Factors Influencing the Effectiveness of E-Learning: An Empirical Study on Senior Secondary Level Students of Private Schools in Colombo, Sri Lanka

Virtual Education

Received 18 December 2021
Revised 29 April 2022
Revised 06 June 2022
Accepted 08 June 2022

Nirosha Ambepitiya
Department of Academic, Royal Institute International School, Colombo
nirosha.ambepitiya@royalinstitute.org

Sivalogathasan, V.
Faculty of Management Studies, The Open University of Sri Lanka
vsiva@ou.ac.lk

Abstract

E-learning is a method of delivering education via electronic media, typically using the internet. E-Learning contributes to conventional teaching methods and provides many advantages to society and citizens. Even if it facilitates fast learning at low cost, provide more access to learning platforms and has clear accountability for all participants in the learning systems, the problem is still a majority of students are demanding the interaction, attention and the quality of virtual education which they achieve from the traditional learning. Effectiveness in e-learning with reference to the learner is measured as whether the learner could meet the learning goals while learning online. Since traditional education couldn't be continued, it was very important to find the significance of e-learning, the challenges students face using virtual platforms, and the factors that influence effectiveness of virtual education. While the literature reveals the factors that influence the effectiveness of e-learning, the study discovered the variables influencing the efficacy of e-learning initiative in the senior secondary education in a factual way using descriptive survey method involving hypothesis test to evaluate how contemporary information technology can develop a successful asynchronous system of education. The data were collected through an online survey which covered the private schools in Colombo, Sri Lanka, that follow the local curriculum set up by the Ministry of Education in local language mediums of Sinhala, Tamil or English. The conclusion is based on the 369 responses received from the senior secondary level students and the study discovered that IT Infrastructure, Instructor Competencies, Perceived Ease of Use and Perceived Usefulness have a significance impact on Effectiveness of e-learning.

Keywords: E-learning, Virtual education, E-learning system success, Online learning, Technological challenges, Pedagogical; Social challenges, Synchronous education.

SLJMS

Sri Lanka Journal of Management Studies
Vol. 3 – Issue II, 2021
pp. 98 – 123
ISSN (Online): 2792-1093
DOI: http://doi.org/10.4038/sljms.v3i2.72

Introduction

E-Learning is becoming an integral part of the educational process. With the advancement of technology, the "Traditional Classroom" conventional learning style has evolved to the "Synchronous e-learning classroom. E-learning typically relies on the motivation and passion of the instructors and commitment of students to interact and collaborate. Compared to conventional education, it has become more difficult to monitor and verify the effectiveness of virtual education. As a consequence of this transformation in the educational process, the use of technology is becoming more significant in helping students to actively engage in their academic work. E-learning, on the other hand, makes it easier for learners to engage in current learning practices. Virtual education has grown extremely popular in most developing nations due to the usage of e-learning technologies. In Sri Lanka, a massive numbers of schools have demonstrated an exceptional proclivity to give virtual instructions, while some are seeking to supply their students' online education with a view to make use of the development of new technology. Therefore, in order to create a high degree of user acceptability, it is vital to identify the factors which influence e-learning practice.

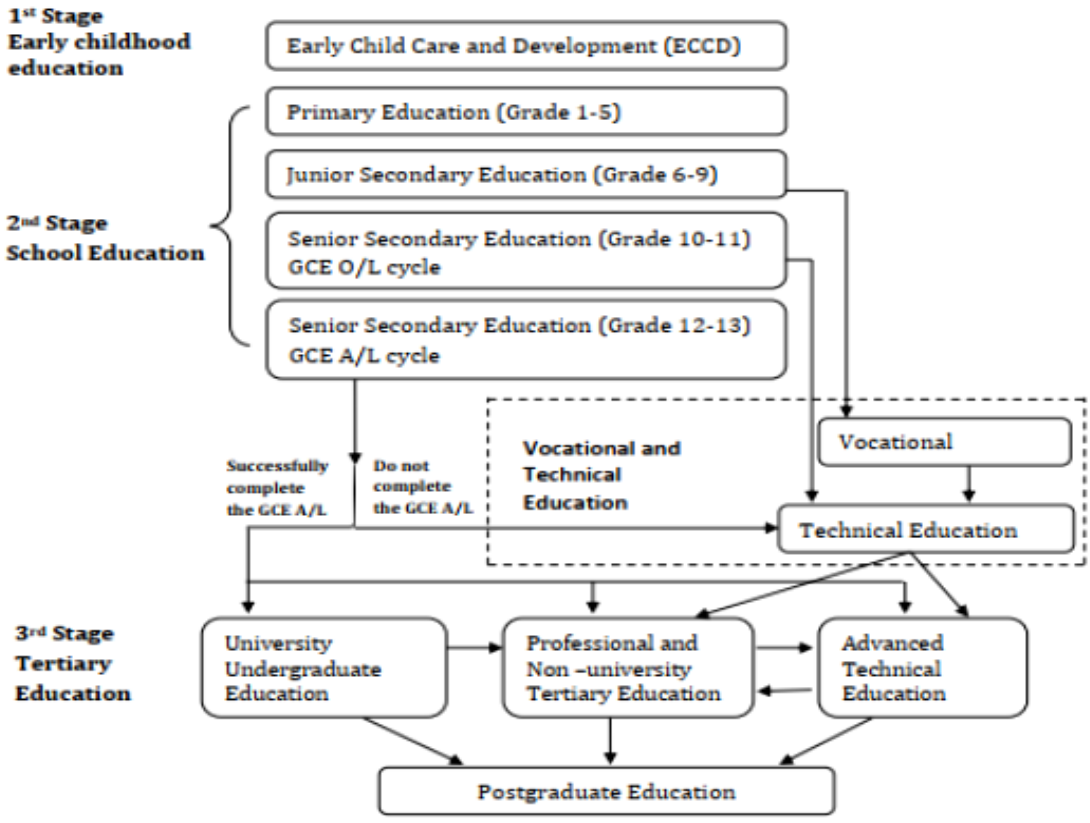

Figure 1. Structure of Sri Lankan Education System

Source: (National Report - Ministry of Education, 2020)

As per the above structure, when segmenting the levels of education system, all schools in Sri Lanka from grade 10 and grade 11 are deemed as Senior Secondary Level. Every year all reputed government owned schools are inundated with applicants for a small amount of openings. Parents are therefore seeking opportunities for high quality learning centers for their

children in the local curriculum. As a result, private schools are becoming common in training students for National Ordinary Level Exams (Ministry of Education, 2020). More parents are clamoring to rely on private schools, believing that the consistency and expectations provided by these institutions are higher compared to government owned schools. Parents tend to believe that by the excellent services and instructors trained in private schools, learners get the opportunity to be well-rounded and better adopted for the global workforce of the twenty-first century. The below graph illustrates the industry overview of private schools in Sri Lanka.

Table 1. Students and Teachers population of Private Schools, Sri Lanka

District	Students			Teachers		
	Male	Female	Total	Male	Female	Total
Colombo	35,807	31,281	67,088	646	2,736	3,377
Gampaha	13,776	12,620	26,396	216	820	1,036
Kaluthara	3,640	5,270	8,910	63	340	403
Kandy	6,391	4,772	11,163	136	549	685
Mathale	271	1,283	1,554	6	73	79
NuwaraEliya	1,139	827	1,966	21	75	96
Galle	12	139	151	5	15	20
Mathara	823	4,197	5,020	20	190	210
Hambanthota	379	367	746	5	26	31
Jaffna	4,910	3,385	8,295	149	204	353
Kurunegala	422	779	1,201	2	48	50
Anuradhapura	390	344	734	6	31	37
Badulla	2,345	58	2,403	64	75	139
Rathnapura	427	408	835	11	28	39
Sri Lanka	70,732	65,730	136,462	1,345	5,210	6,555

Source: School Census (Department of Census & Statistics, 2020)

As mentioned in the above table, private schools are primarily found in the Colombo district. Majority demand for their children to attend private schools, claiming that the stability and aspirations given by such organizations are greater than those offered by the government schools.

