education Sector in Sri Lanka

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Abstract

The purpose of this study is to review the prevailing trends in online learning amidst in COVID-19 Pandemic, in the higher education sector in Sri Lanka. It has been observed by higher educational institutes in Sri Lanka, who replaced traditional pedagogical approaches with online learning that the learners' engagement has not been satisfactory in the online platforms irrespective of the fact that so many measures have been taken to develop and expand online learning. Quantitative research approach based on cross-sectional research design was used in the study. Data was collected via electronic survey using a questionnaire and it consisted of multiple-choice, Likert Scale, and open-ended questions. It was distributed via Google form among the private and public sector university undergraduates and postgraduates in Sri Lanka, who are engaged in learning activities in the higher educational sector in Sri Lanka. Data gathered on demographics, socio and economic background, ability to access technological resources, study habits and purpose of using online platforms, etc. Descriptive statistics were calculated and trends were analysed accordingly. The findings revealed that many of respondents had spent considerable amount of time for online learning by shifting from traditional classroom based learning. The most popular video conferencing tool is Zoom Meeting. It occupied 94.70% of preferences out of 429 respondents. The most popular online resources and portals are Google (82.5%), YouTube Channel (35.4%), and Spoken Tutorial (9.3%). The main device used by learners to login online sessions is smart phone (71.7%) comparative to laptop computers used by 52.6% and desktop and tablet used by 8.6% and 1.8%. At present, the smart phone has being utilized a vital role as a multi-functional device. Challenges mainly existed from incapability of technological adaptation. Many had environmental challenges to learn from domestic places at different geographical locations which were not supported for frequent online accessibility. This led to poor

communication between educators and learners and engagement was negatively affected. Development of information technology infrastructure and affordable package systems at concessional rates were requested by many participants. Further, inclusion of interactive attributes of online learning tools and delivery patterns of lecturers were suggested to enhance engagement in online learning. The study has been limited to higher education sector in Sri Lanka. The study would assist policy makers, The Government, financial institutes and key players in telecommunication industry to frame new strategies and implement intervention controls in online education. The present study examines the changes of behaviour patterns of learners amidst COVID-19 pandemic and its impact on their social and economic wellbeing. The COVID-19 has significant threats on traditional classroom based learning and created opportunities for online learning platforms. This study is to investigate novel trends in online education around the globe in 21st Century. The findings will pave the way to many stakeholders to reengineering their strategies and reach to unreached opportunities.

Keywords: *COVID-19, Pandemic, Online Learning, Technology, Learner Engagement, Higher Education*

Introduction

Learning is a main part of a person's lifestyle and his/her behaviour is dependent on the knowledge a person possesses. The on-going COVID-19 pandemic has greatly damaged the life styles of the people around the world, specially the way they pursue education. "The COVID-19 is a disease caused by severe acute respiratory syndrome coronavirus 2(SARS-CoV-2), originated in Wuhan city of China, has already taken on pandemic proportions, affecting across all the continents mostly spread among individuals during close contact now resulting in millions of death" (Remuzzi & Remuzzi,2020, p.1225). The latest updates by the WHO as on 13.08.2021, the total confirmed cases of COVID-19 are 205,338,159 and confirmed deaths falls 4,333,094 (WHO, 2021). The virus has been spread around 223 countries, areas or territories with fast paced. Most of the countries all around the world have closed educational institutions to control the spread of COVID-19 virus, considering the safety of students, educators and all associated stakeholders. There is a severe short-term disruption that has been felt by families across the globe. Education at home has brought a lot of shocks not only to students but also to their

parents 'productivity hence, Burges and Sievertsen (2020) emphasized parents have responsibility to understand prevailing situation and encourage children to continue their studies. COVID-19 is a serious global pandemic penetrated to each and every continental in the world at the end of second decades of 21st Century. The novel coronavirus Delta and its variants have negatively impact on social and economic activities of the world. When the COVID-19 pandemic rapidly spread all around the world, schools, colleges and universities have suspended in person teaching in order to maintain social distancing. Online learning at present has increased students' retention and grasping information at a faster pace (Li and Lalani (2020). The Government organizations and technology-led start-ups have introduced online courses. Those are free and some have a very minimal fee; which is helping students and educators to temporarily cope with stress due to lockdown and shutdown of all workspaces. One such is Byju's, a Bangalore, India–based digital educational platform founded and started by Byju Raveendran, who has announced to give free access to children from its learning app (Lewis, 2020).

As this coronavirus is new, the challenges are also new (Shereen et al., 2020). It is very disappointing to hear that gathering and working at one place like offices, shopping malls, colleges, banks will escalate the spread of this virus. WHO has recommended social distancing (Hageman, 2020). Avoiding close contact leads to nearly total closure of schools, shops, colleges, universities etc. All these gave a rise into a sudden increase in online classes as only alternative to traditional classes. With more than 25% of the total number of students in higher education receiving instruction online and ever increasing online student numbers projected(Allen & Seaman, 2010).

Learners at online platforms can share their knowledge and experiences with increasing higher order thinking and greater personal satisfaction (Engstrom, et al., 2008). According to Ascough (2007) and Liu et al. (2007), a welcoming teaching and learning community is central to online student knowledge acquisition, which in turn leads to meaningful learning experiences.

During this lockdown era the closing of educational institutions hampered the education system and therefore the teaching-learning methods. Understanding the novel trends in teaching-learning methods amidst this crisis is imperative. Here at, the academics should be creative for effective interventions for the smooth running of teaching and learning

platforms. Therefore, the aims of this study are to review the trends in online education, patterns of students 'engagement, students learning interest and enthusiasm towards online forums and classroom community in on-line courses conducted in the higher educational sector in Sri Lanka. The outcomes of this study with understanding of online trends may enable and strengthen scholars, learners and relevant stakeholders.

Literature Review

Beginning of E - Learning or Online Learning in Higher Education

Internet revolution has made online learning as an alternative option to face-to-face learning. As a form of distance education, online learning can be defined as ''any class that offers its entire curriculum in the online course delivery mode, thereby allowing students to participate regardless of geographic location, independent of time and place'' (Richardson & Swan, 2003, p. 69). Most, if not all, aspects of a course, including discussions, assignment submission, and communication with the instructor, tends to be facilitated through online course management platforms such as Moodle, Blackboard, Web board, and supplemental communication technologies such as Elluminate, Skype, and others. Given this context, online courses are different from their on-campus counterparts in several aspects (Muilenburg & Berge, 2005). The internet has become a medium of delivery for online teaching. To date, online learning has received considerable attention as a means of providing alternatives to traditional face-to-face, instructor-led education (Douglas & Van Der Vyver, 2004).

Educational institutions now implement online learning technologies as a part of their growth strategy for delivery of teaching and learning to domestic and overseas students. Goodfellow (2004) describes the "e-learning revolution", as "an inexorable process of penetration of technical processes into all aspects of course development, production, delivery, quality assurance, assessment, validation etc." "As these technologies pervade educational organizations, there is a critical factor in the process which is reshaping and transforming higher education teaching and learning, impinging on both organizational structures and individual functions" (Conole, 2004, p. 5).

E-learning in Sri Lanka

Sri Lanka is a country in the developing world with a high level of print and digital literacy. According to the Department of Census and

Statistics, the digital literacy rate of Sri Lanka is 46% in 2019 (DCSSL, 2019). The Central Bank of Sri Lanka states that the country's print literacy as 92.5% in 2018 (CBSL, 2020). Human capital of ICT has potential itself to gain benefits from the emerging global knowledge. Primary and secondary schools are free and accessible for all, but far from everyone leaves secondary schools with career opportunities. When it comes to higher education the situation is different and the actual intake to tertiary education for the year 2018/2019 was 31,902 while the number of students left out of the university system was 29,841 in 2019 (From the Open University of Sri Lanka 6,795, external degrees in Government universities 6007 and internal degrees in Government universities 17039) (UGCSL, 2019). During the last two decades the country's use of information and communications technology (ICT) has increased and the infrastructure has improved not only urban areas but also in rural areas also. There are many reasons to pursue online teaching, learning, and student assessment. Online courses make learning accessible to students who cannot be on campus during regular hours or at all (Lei & Gupta, 2010). Instructors can use online courses to accommodate increasing class sizes and reduce the associated high instructor workload (Earl, 2013). These assessments can be completely online (such as online exams) or just require online submission (such as essays). Assessments can be either formative, designed to monitor students' progress in a low or no stakes environment, or summative, designed to evaluate students against a standard or criteria (Dixon & Worrell, 2016).

Personalized Learning

Personalized learning involves extending the educational concepts of differentiation (teaching tailored to the learning preferences of different learners) and individualization (teaching paced to the learning needs of different learners) to connect to the learner's interest and experiences and meet the needs, abilities and interests of every student through tailoring curriculum and learning activities to the individual. The ultimate aim of a personalized learning environment is to create an educational system that responds directly to the diverse needs of individuals rather than imposing a 'one size fits all' model on students (Bates, 2014).

Personalization of a learning environment allows for a personal learning experience as it allows the learner to access content that meets his needs (Childress and Benson, 2014). In a traditional classroom setting, such personalization is not possible. Thus, the personal learning environment is

a radical shift from traditional learning, providing learners with content adapted to meet their needs (Childress and Benson, 2014).

Artificial Intelligence (AI) in Education

From the very beginning of computer science, researchers like Alan Turing considered the possibility for a computer to play chess, as a test of the machine's intelligence. Thus, he published "Intelligent Machinery" in 1948 and "Computing Machinery and Intelligence" in 1950, both of which will inspire future scientific research in Artificial Intelligence AI (Turing, 2009). Literally, AI means the use of technological devices aimed at reproducing the cognitive abilities of humans to achieve objectives autonomously, taking into account any constraints that may be encountered (Benko and Lanyi, 2009).

Artificial intelligence (AI), in which machines exhibit aspects of human intelligence (Syam and Sharma, 2018), is set to radically transform the marketplace. It is part of the fourth industrial revolution, along with other transformative technology such as three-dimensional printing and the internet of things (i.e. extending connectivity into devices such as security systems and electric appliances to provide the ability to send and receive information over the internet). The potential for disruption by AI is particularly high in services.

AI support of online learning is especially important with the growth of Massive Open Online Courses (MOOCs), where enrolment in the most popular MOOC platforms averages over 40,000 students (Ferenstein, 2014).

Virtual Reality (VR) in Education

VR is an interactive experience within a computer-generated three-dimensional environment that can be a representation of either a real-life or an imaginary environment (Freina and Ott, 2015; Ke et al., 2016). The term "virtual" means computer-generated, while the term "reality" refers to the similarity of objects or of the environment to the physical world (Cheng, 2014). Another significant advantage of VR technology is that it allows the creation of virtual worlds that mimic real-life situations and events, not otherwise possible to simulate, offering users a safe space with room for error to be trained and learn. For instance, simulating in physical space fire situations, earthquakes or terroristic attacks is impossible due to the high danger and cost (Bailenson et al., 2008; Freina and Ott, 2015).However, using VR technology, it is possible to offer the opportunity to develop a

virtual world that represents real-life events, allowing fire-fighters or terrorism response units to be trained in dealing with chaotic crisis within a safe yet stressful environment (Bailenson et al., 2008; Freina and Ott, 2015).

Most importantly VR offers the possibility of visualizing events and situations, allowing the users to step inside the event or situation and examine it from different perspectives, maximizing in-depth understanding of the conceptual framework (Marks et al., 2017). VR technology not only allows to make the unseen visible (Marks et al., 2017) but also makes possible to overcome the restrictions of time and physics and be transferred for instance to the past experiencing historical eras such as the world wars (Eschenbrenner et al., 2008). An important aspect of using VR-based training systems is the fact that knowledge acquired within a VI can be applied to the real context but also the opposite (Huang et al., 2013).

Internet of Things (IoT) in Education

The Internet of Things (IoT) "is not a single technology; rather it is an agglomeration of various technologies that work together in tandem" (Sethi & Sarangi, 2017, p. 1). Mitew (2014, p.5) clarifies the parameters in more detail. IoT stands for the connection of usually trivial material objects to the internet – ranging from tooth brushes to shoes or umbrellas. At the very least, this connectivity allows things to broadcast sensory data remotely, in the process augmenting material settings with ambient data capture and processing capabilities. Once connected, each thing acquires a network address making it uniquely identifiable. The object usually has some sort of layered sensing capacity allowing it to dynamically register changes to its environment and transmit that information over the internet.

Digital technologies such as multimedia projectors, interactive smart boards, and content management had already revolutionized teaching and learning systems. Content management tool, a centralized software application, which provide course creation, delivery, management, tracking, reporting, and assessment, made reality of distance education and online courses. Educational systems embracing learning environment methods rather than focusing only on the learning contents, in a peer-learning environment is quite important (Kamar & Ali, 2017).