Evolution of the Virtual Education in Sri Lankan Schools

With the Easter attack in April 2019, which resulted in the emergency closures of schools, virtual education was implemented in Sri Lankan schools for the first time. Furthermore, COVID-19 has resulted in a large number of students being forced to forfeit school for nearly two years. According to the statistics, 90% of students are using virtual learning platforms. Free access was given to college students. The global digital education industry is anticipated to grow 9.23 percent on average over the next five years, reaching a revenue potential of USD 319.16 billion in 2025. Sri Lanka's ICT sector has grown steadily during the recent five years

becoming the region's major foreign trader, with the goal of being a $5 billion market by 2022. (Nguyen, 2015).

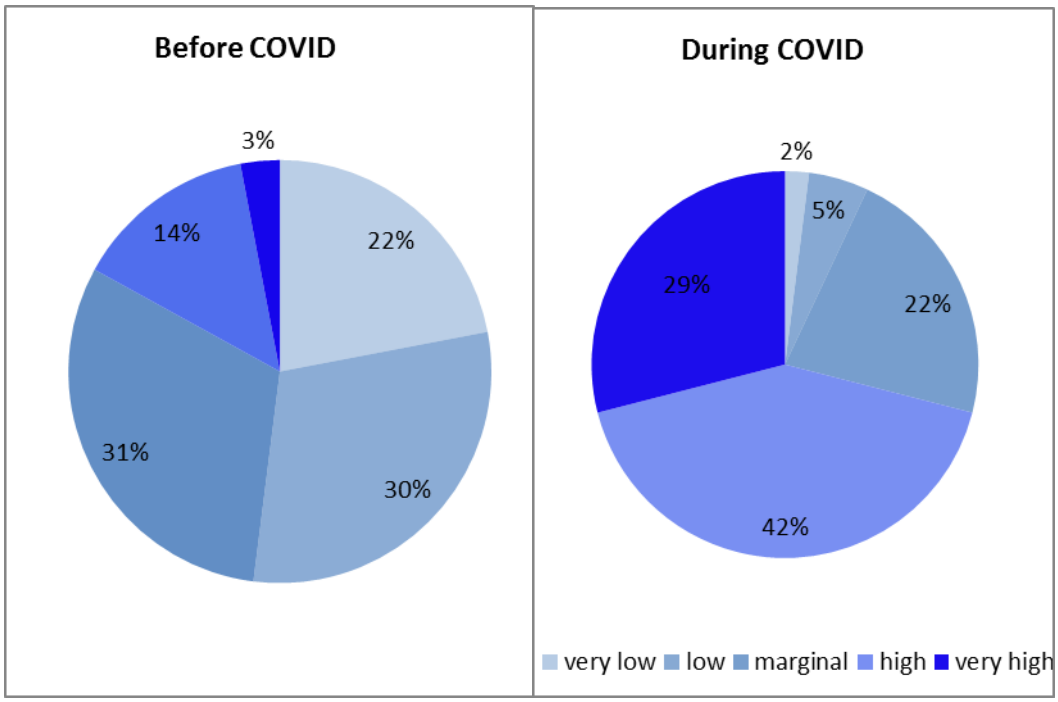

Figure 1 (a) – Virtual Education before COVID

Figure 1 (b) – Virtual Education after COVID

According to Figures 2 (a) and (b), students are using virtual education at a rate that is 54% higher than before the COVID. And, as seen in Figure 2(b), it has grown to 71 %.

Despite the fact that nations have accepted virtual learning systems and built effective synchronous virtual classrooms, insignificant number of schools in Sri Lanka is actively involved in establishing instructional activities through digital platforms. It's a great challenge to get school children to enroll in a digital environment.

Research Problem

There are serious concerns with the distance learning given to senior secondary pupils by private institutions. Even though instructors design diverse educational modules, they denied the possibility in completing the syllabus on time due to low students' engagement in flipped classrooms where the majority of pupils' grades are not improving noticeably. When pupils' motivation is low and their comprehensive educational outcomes are unsatisfactory, the reputation of the schools gradually deteriorates as a result of parental confrontations with the private education system. Therefore, it is essential to improve the efficiency of online education for learners by identifying the factors that impact on successful virtual education.

Most individuals have striven hard to use virtual learning platforms, and for some, it remains a pipe dream owing to a variety of difficulties such as inadequate and feeble infrastructure and underpinnings. Moreover, research in this subject is focused on senior

secondary education in Colombo, due to traditional education and evaluation approaches are routinely practiced in these organizations, whereas virtual education has not been widely adopted and utilized by the learners. While most schools are attempting to fully accept virtual education by spending massive assets in the procurement of these technologies. However, the majority of schools have been unable to do so owing to lack of finance that facilitates the possession and use of all of these facilities.

Network connectivity and mobile data were important, and even though all firms offered free access to digital infrastructure to promote online learning, many students were concerned about availability and convenience during COVID-19. Student participation and achievement evaluations, especially for colleges, became much more difficult without having a secured broadband connection. One obstacle faced by the students was poor access to the network throughout virtual education. Since there were no reasonable or rather inexpensive, mobile internet packages pupils are looking for comparably excellent coverage in particular locations. There may also be connection issues caused by power outages. Without the need for a reliable, internet service, student engagement and success ratings become considerably more challenging, particularly while they want to mix interactive instructions whereas the majority do not have a desire for virtual learning. Colleges are completely accountable, and a strong dedication to help their children achieve a positive outcome.

The researcher has observed and found a noticeable gap between online and conventional learning. Following an open discussion on virtual learning difficulties encountered by students throughout the process some claimed that the instructors may be knowledgeable on the subject but they are incompetent when it comes to interactive virtual learning tactics. Some concerns were about learning resources, and they indicated that instructors only share complex PowerPoint presentations without adequate interpretations. Due to that low-achievers have retracted for a multitude of reasons, including that nothing entertaining is being instructed, and that instructors are only keen on having conversations with those who understand at a greater extent.

Furthermore, to investigate this matter a pilot study was conducted in which a random sample of 50 students from different schools were asked to pick their devices connecting to the internet, mode of connecting to the internet and average test scores and discovered that as a result of virtual learning most students lag and their learning experience have become challenging.

The table 2 below illustrates that the transition from traditional classroom to computer-based training in a virtual classroom completely transforms the learning experience of many students. Their resistance to change doesn't allow them to adapt to the online learning environment, whereas it takes time for them to get accustomed to la earning management system. While passive listening and note taking are expected in a traditional classroom, online discussions should be interactive. Students with a "traditional" mindset find it difficult to adapt; however, they need to accept the new learning circumstances with an open mind and heart.

Table 2 shows that students' test scores have become low significantly in 2020 as compared to previous years.

Table 2. Average Test Scores of Students

	2016	2017	2018	2019	2020
Total average of 50 Students	82.99	79.95	80.49	78.51	70.22

Source: Authors computations

According to the graph below, some students use a desktop, a laptop, or tablets while some pick more than one choice since students utilized different devices for online learning throughout the years.

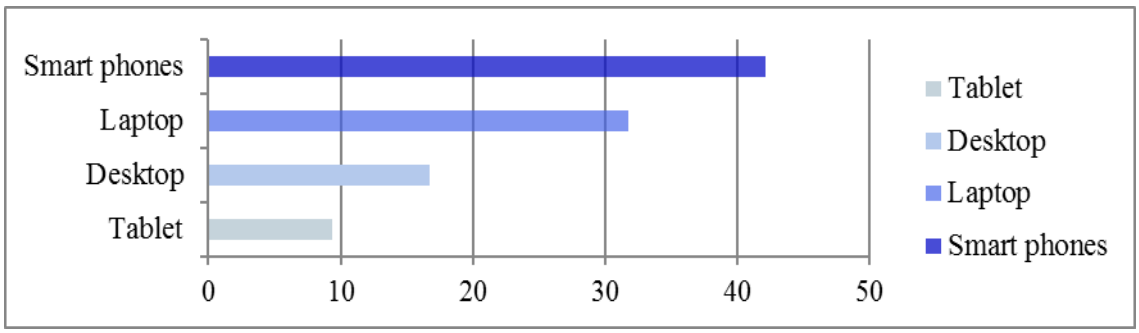

Figure 2. Devices use for Online Learning (Developed by author)

As shown in Figure 3, 52.7% utilized smart phone hotspots to access to the online platform, but a substantial amount of pupils used Wi-Fi which is 34.8 %, a dongle 6.4%, ADSL 4.6% and 1.5 % use wired connections. The majority of individuals access the internet by using their Smartphone hotspot. However, they may not be dependable or sustainable in the long run and device compatibility issues may arise owing to a lack of consistency in smart phones.