Abbasy and Quesada (2017) says IoT is transforming traditional education system into a scalable, adaptable with rapid dynamic changes, flexible and more efficient e-learning with a topology where the huge

number of physical and virtual interacting objects are involved in the process of learning. Making IoT in learnings systems would open up new pathways to proffer effective learning. It helps to create energy-efficient and cost-efficient education system through automation of common tasks outside of the actual education process. The influence of IoT can be seen in many aspects of education from student engagement in learning and content creation, helping teachers in providing personalized content and improve student outcomes (Wellings & Levine, 2009).

Opportunities in Online Learning

Online media can ensure multiple benefits for both students and teachers in supporting teaching and learning (Graham & Misanchuk, 2004). Different studies reveal that online courses have been found to be conducive to students who favour self-regulated learning (You & Kang, 2014). In a study conducted by Kirtman, a student responded to online coursework by stating, "It is more self-guided so I can spend more time on the concepts that I need help with and less on concepts that I can pick up quickly" (Kirtman, 2009, p. 110). Self-regulated learners have a tendency to use various "cognitive and metacognitive strategies to accomplish their learning goal" (You & Kang, 2014, p. 126).

Another benefit of e-learning is reduced off-task behaviours of students. Cooney (1998) and others (Bonk, Hansen, Grabner-Hagen, Lazar, & Mirabelli, 1998) discovered that students in computer conferencing environments stay on task more than 90% of the time. Students in these studies were so task driven that they often failed to interact beyond basic task requirements. To nurture student interpersonal skills and knowledge, therefore, instructors might consider using tools that foster socially related interactions, such as coffee houses and icebreaking activities. In contrast to the above asynchronous learning studies, a recent study of student synchronous training in the military found that students were off-task about 30% of the time (Orvis et al., 2002). These findings, in fact, approximated what had been the norms of face-to-face training.

Challenges in Online Education

Online learning process has many challenges coming from internal and external factor of the user. These challenges will have negative impact on learners expected outcome or quality of engagement. With COVID-19 pandemic, it has become clearer that education system is susceptible to external dangers (Bozkurt & Sharma, 2020). Ribeiro (2020) rightly noted

that this digital transformation of instructional delivery came with several logistical challenges and attitudinal modifications.

Inequality in the socio-economic status of students, some rely on the computer and free internet in school (Demirbilek, 2014), and due to the closure of schools, the migration process of these set of students is expected to be slow. It becomes undeniable that students with low socioeconomic background will definitely find it difficult to migrate as early as expected since they cannot come to school due to the pandemic. Fishbane and Tomer (2020)'s research findings on what students with no internet access are to do during this Covid-19 pandemic show that as the level of poverty increases in the community, the rate of internet accessibilities declined rapidly and by implications, students with no or low socio-economic power to afford broadband connection are most vulnerable to fall behind or encounter additional challenges to meet up with others in online learning.

Research Methodology

Population and Sample Design

This research adopted quantitative method. Quantitative methods include the techniques associated with the gathering, analysis, interpretation, and presentation of numerical information (Johnson & Turner 2003). According to Saunders et al (2014), the target population is the full set of cases taken into consideration from the total population. The present study focuses on learners who are engaging in certificate courses, diplomas, undergraduate and postgraduate of higher educational institutes in Sri Lanka. When the sample size is high, its representativeness will be higher hence would be able to expect reliable results (Saunders et al., 2009). The sample size of this study is 429 respondents.

Research Instruments and Data Analysis

In this study primary data was collected for addressing the problem of lower engagement to academic programs via online. The secondary data was collected for purposes other than the problem at hand. The primary data gathered by using a self-administrated questionnaire. The data was gathered during the months of November 2020 amidst in COVID-19 second wave in Sri Lanka. Questionnaire was distributed via Google Form covering nine (09) provinces in Sri Lanka and the questionnaire consists of multiple-choice, Likert scale and open-ended questions related to the prevailing trends in online learning in Sri Lanka.

The data collected from questionnaire were analyzed and evaluated with the descriptive statistical analysis covering frequencies, mean, range, and percentages by Statistical Package for Social Sciences (SPSS-25) and Microsoft Excel. In addition, tables, charts and graphs were used to demonstrate the observation for the purpose of interpretation.

Data Presentation and Data Analysis

The observations were mainly presented as tables, figures and exhibits enabling reader to covert textual materials into tabular or pictorial form. Attempts were made to design and integrate graphic aids into research report to enhance readers' comprehension and figure out trends in online learning at present.

Demographic characteristics of the respondents

There are four age categories for the respondents who are between the ages of 20-29, 30-39, 40-49 and 50 above. Participants for this research study were taken from higher educational institutes in Sri Lanka. Majority of them are undergraduates representing 83.9% out of total respondents. The second highest percentage of 5.6% of respondents are students of Master Degrees Programs.

	Frequency	Percentage %		Frequency	Percentage %
Age			Marital Status		
20-29	350	81.6	Single	326	76.0
30-39	65	15.2	Married	68	15.8
40-49	11	2.6	Married & having kids	35	8.2
>50	3	0.7	Total	429	100%
Gender			Enrolled Online Programs		
Female	302	70.4	Certificate	09	2.1
Male	127	29.6	Diploma	09	2.1
Total	429	100%	Higher Diploma	20	4.7
Ethnicity			Degree	360	83.9
Sinhalese	325	75.8	Postgraduate	06	1.4
Tamil	73	17.0	Masters	24	5.6
Muslim	31	7.2	PhD	01	0.2
Other	0	0			
Total	429	100%	Total	429	100%

Table 1: Profile of Demographic Factors

Source: Empirical Data

As depicted in the above table 1, 81.6% of the sample was in the age range between 20 and 29, out of 429 respondents. The second highest percentage 15.2% of respondents was in the age range between 30 and 39. The total responses received from the individuals above 40 years were 14, marking a percentage of 3.2%. In the sample, gender distribution among female and male was 70.4% and 29.6% respectively. This indicated that more than two third of the respondents were females. Seventy six percentage of (76%) unmarried individuals was observed with regard to the marital status, 15.8% of the sample was married and 8.2% had children. Out of 429 respondents 75.8% were Sinhalese, Tamil and Muslim representation was 17% and 7.2% respectively. A significant gap was depicted between degree programs and the other educational programs regarding the sample's online engagement. A frequency of 360 individuals who followed undergraduate degree programs was observed, with an indication of 83.9%. A total of 38 respondents (8.9%) were enrolled in certificate, diploma and higher diploma programs. 31 (7.0%) respondents were following postgraduate study programs such as Post Graduate Diploma, Masters and PhD.

Assessment of adoption of technology

	Frequency	**Percentage %**		**Frequency**	**Percentage %**
Device Ownership			**Devices Used in Online Sessions**		
One device	241	56.2	Desktop	38	8.9
Two devices	170	39.6	Laptop	227	52.9
Three devices	11	2.6	Mobile	306	71.3
More than three devices	7	1.6	Tablet	8	1.9
Frequently Used O.S.			**Frequently Used Browser**		
Windows 10	217	50.6	Google Chrome	401	93.5
Windows 8	36	8.4	Safari	32	7.5
Windows 7	32	7.5	Internet Explorer	30	7
Android	209	48.7	Firefox	25	5.8
iOS	54	12.6	Opera	18	4.2
Other	5	1.2	Other	23	5.4

Table 2: Assessment of adoption of technology

Source: Empirical Data

Based on the gathered data, majority containing 56.2% of the sample stated the ownership of a single device. Respondents who mentioned the ownership of two devices were denoted 39.6%. Three or more devices were owned by percentages of 2.6% and 1.6% respectively. Amongst the participants, a greater part 71.3% marked the possession of mobile phones while only 8.9% possess desktops. 52.9% of the aforementioned sample stated the utilization of laptops used in online sessions. Tablets were considered as the least preferred appliance as the usage of tablets was 1.9%.

In the midst of the Windows users, the most prominent operating system was Windows 10 (50.6%) and Windows 7 and 8 were utilized by only 7.5% and 8.4% sequentially. Android as an operating system was utilized by 48.7% of the sample and iOS was used by only 12.6% of the respondents. The least of 1.2% mentioned several other operating systems used during their online sessions. The most renowned web browser was Google Chrome with more than 400 responses (93.5%) while all other browsers were preferred by less than 10% respondents. For instance, Safari, Internet Explorer, Firefox, Opera and other browsers were marked by 7.5%, 7%, 5.8%, 4.2% and 5.4% sequentially.

Online Trends Amidst in Covid 19 Pandemic

Nature of Online Engagement of learners

The nature of online engagement of learners has been changed after COVID-19 pandemic. This may be simply because of the concept of social distance applied by the country where higher educational institutes initiated online academic programs. See figure 1 below.

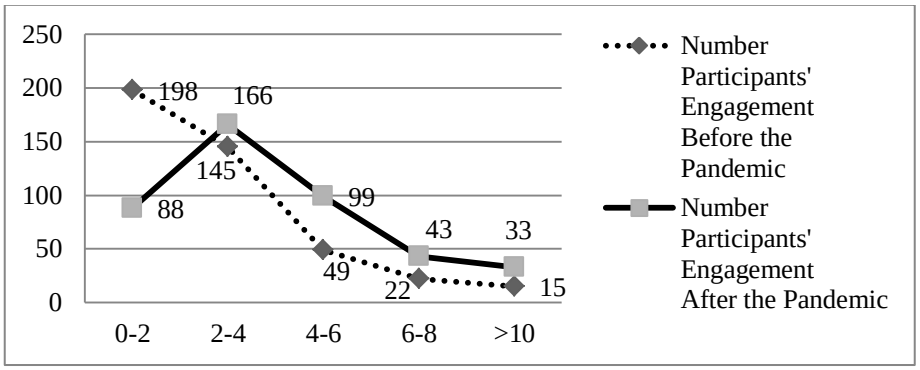

Fig.1: Online learning hours prior and after COVID-19 Pandemic
Source: Empirical Evidence

This figure evidence the fact that, number of online learning hours have been clearly increased after the pandemic. There is a clear increase from 0-2 hours of engagement per day before COVID-19 pandemic and it has lifted into higher range of hours used for different online activities. Majority of the learners have used 2-4 hours per day for their studies and other online activities. 10% of the learners have used 8-10 hours where 7.69% had engaged more than 10 hours for online activities.

According to the Telecommunications regulatory commission of Sri Lanka (TRCSL) Sri Lanka has a very vibrant telecommunication sector with around 32.5 million mobile subscribers, 2.5 million fixed subscriber and 7.2 million broadband subscribers by 2018 end (TRCSL, 2018). There are five main broadband service providers in Sri Lanka. They are Sri Lanka Telecom PLC, Mobitel (Pvt) Ltd, which is a fully wholly owned subsidiary of Sri Lanka Telecom, Dialog Axiata PLC, CK Hutchison Holding Limited, and Bharti Airtel Limited. These telecommunication companies play a crucial role in providing their services. The respondents of this study had demonstrated their preferences of each of above service providers as shown in **Figure.2**. Majority of the learners have used Dialog service packages and as a whole it is 44%. The second highest service provider is Mobitel and it occupies 27%. The third highest is the Sri Lanka Telecom (SLT), and it records 21%. It is recorded that many users get services from multiple service providers.

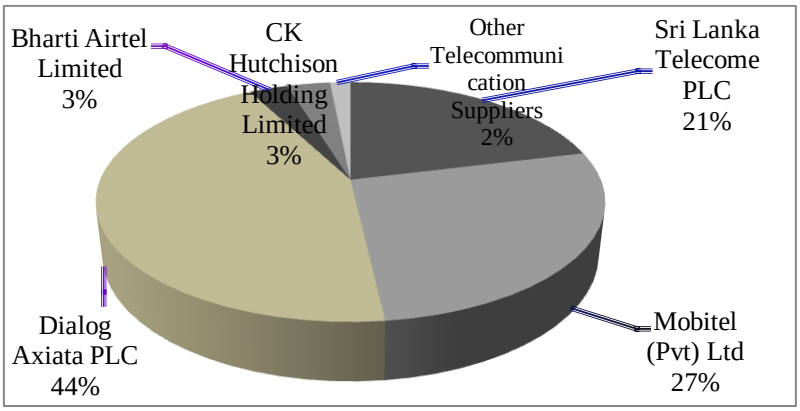

Fig.2: Broadband usage

Source: Empirical Evidence

Majority of 73.3% respondents use one method of followings, for getting access to online through the Prepaid Mobile Data, Post Paid Mobile

Data, Public Wi-Fi, Office Network, Wi-Fi access through broad brand Connections. However, out of them, rate of using prepaid mobile data account for 43.8%, Wi-Fi access through broad brand Connection account for 23.1%, and use of post-paid account for 7.2%. Other medium access was insignificant.