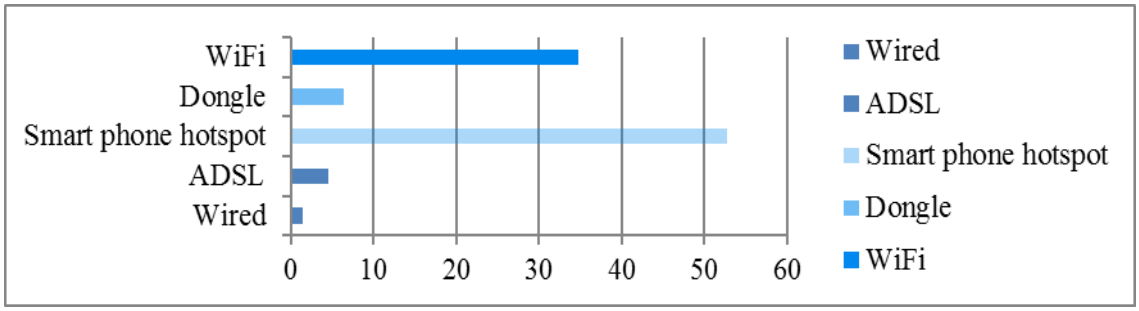

Figure 3. Mode of connecting to the internet (Developed by author)

As per the scholars, the impact of digital classroom instruction depends on well-structured educational resources, and motivational engagement between the instructor and learners. Well-prepared and well-experienced teachers can contribute significantly to the growth of virtual education and massive technological innovation (Chang, 2017). Efficient virtual learning approaches would enhance the learners' participation and interaction. Enhancing educational capabilities in new fields of study by utilizing successful Synchronous e-learning

classrooms allow pupils to engage lessons at their pace while allowing adjustments to subject-related issues and syllabus requirements (Sun and Chen, 2016).

As mentioned by Kaptein (2017) learners and parents, are influential stakeholders in schools. When re-encounters are possible, keeping a high level of reliability can be a significant advantage that contributes to a successful outcome. Learners and parents put more pressure on the colleges to accommodate their requisites if they feel proclivity and expectations will not be fulfilled (Kaptein, 2017). Online learning lag a bit of communication skills and the teacher should be able to string the cord of the class. Schools concentrate their endeavors on addressing current reputational threats. That isn't risk management; it's crisis management. It's a quick- approach aimed at minimizing the harm (Eccles, 2017). When there is a lack of an advanced education system it effects the professional reputation. Market ability derives from hard-to-assess intangible assets such as service equity, human capital, and goodwill (Eccles and Newquist, 2017). Schools, in particular, are especially concerned on something that impacts their reputation. To overcome the reputation-reality discrepancy, schools must enhance their capabilities to satisfy the needs of their stakeholders.

Research Questions

RQ 1: What is the significance of e-learning?
RQ 2: What are the obstacles that learners' experience when using online platforms?
RQ 3: How does technology influence student achievement in schools?
RQ 4: What are the factors that must be implemented in order to increase the efficacy of virtual education?

Research Objectives

The purpose of this research is to determine the factors that affect virtual education among students with varying levels of E-literacy. Different schools offer instructions for online learning platforms using cloud based system of education; where students have high expectations for academic excellence that string the chord of traditional classroom lectures.

RO 1: To examine the significance of e-learning.
RO 2: To examine the obstacles learners' experience when using virtual platforms.
RO 3: To examine how technology influence students' achievements in schools?
RO 4: To examine the factors that must be implemented in order to increase the efficacy of virtual education.

Significance of the Study

This study is indispensable because many researchers have focused on issues associated with the implementation of distance learning, requirements, obstacles, and potentials generally in Higher Educational institutions, where the factors that impact e-learning among senior secondary level learners have been less observed. Different schools offer instructions using online learning platforms and cloud based system of education; Learners struggle to find strong virtual environment of constant interaction among online educators. As a result, the author finds it significant to study students' perception of virtual education based on private schools in

Colombo. The study examines the influencing factors of virtual education among students in the senior secondary level of private schools in a concise manner using a deductive approach involving hypothesis test to demonstrate how modern technological advancement can establish an effective asynchronous education system.

Review of Literature

This section will review and examine the previous literature and studies on e-learning emphasizing the research questions and highlighting the critical components that would affect e-learning acceptance in general and in Sri Lanka in particular. The literature was studied utilizing a range of analytical and empirical evidence. This section also describes the factors that affect the effectiveness of virtual education, such as perceived ease of use, perceived utility, language proficiency, learner psychological process, instructor competency, accessibility and higher retention, fast and efficient delivery, IT infrastructure, collaboration, learning environment etc. using recent research reviews.

Effectiveness of E-learning

Over the last five years, the efficacy of e-Learning has risen tremendously. After reviewing the search results, the observations reveal that prior studies defined and examined efficacy in a variety of ways. When learners have comprehensive authorities over their education individual learning and in fact, students learn faster and acquire more information when they perform within their own schedule compared to traditional classrooms. They can go quicker through subject matters where they have been comfortable, but gradually with everyone else where they require a bit more time. According to the Research Institute of America, virtual education among school learners has boosted engagement in the learning process from 25% to 60%. One of the benefits of virtual education is that grading may become more of a continuous activity. This is especially exciting for students since peppering multimedia content and effective learning materials with regular short assessments has been shown to increase learner participation. Virtual education systems used by the pupils should not only track their own learning time, access duration, progression of course completion, assignment submission, and student involvement and so on, but also create educational records for other students in the classroom or school, so that they can use it as a reference to raise awareness of their individual learning experience and work on achieving their academic skills. Other benefit of e-learning is increased engagement and participation. Digital resources make it much easier for learners to communicate. Because many tasks need class participation, and the virtual environment is more convenient to work with because pupils do not have to confront one another. Instructors can enhance their engagement in virtual classrooms as a fundamental component of the teaching and learning process, answer questions promptly, arrange discussions often, interact and explore concerns with students, and have a deeper understanding of participants' learning status (Ashrafi et al., 2020). Students conversely should improve their self-monitoring, which is a natural cognitive characteristic. Learners must be inspired and involved in self-awareness of virtual learning in order to increase their academic standards. According to the findings of research work, digital mindset has a beneficial impact on e-learning efficacy via virtual education motives and techniques. At the moment, a significant progress has been achieved in the infrastructure

building and teaching aids acquisition digitalization, which is causing remote education to spread fast throughout the globe and become a major transition (Wang, Zhang and Chen, 2021).

The majority of the research defines efficacy as the capacity to produce the expected outcomes, or the individuals' virtual learning priorities. It is maintained that the effectiveness of virtual education needs to be demonstrated by assessing ROI, academic accomplishments, system quality, process improvements, and quality of operations (Almutairi and Albraithen, 2018). The use of distance learning in an unexpected crisis is a necessity, but it has also prompted professionals, legislators, residents, instructors, and students to seek innovative solutions. This has resulted in a transition from distance learning to emergency remote teaching, which is a significant change. E-Learning effectiveness can mostly be linked with instructors, technology literacy and well organized materials in the face of a plethora of virtual resources, (Ferri, Grifoni and Guzzo, 2020). The transactional distance theory, contributed to the field of online learning, sheds light on the interaction among the students, and the tutor, curriculum, as well as the relational distance generated by the physical barriers between the students and the teachers could be reduced. Further they stated that virtual education provides students with the framework and opportunities to improve their psychological, intellectual, and philosophical pedagogies in order for them to thrive in distance classes (Waheed and Kumar, 2016).

As per the definitions, a temporary transition in education techniques to an alternate content delivery system, due to emergency situations, a transitory shift in instructional techniques to a more effective delivery medium. "We are breaking new ground and working with governments to develop high-tech, low-tech, and no-tech solutions to assure the continuance of education (Ziaul, 2020). As a consequence, significant social and technological problems and opportunities may emerge. It's an event that enables us to reflect on the varied techniques and knowledge gained in other countries while also allowing us to capture up on new concepts. The worldwide pandemic concern has spurred the most comprehensive use of internet education (Ziaul, 2020). Lack of funding, such as accessibility to excellent education and modern devices and an insufficient geographic location are examples of structural disparities connected to different socio - economic factors. Certain characteristics have resulted in a substantial discrepancy in how pupils in the Netherlands have learnt during the crisis period. Such discrepancies are even more evident in developing countries like Ghana, where the majority of students lack access to the internet and adequate educational levels. Malaysia, too, has had to cope with comparable challenges. In the study of Ferri and Grifoni (2020), there are certain characteristics of e-learning that have been addressed, for instance, consecutive encounters and unrestricted access to vast regions.

Students may now engage in their classroom instructions much more easy due to the virtual learning approach. With the usage of e-learning technologies, web based education has become quite prevalent in most emerging economies (Hubackova, 2015). PEOU, PU, social norms, quality of students' life, instructor competency and enabling circumstances were found to have beneficial impacts on the usage of virtual education platforms among learners. In terms of behavioral intention, a person's perceptions of the effectiveness of digital learning systems are dependent on the virtual learning platform's ease of use. Perceived ease of use had a direct impact

on perceived usefulness and attitude toward behavioral intention to use learning management systems (Boateng, Mbrokoh and Ansong, 2016).

According to Akareem and Hossain (2016) one of the factors that may be changed in virtual learning is the learners' impression of educational standards. According to the research, when all learning resources are available at any time, including after the session, effectively developed interactions assist learners in assessing their requirements. Learning environments are designed to facilitate growth, talents, characteristics, and personality, as well as to strengthen virtual learning through interactive conversations between instructors and learners (Akareem and Hossain, 2016). The quality, comprehensiveness, convenience and validity of information have an impact on the academic accomplishments and faithfulness of learners who participate in online learning, implying that students feel satisfied with the quality of knowledge acquired through e-learning resources. Academic achievement, learning effectiveness, and student commitment all have a high correlation with satisfaction. This indicates that the more satisfied students feel they are obtaining better learning outcomes and are more devoted to the digital environment (Waheed, Kaur and Kumar, 2016).

Heba and Sultan (2020) have stated, the need for more engaging in live sessions between instructors and learners, as well as greater contact between schools and parents, were the most often mentioned ideas by parents for improving the quality and experience of online learning. In his research Maureen Andrade has introduced three insights that help learners shape and improve their psychological, intellectual, and ethical instructional strategies in order to thrive in virtual classrooms. Further he has explained that personal training is an approach to education that may be utilized to help learners to work with confidence progressively toward greater comprehension and skill development, which they must manage individually after receiving various levels of assistance from the instructor (Ahmad, 2015). It is maintained that the efficiency of web based education may be demonstrated by assessing ROI, accomplishments, facilitating conditions, process improvements, and administrative assistance (Almutairi and Albraithen, 2018). With a strong internet access and innovative methods in presenting online instruction, ICT facilities such as computers, iPads, notebooks, ICT laboratory facilities, network equipment and available bandwidth can be continued to broaden to ensure that infrastructure are sufficient to assist students ' learning efficacy in distance learning (Gichuki and Mwang, 2017).

As Sivalogadasan, V. stated in his study, all educational institutions should engage in innovation processes. New academic establishments, system integration, technology, and procedures are all manifestations of the great potential of innovativeness. Education innovation for students' learning need to enhance with the advent of smart phones, Internet and low-cost computers, cellular phone access, and various innovations, as well as the ability to deliver academic achievements among individuals. Technology and other advances enable instructional content and subject knowledge conveyance to be customized to the requirements and surroundings of pupils enrolled in virtual education. Instructors need to maintain technological advancements and assessing whether they pertain to students who live in the "physical world". As he stated, it is true the potential is enormous, but there are also technological constraints in less developed countries like Sri Lanka. If there is sufficient advancement of technology, well experienced professionals, and the affordability and availability of low - cost telephones, mobile

phones, computers, and electricity and creative approaches of instructors may make a substantial difference in the effectiveness of virtual education, students' behavior and the promotion of their social interactions (Sivalogathasan, 2019).

Some of the characteristics required for virtual learning acceptance include teachers' professional knowledge of computer technologies, a strong grasp of virtual pedagogical approaches, and enhance educational development among instructors. E-learning has the potential to increase access to quality education, improve cultural and academic fairness, reduce costs, improve learning effectiveness, provide adaptable approach, and sustains interaction among learners. OUSL has introduced nodes which is a cloud-based system designed to educate undergraduates, graduate students, and professionals. As stated in his study, using the Moodle cloud system, it is convenient to deliver lectures through video conferencing to 20 different locations at the same time. Interactive multimedia resources invigorate studies by allowing students to see video movies and useful facts, as well as to listen to audio presentations. As a result, audio visuals are a significant instructional aid for self-learners. E-Learning: Maintaining academic standards based on the results, education in a virtual setting at the Open University of Sri Lanka, Moodle and other required materials and approaches are used as a Learning Management System (LMS) (Sivalogathasan, 2019).

Participants need to be aware of the study materials available to them, and this knowledge is an important factor in achieving a better virtual experience (Henderikx et. al., 2019). Apart from the aforementioned, as illustrated below, various researchers have highlighted the efficacy of e-learning in a factual manner. Reciprocal influence among colleagues and instructors, teaching methods, style & quality, syllabus, curriculum design, course content, and instructor assistance and supervision are six criteria that is being used to assess quality of education in virtual context in the United States. In secondary school, digital education can be merged with physical classroom instruction, but only in a flattering way.

Variables that Determine the Efficacy of Web-based Education

IT Infrastructure

Virtual tools for learning flexibility and ease of use an adequate technology support desk was highly respected by the students (Chow and Croxton, 2018). In the study of Gunawardhana (2020), sufficient access to computers and the Internet, an adequate infrastructure, high levels of computer competence, sufficient language material, and well qualified institutional educators were identified as key factors to adopting mandatory online activities. Even though learners could afford to pay for Broadband internet and had home computers or other devices, there will still be connection failures. In the study of Roman and Plopeanu, (2021) confirmed that an IT infrastructure services is a valid and reliable construct to measure an e-learning systems' success. In addition, studies provide evidence of the critical role of IT infrastructure services in the success of e-learning systems via its significant effect on perceived usefulness, user satisfaction, customer value, and organizational value.

Instructor Competencies

E-learning necessitates practices to create an innovative platform for learners to explore and engage with instructional approach, and it is the instructor's interaction, awareness, and excellent instructional strategies, as well as a technique of supporting students in achieving a depth understanding of fundamental concepts (Syed, Ahmad and Rafi, 2020). Instructor competency is one of the main factors that influence the efficacy of virtual learning among students. Teaching online necessitates the development of new techniques for guiding learners in collaborative discussions and reflection. Learners may take advantage of their learning preferences by having an instructional method that accommodates themselves and their academic needs. The complex and changing nature of instructors' responsibilities and activities necessitates a thorough understanding of their professional practice. Instructors must be knowledgeable in their subject and have a wide theoretical understanding of it. Teachers must have a strong understanding of the subject of remote learning as well as the ability to convey information and promote learning via the use of technological tools and resources in a perfect manner.