	Frequency	Percent	Cumulative Percent
At home	358	83.4	83.4
At home, At work place	54	12.6	96
At home, At work place, Free Wi-Fi Zone	1	0.2	96.2
At home Free Wi-Fi Zone	2	0.5	96.7
At work place	12	2.8	99.5
At work place, In the main campus or higher educational institutes you attached	1	0.2	99.8
Boarding place	1	0.2	100
Total	429	100	

Table 3. Accessibility to Online Activities

Source: Empirical Data

The summary of the respondents' statistics as per **Table 3** of the study explained the 83.4% of the highest respondents were accessing only from home and prove that home is the most secured zone to access for online learning. The significantly higher rate of 96.7% accessed their academic activities from home and where other places which flexible to them at work places or free Wi-Fi Zone. Total preference of access for online activities at workplace was shown by 15.8% of the sample. However, it should be noted that 13.3% of respondents access their online activities by preferring to the two locations of both at home and at the workplace. Furthermore, It also validated that out of the other access preference (at work places, free Wi-Fi Zone, boarding place, main campus) the undergraduates had responded 86.5%, diploma students of 84.6%, Advanced level respondents 80.2% have highly preferred access at home for their online studies.

The purposes of using online services

The analysis of online usage of the respondents revealed multiple preferences. Those are reflected in the following **Figure 3** below;

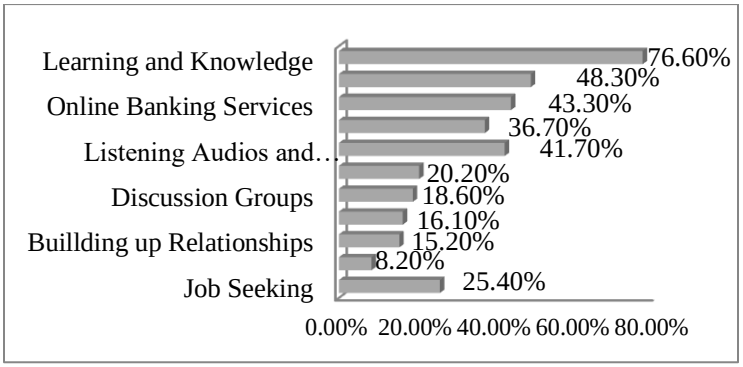

Fig.3: Purpose of using online services

Sources: Empirical Data

In order to maintain the social distance during the COVID–19 pandemic people were encouraged to do more online activities and services. The COVID–19 pandemic has created opportunities for work from home, online studies, online shopping, banking etc. This study has examined how the pandemic has changed the way of individuals' use of e-commerce and digital solutions.

According to this study, 76.6% of individuals had used the online services to their learning and knowledge development. The second largest of 48.3% had used online services for gaining knowledge around the world. The third largest preferences of 43.3% respondents had used online banking services.

The Daily Logins

The statistics in **Figure 04** show the internet users in Sri Lanka who access selected social networks during the COVID-19 pandemic. Facebook, Twitter and YouTube Videos allow users to post and share their images online and directly engage with their followers on the social network.

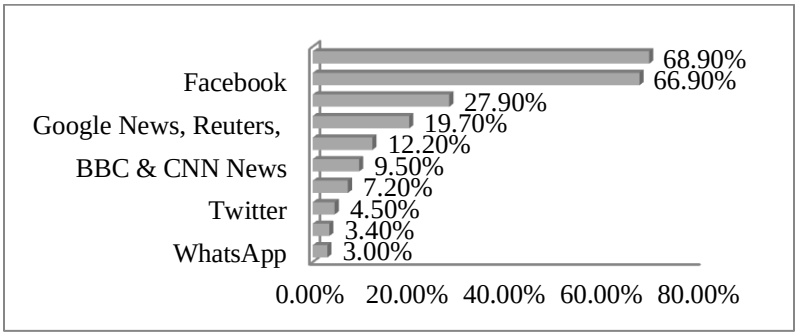

Fig.4: Daily logins

Source: Empirical Data

The highest usage of the respondents 68.9% had used YouTube videos and 66.9% of the respondents had utilized Facebook as their daily logins. Instagram is a photo sharing social networking services that facilitates the users to share and edit photos and videos. Further, Social websites such as Instagram has been preferred by 27.9% respondents, where LinkedIn has been used by 12.2% of respondents. WhatsApp is an instant messaging services and unique app for the users. Following these, Twitter has been used by 4.5% and WhatsApp has been used by approximately 3.0% of the respondents. Other than the above, a few daily logins such as BBC & CNN News were occupied by 9.5% respondents. Other News web sites as Reuters, Google News, News Link and Radio Station World have been view by 19.7%. The TED Talks has been viewed by 3.4%.

The Trends in Video Conferencing

Web conferencing software is allowed to the participants to attend audio and video meetings. It enables the participants to share files, screen sharing, instant messaging and video conferencing.

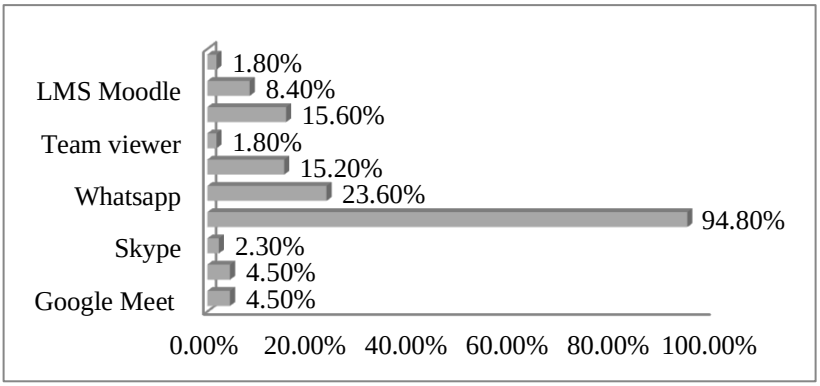

Fig.5: The Trends in Video Conferencing

Source: Empirical Data

Figure 5 demonstrates the percentages of the most popular video conferencing tools that used in online education during COVID -19 outbreaks. It is clear from the charts that many scholars tend to use different types of video conferencing tools to engage in online education. The highest percentage 94.70% was recorded as usage of Zoom Meetings. There is a considerable increase 23.80% in WhatsApp and 15.30% in YouTube respectively. Moreover, trends of using some other web conferencing software were as follows. Team Viewer and Google Hangout 1.8%, Skype 2.3%, Google Meet and Google Classroom 4.6%, LMS/Moodle

8.5%, Microsoft Teams 15.8%. It is evident that, the usage of above were significantly lower than usage of Zoom Meetings.