Perceived Ease of Use

This defines as the degree to which the individual believes that using a certain IT system will be easy Nguyen (2021). Their results suggest that an instructor who wants to solve a specific problem with the goal of improving learners' perceptions of virtual classrooms by raising pupils' perceptions of the system's efficacy would be more beneficial. There is a definite beneficial relationship between the actual usage of educational tools such as Zoom and MS Teams and the learners' emotions and behavioral goals. In reality, there is a strong relationship between technological self-efficacy and other aspects such as convenience of utilizing a certain system, mindset, and performance expectancy (Alfadda and Mahdi, 2020). In the study of Malureanu (2021) it indicates that boosting self-confidence improves the extent to which an individual feel that utilizing a certain system would really be comfortable and also his study found that the convenience of a digital tool is a vital part in its acceptance. Self-confidence had an effect on performance expectations.

Perceived Usefulness

In the study of (Alyoussef, 2020) the involvement of instructors in course planning and design of the virtual syllabus plays an important role. The empirical findings demonstrate that e-learning is viewed as beneficial when the instructor is involved with their actions in a virtual context, and the student's mindset towards the subject matter and the teacher's teaching style have a direct impact. In many schools blended learning is regarded as a promising teaching and learning paradigm. It meets learning objectives by utilizing state of the art technology to personalize the act of learning and convey information and skills to the target audience, and when paired with face-to-face learning, it outperforms traditional methods. According to their research, virtual classrooms must be transparent. Some virtual learning platforms may provide fundamental understanding in simple colour combinations and fonts without any visuals as well as links to audiovisual sites, etc. The study of Malureanu (2021) on the perceived usefulness of virtual learning mostly relies on content delivery and interactive learning materials. Ease of using e-contents influences how a student perceives the studies. Students feel more relaxed and

motivated to study when learning from management systems, lecture notes, and assignments are well-prepared and convenient (Aristovnik and Umek, 2019). Pupils who are more self-sufficient agree that digital education is convenient and easily obtainable. Moreover, they said that adequate technological training and assistance are required, especially for interactive web platforms that learners are inexperienced with. They also claimed that as E-learning tools grow more mobile-friendly, learners would be more engaged in virtual education utilizing their devices (Aristovnik and Umek, 2019).

Research Methodology

Conceptual Framework

The concepts and theories from the literature review are used to build the conceptual framework. All variables were chosen after examining the interrelationships discovered through the literature study.

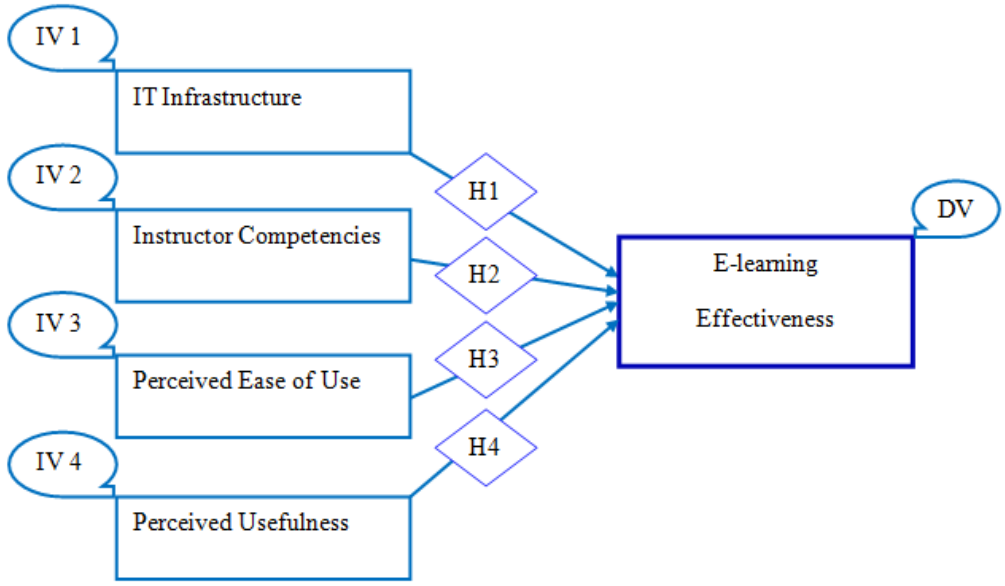

Figure 4. Conceptual Framework (Developed by Author)

Hypothesis

H1: ICT Infrastructure will have a significant impact on the efficacy of e-learning.
H2: Instructor Competencies will have a significant impact on the efficacy of e-learning.
H3: Perceived ease of use will have a significant impact on the efficacy of e-learning.
H4: Perceived usefulness will have a significant impact on the efficacy of e-learning.

Table 3. Operationalization Table

Concept	Variables	Indicators	Scale	Question Numbers
E-learning Effectiveness	IT Infrastructure	Device type Broadband Connection	Likert Scale 1-5	Q1 Q2

		Working Environment		Q3
		Software Licensing		Q4
	Instructor Competency	Contextualization	Likert Scale 1-5	Q5
		Vocabulary Skills		Q6
		Challenging Virtual Tasks		Q7
		Assessments		Q8
	Perceived Ease of Use	Content Accuracy	Likert Scale 1-5	Q9
		Availability		Q10
		Understandability		Q11
		Timeless		Q12
	Perceived Usefulness	Time Saving	Likert Scale 1-5	Q13
		Cost Effective		Q14
		User-friendly		Q15
		Transparency		Q16
Senior Secondary Level Students, Private Schools	E-learning Effectiveness	Students' Engagement	Likert Scale 1-5	Q17
		Net Promoter Score		Q18
		Attendance		Q19
		Exam Results		Q20

Through this process researcher has investigated the topic using previous literature, and defined conceptual variables. Furthermore, indicators that can be measured for each variable has been developed and made empirically and statistically quantifiable.

Researcher has used quantitative research strategy and the survey questionnaire was carried out virtually using Google forms, which were distributed among the senior secondary level students who participate in online sessions due to the limited time and resources. As a consequence, the participants were chosen using convenience sampling strategy, which aided in obtaining the necessary statistical findings in a timely and concise way. In addition, the researcher requested the participants to distribute the questionnaire to all students who meet the requirements. In reality, this digital approach of sending the questionnaire was chosen because it is affordable and helps the researcher to have access to pupils who may be difficult to reach in person, particularly during the COVID-19 pandemic. Furthermore, it allows participants to take their time filling out the questionnaire and providing thoughtful responses to the questions.

Research Design

The researcher has used positivism research philosophy where factual data gained through a close quantifiable observation are obtained and interpreted. The researcher utilized a deductive approach, with the goal of this survey being to evaluate whether or not the observed occurrences are consistent with what was predicted based on previous findings. Using quantitative data, mono method was chosen by the researcher throughout the study. As a part of the research, a survey questionnaire was utilized to collect primary data. A standardized questionnaire was used to conduct the survey. In each question, the following options have been available for selection.

To compute the various factors and measures of the research model, the questions were generated using a five-point Likert scale ranging from "Strongly Disagreed" to "Strongly Agreed." As stated in the conceptual framework, the study is based on four variables. The researcher has used comprehensive review of annual reports, previous studies relevant to the topic, journals, research articles of recent five years, publications, author's experience in order to solve concerns related to the research objectives and conceptual model. Data has been gathered through an online survey from the students of private schools who participate in virtual learning sessions in Colombo district. Analyzing data based on the conceptual framework has been done according to the Pearson correlation coefficient; each variable has a significant relationship with the dependent variable.

This study is limited geographically to private schools in the Colombo district. The overall Senior Secondary students' population of private schools in Colombo is 9,381.

Table 4. Senior Secondary Level Students' Population of Private Schools in Colombo

Senior Secondary Level Student's Population of Private Schools

Year	Province	Grade 10	Grade 11	Total
2019-2020	Western Province	7,797	7,472	15,269
	Colombo District	4,796	4,585	9,381

Source: Department of Census & Statistics, 2020

This study is geographically limited to private schools in the Colombo district, and the author has used a methodological approach including hypothesis test to investigate the effective parameters of e-learning among senior secondary students in a concise manner.