The Utilization of Online Resources and Portals in E-Learning

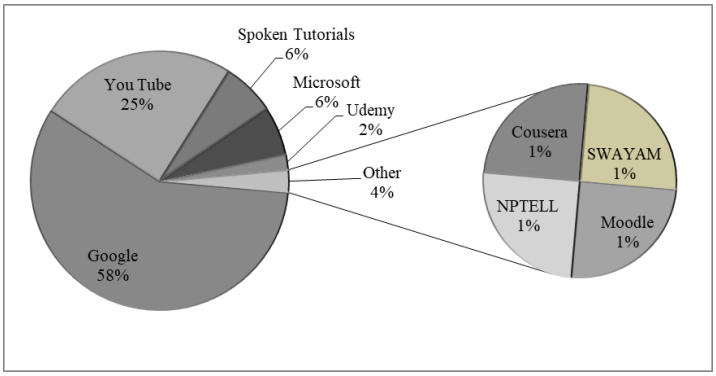

Fig.6: The utilization of online resources and portals in E-Learning
Source: Empirical Data

Online resources and E– portals offer profound platform for online learning. Learning resource portals are gateways to so many online resources available across the world. It offers materials and links for the resources in terms of training and learning.

In accordance wit the statistics shown in **Figure 6**, the online resources and portals including twelve major categories which are suit for learners' requirement of E- learning. The Google 82.4% is the largest segment and Zoom, Moodle, Books, Pluralsight; Emerald, Insight, Microsoft Teams, Neptal and Cousera 1.6% are the smallest segments that were using as online resources and portals for Online Learning.

Nevertheless, YouTube Channel accounted for 25% of online resources and portals matching for learners' requirement of Online Learning and experienced more than 1/3 of the entire contribution. The Spoken Tutorial, Microsoft and Udemy indicated 6.0%, 6.0%, and 2.0% respectively.

The Interest of Online Learning as compared to Classroom Learning

The graph shown in **Figure 7** demonstrates the percentages of how learners feel online learning as compared to classroom learning during the COVID-19 outbreak period. Overall, the learners are interest towards online education comparatively classroom based teaching.

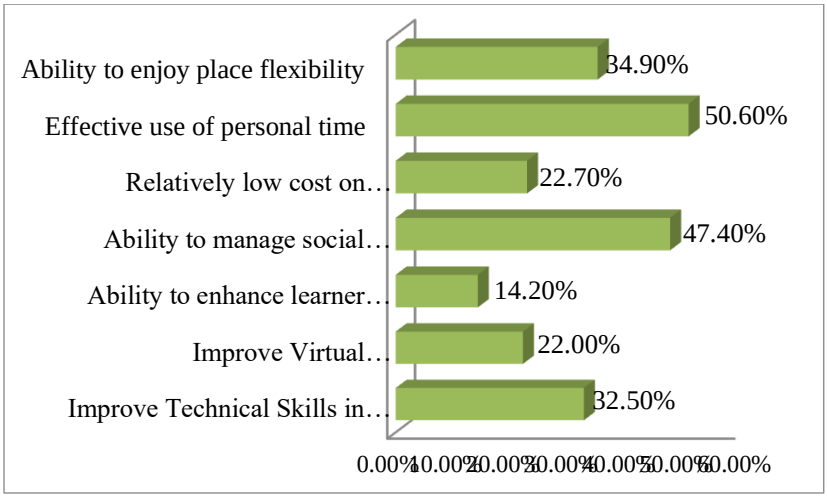

Fig.7: The Interest of Online Learning as compared to Classroom Learning
Source: Empirical Data

However, the importance of online learning can be seen some significant differences.

The highest proportion of learners prefer for Effective use of personal time of 50.60% and the smallest proportion of learners prefer for ability to enhance learner engagement of 14.20% respectively. The learners are capable to manage social distance as of 47.40%, Ability to enjoy place flexibility as of 34.9%, relatively low cost on specific expenditure as of 22.70%, and improve virtual communication and collaboration as of 22% correspondingly.

In general, the statistics demonstrates that during the period of COVID-19 period the learners have a preference of using online learning comparative to the classroom based teaching.

Advantages of Online Learning

The most significant advantage highlighted by the respondents was flexible time management in online learning it is recorded 65.1% preferences. The second preferred advantage was comfortable at home while learning online, which account for 54.4%. The third advantage is recognized as low cost of online learning which stated as 29.3%. Ability to access learning management systems (LMS) has been preferred by 24.9% of the respondents while easy access to related information was stated as 24.5%. Further, the other advantages highlighted by respondents were quick self-assessment, group learning and personal guidance accounted for 18.1%, 17.0% and 11.6% respectively.

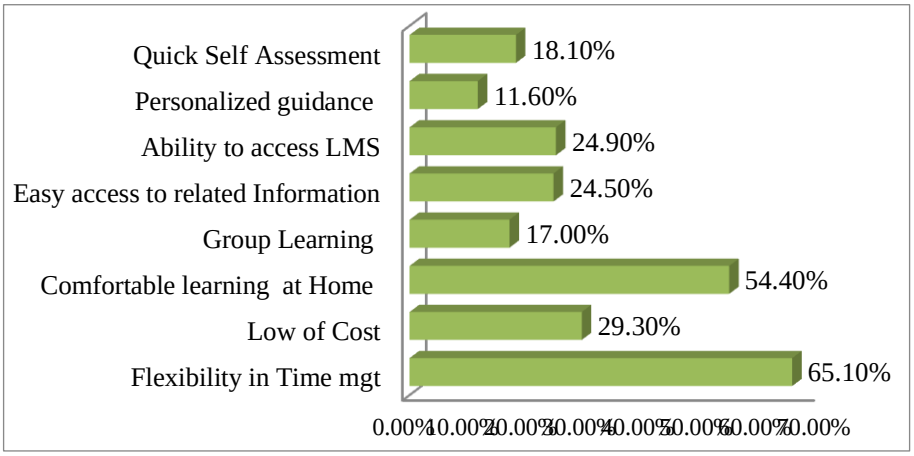

Fig. 8: Advantages of Online Learning

Source: Empirical Data

	Frequency	Percent
Domestic barriers	100	23.3
Domestic barriers, Financial constraints for Internet connection	11	2.6
Domestic barriers, Institutional Problems	11	2.6
Domestic barriers, Lack of self-motivation	14	3.3
Financial constraints for Internet connection	53	12.4
Institutional Problems	19	4.4
Lack of self-motivation	37	8.6
Lack of technical skills	35	8.2
Lack of technical skills, Financial constraints for Internet connection	12	2.8
Problems related to the content of the course	42	9.8
Other barriers	95	22
		100

Table 4 : Online difficulties faced by online participants

The main difficulties that respondents encountered in online learning were domestic barriers which represent 23.3%. The second highest barriers account for 12.4% is the financial constraints for Internet connection. The third significant issue referred as 9.8% of the respondents is problems related to the content of the course. Further, lack of self-motivation and lack of technical skills account for 8.6% and 8.2% respectively. However, there were other barriers taken together account for 22%.