A questionnaire was distributed among students in private schools with varying levels of E-literacy who participate in virtual learning sessions. Since the survey topic is important and relevant to the participants, after been followed up repeatedly the researcher could collect 383 responses from the participants; hence it was easy to remove few incomplete survey responses to adjust the data normality without losing the statistical power of the sample size. The questionnaire consisted of two parts such as demographic data about the participant and factors influencing the effectiveness of E-learning

Primary data for the study was gathered via a questionnaire. Secondary information was gathered to identify and solve research-related problems and the conceptual framework. Data from the conceptual framework were utilized in the data analysis section. SPSS (Statistical Package for Social Science) and Microsoft Excel were used for analysis. Further, reliability analysis has been done by the researcher to confirm the accuracy of the results and a descriptive analysis to give a concise overview of the population and measurements taken during the research. The correlation theory has been used by the researcher to discuss the relationship between the independent variables and the dependent variable while Multiple linear regression analysis to test the overall impact of the independent variables such as IT Infrastructure,

Instructor Competencies, Perceived Ease of Use and Perceived Usefulness on the dependent variable of E-Learning Effectiveness.

Data Analysis

The data were analyzed using the SPSS version 26 and Microsoft Excel Packages used to determine the Karl- Pearson correlation coefficient regarding the relationships. The answering proceeds from the Google form and the students are highly engaged to fill-up these questionnaires in accurate ways. The student responses are automatically recorded on MS Excel and then those details were maintained to calculate the relationship with the research findings.

Reliability Analysis

According to Salkind, (2015) reliability analysis value is needed to be over 0.7. In the case of that researcher examined Cronbach's Alpha value. The value of Cronbach's Alpha managed good internal consistency.

Table 5. Reliability Statistics Acceptability

Variables	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted	Reliability of the questionnaire
IT Infrastructure	.932	.928	Excellent
Instructor Competencies	.778	.953	Excellent
Perceived Ease of Use	.926	.929	Excellent
Perceived Usefulness	.931	.928	Excellent
E-Learning Effectiveness	.797	.956	Excellent

Source: Survey Data, 2021

The test has been carried out to see how well the produced questionnaire handled the specified factors. The validity of each of the selected items was verified individually by the author. According to George and Mallery (2003) a reliability score of Cronbach's Alpha figures> 0.9 is considered excellent. To compute Cronbach's Alpha for all four items the researcher has been using the reliability command which is Reliability/Variables = q1, q2, q3, q4. According to the above figures, the alpha coefficient for all four items of IT Infrastructure is .928, alpha coefficient for all four items of Instructor Competencies is .953 while alpha coefficients for all four items of Perceived Ease of Use is .929 and alpha coefficients for all four items of Perceived Usefulness is .928. Alpha coefficient for all four items of E-learning effectiveness is .956.

Demographic Factors Analysis

Demographic data was gathered to determine the profile of senior secondary level pupils of 91 private schools in Colombo. The Gender formulations of questionnaire respondents are as follows. 61.0% of respondents were male and 39.0% were female respondents. The selected 91 private schools were specified with the students, as in case the students are managing online educations systems in specific ways. The education infrastructure is developed through reliable

ways of the student's management systems. Grade formulations of questionnaire respondents. 55% Grade 10 responses were available in the research and 45.0% Grade 11 responses. Respondents for the question on "how many hours you spend per day on virtual sessions provided by the school formulations were: 48.0% 2 – 4 hrs., 43.1% 4 – 6 hrs., 4.6% less than 2 hrs. and 4.3% more than 6 hrs.

Descriptive Analysis

Table 6. Descriptive Statistics for variables (Survey Data, 2021)

Variable	N	Range	Min.	Max	Mean		Std. Deviation	Variance	Skewness		Kurtosis	
	Stat.	Stat.	Stat.	Stat.	Stat.	Std. Error	Stat.	Stat.	Stat.	Std. Error	Stat.	Std. Error
IT Infrastructure	369	3.25	1.75	5.00	3.856	.0386	.743	.552	-.604	.127	-.163	.253
Instructor Competencies	369	3.75	1.25	5.00	3.111	.0366	.703	.495	.098	.127	-.462	.253
Perceived Ease of Use	369	3.00	1.75	4.75	3.323	.0267	.513	.263	-.359	.127	.708	.253
Perceived Usefulness	369	3.00	2.00	5.00	3.273	.0331	.637	.406	.059	.127	-.739	.253
E-Learning Effectiveness	369	4.00	1.00	5.00	2.874	.0425	.8168	.667	-.093	.127	.226	.253
Valid N (listwise)	369											

The findings are described at several levels of outcomes that can manage the variables. According to the Descriptive Statistics of IT Infrastructure, the mean value will take 3.8564. The standard deviation of the variable has amounted to 0.74320and that engaged with a good relationship for the research outcomes. The Skewness is -0.640and the Kurtosis is -0.163. The Descriptive Statistics of Instructor Competencies, the mean value will take 3.1118. The standard deviation of the variable has amounted to 0.70340 and that engaged with a good relationship for the research outcomes. The Skewness 0.098 and the Kurtosis -0.462. In the Descriptive Statistics of Perceived Ease of Use, the mean value will take 3.3232. The standard deviation of the variable has amounted to 0.51314and that engaged with a good relationship for the research outcomes. The Skewness is - 0.359 and the Kurtosis is 0.708. For the Descriptive Statistics of Perceived Usefulness, the mean value will take 3.2737. The standard deviation of the variable has amounted to 0.63733 and that engaged with a good relationship for the research outcomes. The Skewness is 0.059 and the Kurtosis is -0.739. For the Descriptive Statistics of E-Learning Effectiveness, the mean value will take 2.8740. The standard deviation of the variable has amounted to 0.81680and that engaged with a good relationship for the research outcomes. The Skewness is -0.093and the Kurtosis is 0.226.

Correlation Analysis

The connection between the dependent variable (E-Learning Effectiveness) and the specified independent variables was measured using correlation analysis. The Pearson correlation model was used to examine the relationships between the variables.

Table 7. Correlation Analysis for Perceived Usefulness & E-learning Effectiveness

Variables	Pearson Correlation E-learning Effectiveness	Sig
IT Infrastructure	.742	.000**
Instructor Competencies	.767	.000**
Perceived Ease of Use	.745	.000**
Perceived Usefulness	.741	.000**

Note: **. Correlation is significant at the 0.01 level (2-tailed)

Source: Survey Data, 2021

IT Infrastructure

According to the findings, IT Infrastructure and E-Learning Effectiveness, have a strong positive relationship. In this research, the Pearson Correlation Coefficient of 0.742 produces a positive relationship, explaining why the study's Correlation meaningful amount of $P< 0.05$ is statistically significant. Because of the correlation value, the Alternative Hypothesis is accepted. If this is the case, the null hypothesis is rejected. Also according to the graph R^2 value emphasizes the responses for IT Infrastructure & E-Learning Effectiveness is 0.551 which means 55.1% of E-Learning Effectiveness is based on IT Infrastructure.

The mentioned results are illustrated from the linear regression analysis to test the effect of IT Infrastructure (independent variable). The findings indicate that the regression coefficient (R) of the IT Infrastructure and E-Learning Effectiveness was 0.742 and R square was 0.551. The outcome demonstrated that 55.1% of the variance (R Square) and E-Learning Effectiveness have been presented in detail by IT Infrastructure. To determine the magnitude of the influence is statistically significant or not F value from the ANOVA test was conducted. F value is 449.848, that was significant at 0 .05 as well as 0.01 level. Hence, the impact of the IT Infrastructure on E-Learning Effectiveness was statistically significant. According to the regression analysis figures shows the adjusted R2 value is 0.551 which means5 5.1% of total variances have been represented by accessibility to IT Infrastructure. β value is 0.742. In this scenario, the researcher can justify that accessibility to IT Infrastructure directly affect the E-Learning Effectiveness of senior secondary level students who are engaged in Colombo District schools.

Instructor Competencies

According to the findings, Instructor Competencies and E-Learning Effectiveness, have a strong positive relationship. In this research, the Pearson Correlation Coefficient of 0.767 produces a positive relationship, explaining why the study's Correlation meaningful amount of P< 0.05 is statistically significant. Because of the correlation value, the Alternative Hypothesis is accepted. If this is the case, the null hypothesis is rejected. Also according to the graph R^2 value emphasizes the responses for Instructor Competencies & E-Learning Effectiveness is 0.588 which means 58.8% of E-Learning Effectiveness is based on Instructor Competencies.

The mentioned results are illustrated from the linear regression analysis to test the effect of Instructor Competencies (independent variable). The findings indicate that the regression coefficient (R) of Instructor Competencies and E-Learning Effectiveness was 0.742 and R square was 0.588. The outcome demonstrated that 58.8% of the variance (R Square) and E-Learning Effectiveness have been presented in detail by Instructor Competencies. To determine the magnitude of the influence is statistically significant or not F value from the ANOVA test was conducted. F value is 523.918, that was significant at 0 .05 as well as 0.01 level. Hence, the impact of Instructor Competencies on E-Learning Effectiveness was statistically significant. According to the regression analysis figures shows the adjusted R2 value is 0.588 which means 58.8% of total variances have been represented by accessibility to Instructor Competencies. β value is 0.767. In this scenario, the researcher can justify that accessibility to Instructor Competencies directly affect the E-Learning Effectiveness of senior secondary level students who are engaged in Colombo District schools.

Perceived Ease of Use

According to Findings Perceived Ease of Use and E-Learning Effectiveness, have a strong positive relationship. In this research, the Pearson Correlation Coefficient of 0.745 produces a positive relationship, explaining why the study's Correlation meaningful amount of P< 0.05 is statistically significant. Because of the correlation value, the Alternative Hypothesis is accepted. If this is the case, the null hypothesis is rejected. Also according to the graph R^2 value emphasizes the responses for Perceived Ease of Use & E-Learning Effectiveness is 0.555 which means 55.5% of E-Learning Effectiveness is based on Perceived Ease of Use.

The mentioned results are illustrated from the linear regression analysis to test the effect of Perceived Ease of Use (independent variable). The findings indicate that the regression coefficient (R) of the Perceived Ease of Use and E-Learning Effectiveness was 0.745 and R square was 0.555. The outcome demonstrated that 55.5% of the variance (R Square) in E-Learning Effectiveness has been presented in detail by Perceived Ease of Use. To determine the magnitude of the influence is statistically significant or not F value from the ANOVA test was conducted. F value is 457.141, that was significant at 0 .05 as well as 0.01 level. Hence, the impact of the Perceived Ease of Use on E-Learning Effectiveness was statistically significant. According to the regression analysis, figures show the adjusted R2 value is 0.555 which means 55.5% of total variances have been represented by accessibility to Perceived Ease of Use. β value is 0.745. In this scenario, the researcher can justify that accessibility to Perceived Ease of Use directly affect the

E-Learning Effectiveness of senior secondary level students who are engaged in Colombo District schools.

Perceived Usefulness

According to the findings, Perceived Usefulness and E-Learning Effectiveness, have a strong positive relationship. In this research, the Pearson Correlation Coefficient of 0.741 produces a positive relationship, explaining why the study's Correlation meaningful amount of $P< 0.05$ is statistically significant. Because of the correlation value, the Alternative Hypothesis is accepted. If this is the case, the null hypothesis is rejected. Also according to the graph R^2 value emphasizes the responses for Perceived Usefulness & E-Learning Effectiveness is 0.549 which means 54.9% of E-Learning Effectiveness is based on Perceived Usefulness.

The mentioned results are illustrated from the linear regression analysis to test the effect of Perceived Usefulness (independent variable). The findings indicate that the regression coefficient (R) of the Perceived Usefulness and E-Learning Effectiveness was 0.741 and R square was 0.549. The outcome demonstrated that 54.9% of the variance (R Square) and E-Learning Effectiveness have been presented in detail. To determine the magnitude of the influence is statistically significant or not F value from the ANOVA test was conducted. F value is 446.564, that was significant at 0 .05 as well as 0.01 level. Hence, the impact of the Perceived Usefulness on E-Learning Effectiveness was statistically significant. According to the regression analysis, figures shows the adjusted R2 value is 0.549 which means 54.9% of total variances have been represented by accessibility to Perceived Usefulness. β value is 0.741. In this scenario, the researcher can justify that accessibility to Perceived Usefulness directly affect the E-Learning Effectiveness of senior secondary level students who are engaged in Colombo District schools.

Table 8. Model Summary (ANOVA[a])

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.817[a]	.668	.664	.47329	.668	183.00	4	364	.000

Notes: a. Predictors: (Constant), Perceived Usefulness, Instructor Competencies, Perceived Ease of Use, IT Infrastructure
b. Dependent Variable: E-Learning Effectiveness.

Source: Authors estimation

Table 10. Regression Results

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	163.976	4	40.994	183.003	.000[b]
	Residual	81.539	364	.224		
	Total	245.515	368			

Notes: a. Dependent Variable: E-Learning Effectiveness.
Predictors: (Constant), Perceived Usefulness, Instructor Competencies, Perceived Ease of Use, IT Infrastructure

Source: Authors estimation

Table 11. Multiple Regression Analysis – Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	-.545	.132		-4.119	.000
	IT Infrastructure	.074	.319	.058	.232	.817
	Instructor Competencies	.556	.051	.479	10.889	.000
	Perceived Ease of Use	.533	.223	.418	2.385	.018
	Perceived Usefulness	-.092	.384	-.072	-.239	.811

Note: a. Dependent Variable: E-Learning Effectiveness

Source: Authors estimation

The above results depict the multiple linear regression analysis to test the overall impact of the independent variables such as IT Infrastructure, Instructor competencies, Perceived Ease of Use and Perceived Usefulness on the dependent variable (E-Learning Effectiveness)

The results show that the regression coefficient (R) was 0.817 and R square was 0.688. The results emphasized that 68.8% of the variance (R Square) in the E-Learning Effectiveness has been significantly explained by all the independent variables. To find out whether the impact is statistically significant or not F value from ANOVA test was conducted. F value is 183.003 which means that it was significant at .05 as well as 0.01 level. Hence, the impact of overall independent variables on the E-Learning Effectiveness was statistically significant. Regression Coefficient R value is 0.817 and it reflect very strong positive correlation between the independent and dependent variables. R2 value 0.688 indicates that 68.8% of total variances for E-Learning Effectiveness can be explained by the selected independent variables.

The value of Cronbach's Alpha which is 0.9 managed good internal consistency. Overall model contributes by 68.8%towards E-learning effectiveness. If schools could place a greater emphasis on the factors and provisions to accommodate for more student engagement, virtual education can be the greatest alternative for independent learning.

Conclusions and Recommendations

Conclusion

The findings obtained a better understanding on the virtual education among school children. The main aim of this study was to investigate the variables that affect the efficacy of virtual education among students while investigating the importance and effect of virtual education and the obstacles learners face when adapting to virtual education. The literature review has made an approach to answering the research topic on efficacy of virtual education. Identified barriers were network triggers, lack of reliable network infrastructure and qualified instructors, lack of well-structured instructional materials, and motivated teacher-student interaction. Microsoft Excel and SPSS statistical software version 26 was used by the researcher

to critically analyze the variables that must be implemented in enhancing the efficacy of virtual education.

As per the findings on demographics the sample consisted of 225 males and 144 females and (55.01%) represented by grade10 and least amount represented by grade11 of (44.99%). From the total sample 47.97% respondents take virtual lessons of 2 to 4 hours, 43.09% of 4-6 hours. While 4.61% take session less than 2 hours, 4.34% of students take sessions more than 6 hrs.