Purpose of making online payments

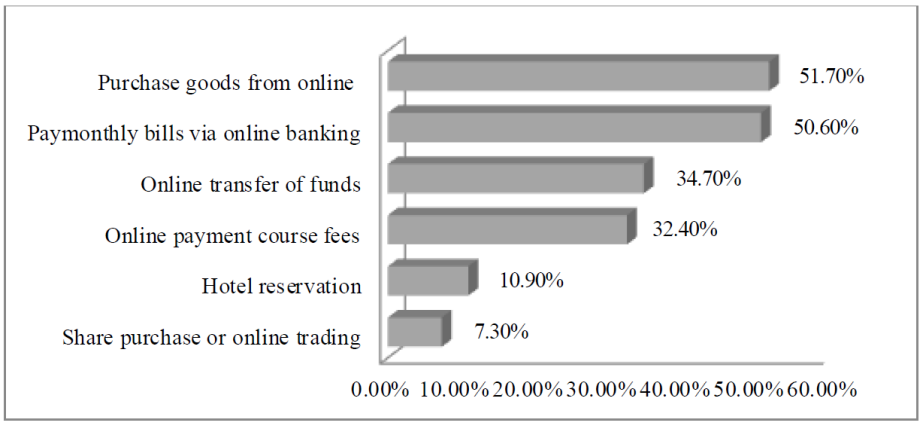

Fig.9: Purpose of making online payments
Source: Empirical data

The learners' behaviour of online payments demonstrates many insights. In order to observe the patterns of this an important question was raised related to purpose of online payments. As shown in **Figure 9,** the highest preference of 51.7% has been marked for purchase goods from online. The second highest of 50.6% was account for pay monthly bills via online banking. The third purpose of online payments related to transfer of funds which stated 34.7%. The subsequent main purposes were online payment course fees, hotel reservation and share purchase or online trading those account for 32.4%, 10.9% and 7.3% respectively.

The most preferred Online Bank

The Bank of Ceylon (BOC) is the most preferred online bank occupying 28.8%. It is the one of a well-established public bank in Sri Lanka. The second preferred online bank was commercial bank which stated 21.5% of preferences. The third placed occupied by peoples bank it stated 18.6% of preferences. The other three banks which offer online banking facilities are Sampath bank, Hatton National Bank (HNB) and National Saving Bank (NSB) account for 17.0%, 9.8% and 5.9%.

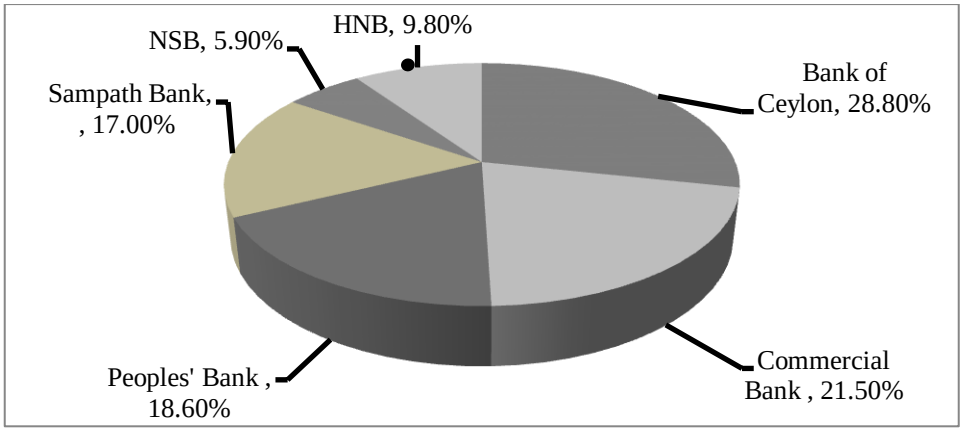

Fig.10: The most preferred Online Bank

Source: Empirical data

Discussion, Conclusion and Recommendation

Educational institutes in Sri Lanka have taken measures to implement online lecturing replacing traditional class room based pedagogical approaches. Therefore, learners of the respective higher educational institutes are now using online learning to certain extend. However, the expected levels of quality of engagement as well as absorption of expected learning outcomes are still doubtful because majority of learners did not have previous experience of online learning pedagogy. Four hundred twenty nine (429) learners participated in this study and 83.9 % of them are undergraduates. Majority of 71.3% learners are using mobile phone to online login. This reflects that, even though mobile phone is not the standard login device, learners have no option other than the mobile devices due to the fact that all of them do not possess a laptop or desktop computer. Further, mobile phone is not the appropriate equipment to online learning simply because its' display is relatively small and hence learners may encounter issues. Apart from that interactivity of through the mobile login is very low.

The most interesting fact is that number of online learning login hours have tremendously increased after COVID-19 pandemic. This is evident the fact that leaners have accustomed to online learning. Out of total respondents approximately 39% (166) learners' login 2-4 hours per day and approximately 8% learners (33) spent more than 10 hours per day. However, more login hours does not itself reflect quality of learning. Sometimes learners may spent time inefficiently in the internet as they are unable to go out of the home during the COVID-19 pandemic. According to the **Figure 2,** broadband usage, the highest preferences of 44% has given to

Dialog Axiata PLC by the respondents. It may be the reason that, Dialog Axiata PLC has different and flexible broadband packages. The second highest of 27% is preference is to Mobitel (Pvt) Ltd. and the third is 21% of preference to Sri Lanka Telecom PLC. The SLT is the parent company and Mobitel (Pvt) Ltd. is fully owned subsidiary of SLT, both together, has shown the 48% highest preferences from the respondents by taking broadband services. These two companies together have offered diversified packages in order to cater the online requirements of the customers.

According to the **Table 3**, accessibility of online activities 96.7% is from home. This demonstrated that learners have been restricted their movement into their homes during the pandemic period. Further, this may help learners to join their academic activities online with free mind set. **Figure 3** shows further evidence regarding this as 76.6% of learners have stated that they use online services for learning and knowledge gaining and 48.3% log in with the purpose gaining knowledge around the world. This may be the reason that internet provides ample opportunities for information retrieval all around the world. Interestingly 25.4% of learners attempted to find jobs through online sources. Apart from that, online shopping trend has been increased by 36.7%. This is a clear evidence of social distancing maintained by respondents while looking for opportunities.

Figure 4 demonstrates the daily logins, where 68.9% of YouTube viewers were the highest preference online login. This may be the reason as video based learning is the latest trend of self-learning. Many institutes as well as individual academics have uploaded video based lessons into YouTube and those are freely available for any viewers. This trend has won the heart of many YouTube viewers. Facebook is the second largest occupying 66.9% of preferences by the respondents. Facebook is freely available for any person irrespective of their differences of professions or personal backgrounds. Many of them excel their pictorial reflections to their family relations, peers, communities and business stakeholders. Instagram occupied 27.9% of the preferences by the learners. Instagram is one of a latest trend among professional communities to share information. **Figure 5** shows the trends in video conferencing.

The Zoom is the winner among all the video conferencing tools at present taking 94.8% highest preferences. WhatsApp is the second highest gaining 23.6% of the preferences and Microsoft Team is the third highest gaining 15.6% preferences. WhatsApp has been ranked as good video conferencing tool among learners at present because of it is simply

operations and ability to communicate images, audios and videos easily. Microsoft Team has been using among many institutions to conduct webinars and online lectures at present. **Figure 6** demonstrates utilization of online resources and portals in E-Learning. Google is the highest preferred online portal where 58% have logged. The second largest logging is the YouTube occupying 25% preferences. Moreover other online resources preferred by the learners are Spoken Tutorials, Udemy, Microsoft, Moodle and SWAYAM.

Interest of online learning compared to classroom based learning was assessed from the learners. Majority of learners, 50.60% had stated that online learning help to use personal time effectively. The second highest preference had given to ability to manage social distance. The third highest preference was given to ability to enjoy place flexibility. Learners had been limited to home during the pandemic, so only available option for many of them to get education through the online. Learners' perceived barriers were assessed in the study. The responses revealed that domestic barriers, financial constraints, problems related to content of the online courses have been rank as most important.

Conclusion and recommendations

The analysis clearly demonstrates the fact that number of participants' engagement in online platforms has been increased. However, the move with the digital illiteracy may lead to technical difficulties. For example, online learning from smart phone may be distracted from incoming calls, limited space for visualization and difficult for interactivity with the lecturer and difficult for immediate responses. However, learners can enjoy location flexibility, place flexibility with smart phone. As 63.6% of learners had used prepaid mobile data for online access, it evident learners are concern of cost of online learning. Further, very limited access via public Wi-Fi was observed. Hence concessionary data packages and strengths of Public Wi-Fi should be increased by authorities.

The major challenge of online learning is coming as domestic barriers. 43.3% of learners had mentioned that they would undergo domestic barriers. These covers limited space at home, sudden intrusion of people and pets, back ground sound and interruptions, login problems, issues with installation of software, problems with audio and video are the common barriers which learners encounter at home. However, possible arrangement of a separate room or convenience place at home with minimum back ground interruption may help effective online learning.

The second main barrier faced by learners is cost on online learning. This mainly covers the online variable cost on service bills. However, if learners had to spend fixed cost on acquisition of computers, mobile phones etc. the cost of finance will be further escalated. To ease the barriers, the five main internet service providers in Sri Lanka can intervene to offer concessionary online packages and affordable data charges. Even education service providers like universities and higher educational institutes should offer favorable financial assistance and IT infrastructure to their learners. Majority of (76.60%) online learners' purpose is learning and knowledge enhancement. However, they seems to be unknown of free web sources, this may lead to wasting of time and unnecessary hanging on less effective web sources. Educational technological educational institute around the world has uploaded many free educational sources which are readily available in the internet. E.g. Byjus.com/ Aptuslearn.in/ udemy.com/coursera.org/swayam.gov.in/Zoom class room/Google classroom/guruq.in /khanacademy.org etc. Further, online educational applications are available for mobile phones also, which can be used to release the stress and improve individual skills like, language, mathematics and ICT. Apart from that, online scheduling, time management etc. can easily be done on the sources like Google, but it appeared to be that the learners may not use them effectively. When it comes to online lecturers like zoom meetings, as it is the main online communication forum at present students' lack of technical 'know-how' may be appeared. Therefore, instructions of online attendance are very useful.

In addition to that creating a collaborative and interactive learning environment by the lecturers are essential ingredient to motivate the learners. Online payment ability is one of a main important element observed by this study. The learners have demonstrated their skills on the online payments especially during the COVID 19 pandemic. Majority of learners, 51.70% had used online banking facility to purchase consumable items and 50.6% of them had paid their monthly utility bills. However, only 32.40% of learners had made online payment of their course fees. This trend is very significant as social distance is very important during the pandemic situation and human interaction can be largely limited via online banking system. But certain challenges should be address as online payment cannot be reversed easily. Therefore, demonstration videos and simple guidelines may play key role in educating the users.

The learners have clearly stated why they preferred for online learning amidst COVID-19 pandemic. These preferences evident and pave

the way for recommendations. The Government can create strategies and provide guide lines on which service providers and educators can implements action plans. Learners who engage in online learning have given first priority for effective use of personal time management. The second mandatory requirement is maintaining of social distancing capability. Then third priority is place flexibility. By taking above matters into consideration, educators should design their academic programme and internet service providers should offer online services at affordable rates. There is a mandatory requirement for educators and a learner to shift online learning pedagogical approaches during the pandemic as in person teaching is still uncertain. Online courses should be dynamic, interesting and interactive, relevant, student centered and group based. Personal attention should be provided to students so that they can easily adapt to online learning environment. Positive arguments related to online learning pedagogy are accessibility, affordability, flexibility, life-long learning, and independent learning. Therefore, online education should be promoted in such a way that learners get maximum benefits. Even assessments should be done in online. Educators must get students feedback for overall evaluation of online learning and global trends need to be carefully adopted.

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