According to the above analysis the value of Cronbach's Alpha which is 0.9 managed good internal consistency. The test has been carried out to see how well the produced questionnaire handled the specific factors. The mean values of IT Infrastructure, Instructor competencies, Perceived Ease of Use and Perceived Usefulness were all above 0.3 and standard deviations were above 0.5 which meant the data are more spread out and all engaged with a good relationship with the research outcome. Correlation coefficient for IT Infrastructure was 0.742 Instructor competencies 0.767, Perceived Ease of Use 0.745 and Perceived Usefulness 0.741 which is $P < 0.05$ is statistically significant. Because of that alternative hypothesis in all four variables are accepted which that is the case null hypothesis are rejected. All regression values are between 0.0 and 1.0. To find out up to what extent impact is statistically significant the ANOVA test was conducted and all values are significant at 0.05-0.01 level.

Compared to conventional instruction, virtual education has constraints and it is not being effectively facilitated. In particular, deficiency in interaction, and capacity building of instructors are more focused on theory than practice, direct contacts with the instructors is missing in virtual platforms and barriers such as inadequate and feeble technology and fundaments, Despite the fact that the instructors have designed multiple learning modules, they failed to accomplish the objectives which caused poor students 'engagement in online sessions. Many students do not see a substantial growth in their outcomes while replicating real-world processes in digital environment. Hence the researcher concludes that the overall model contributes by 68.8% towards E-learning effectiveness. If schools could place a greater emphasis on the factors and provisions to accommodate for more student engagement, virtual education can be the greatest alternative for independent learning. Efficient use of factors that affect e-learning may help students become more motivated and also enhance students' engagement in class, as well as it highly impacts on students' expectations and performance. The procedures need to be simplistic for learners with a better learning management system, and a reliable network infrastructure. There is a need of interactive/dynamic teaching skills and a genuine concern for students' learning. If all assignments/presentations are well coordinated, well designed & meet the lesson objectives are explained briefly but in a comprehensive manner by saving their time and making information available, it is feasible that schools will provide students with what they desire whenever they demand it. The findings indicated above will be helpful for educators, professionals and legislators in making the required reforms to enhance distance learning. To get the most out of virtual learning, it has to be well-designed with contributions from a range of aspects. Otherwise, online learning would be associated with unfavorable connotations.

Recommendations

The below mentioned best practices would be beneficial for everyone; from teachers to pupils, educational institutions, parents to navigate and continue education more effectively.

A synergistic education can be implemented and provide students a sense of social engagement; the virtual teaching approaches must combine numerous digital tactics and techniques collaboratively. Schools must prerequisite for digitization of the curriculum and need to supply interactive online learning education systems with easy accessibility to study materials. Applied education using reciprocate technologies such as video content and visual effects is much more successful than text resources such as power point and pdf; thus, audio recordings should be supplied with the study materials. A professional evaluation system can be created to check the quality of virtual education in schools on a regular basis. After each class, provide learners formative assessments and activities to assess the comprehend skills. Briefly explaining assignments in a comprehensive manner might make students feel less stressed and have a better perception for virtual sessions. Schools should plan virtual career advancement events for instructors to educate in the use of various types of digital learning platforms, leading digital classroom apps (Ex: Grade Ticker/ClassMarker/Kami extension) to mark & grade all answer sheets. Schools must use technology like Mentimeter to gather feedbacks and response from learners. Develop interactive instructional modules and publish exemplars for other teachers to use. Technology and techniques that help in enhancing remote learning would be helpful to improve synchronous learning capacities and simulate the conventional classroom setting.

Limitations of the Study

Due to the closure of schools because of COVID- 19, the acquisition of data has been done through an online survey since receiving endorsements from schools were difficult. A significant percentage of students in Colombo district have been used for the study since it is impossible to compare the entire Senior Secondary level students' population in Sri Lanka. Researcher constraints acquiring confidential data from organizations, submission has been taken as voluntary informed consent and all the information shared from organizations and students' interests with the researcher is confidential.

References

Ahmad, G. (2015). Instructional strategy based on associative relevance improves e-learning. *International Journal Of E-Education, E-Business, E-Management And E-Learning*, *5*(3), 165-172. https://doi.org/10.17706/ijeeee.2015.5.3.165-172

Akareem, H. & Hossain, S. (2016). Determinants of education quality: what makes students' perception different? *Open Review of Educational Research*, *3*(1), 52-67.

Alfadda, H. & Mahdi, H. (2021). Measuring students' use of zoom application in language course based on the technology acceptance model (TAM). *Journal of Psycholinguistic Research*, *50*(4), 883-900.

Almutairi, B. M., & Albraithen, M. A. (2018, April). A framework on the critical success factors of virtual school system implementation: A systematic literature review. In *2018 1st International Conference on Computer Applications & Information Security (ICCAIS)* (pp. 1-6). IEEE.

Alyoussef, I. (2020). An empirical investigation on students' acceptance of (sm) use for teaching and learning, *International Journal of Emerging Technologies in Learning.*, *15*(4), 158-178.

Aristovnik, A., Keržič, D., Tomaževič, N. & Umek, L. (2016, July). Determining factors of students' perceived usefulness of e-learning in higher education. *International Conference e-Learning*, Madeira, Portugal.

Ashrafi, A., Zareravasan, A., Rabiee Savoji, S., & Amani, M. (2020). Exploring factors influencing students' continuance intention to use the learning management system (LMS): a multi-perspective framework. *Interactive Learning Environments*, https://doi.org/https://doi.org/10.1080/10494820.2020.1734028

Boateng, R., Mbrokoh, A. & Ansong, E. (2016). Determinants of e-learning adoption among students of developing countries. *International Journal of Information and Learning Technology*, *33*(4), 249-257.

Chang, W., Liu, Y., & Huang, T. (2017). Perceptions of learning effectiveness in M-learning: scale development and student awareness. *Journal of Computer Assisted Learning*, *33*(5), 461-472. https://doi.org/10.1111/jcal.12192

Chow, A. and Croxton, R. (2018). Designing a responsive e-learning infrastructure: systemic change in higher education. *American Journal of Distance Education*, *31*(1), 20-42

Department of Census and Statistics (2020). *Annual school census of Sri Lanka.* http://www.statistics.gov.lk/Education/StaticalInformation/SchoolCensus/2020

Eccles, R. (2017). Reputation and Reputational Risk Management. *The Geneva Papers on Risk and Insurance - Issues and Practice*, *31*(3), 377-381. https://doi.org/10.1057/palgrave.gpp.2510092

Ferri, F., Grifoni, P. & Guzzo, T. (2020). Online learning and emergency remote teaching: opportunities and challenges in emergency situations. *Societies*, *10*(4), 86. https://doi.org/10.3390/soc10040086

George, D., & Mallery, P. (2003). *SPSS for Windows step by step*: *A simple guide and reference.* 11.0 update (4th Ed.). Allyn & Bacon

Gichuki, E. & Mwang, (2017). Infrastructure readiness for the adoption of e-learning in universities of Kenya. *International Journal of Science and Research*, *6*(3), 89–101.

Gunawardhana, L. K. (2020). Review of e-learning as a platform for distance learning in Sri Lanka. *Education Quarterly Reviews*, *3*(2), 141-145.

Heba, C. & Sultan, S. (2020). Parents' views of their children's online learning in the use context during the Covid-19 pandemic. *Journal of Advances in Education and Philosophy*, *4*(10), 424-434.

Henderikx, M., Kreijns, K., Castaño, J. & Kalz, M. (2019). Factors influencing the pursuit of personal learning goals. *The Journal of Open, Distance and e-Learning*, *40*(2), 187-204.

Hubackova, S. (2015). History and perspectives of e-learning. *Social and Behavioral Sciences*, *191*, 1187-1190.

Kaptein, M. (2017). The Battle for business ethics: a struggle theory. *Journal of Business Ethics*, *144*(2), 343-36.

Malureanu, A., Panisoara, G. & Lazar, I. (2021). The relationship between self-confidence, self-efficacy, grit, usefulness, and ease of use of eLearning platforms in corporate training during the Covid-19 pandemic. *Sustainability*, *13*(12), 6633. https://doi.org/10.3390/su13126633

Ministry of Education (2020). *School-Census-Report-2020*. https://moe.gov.lk/wp-content/uploads/2022/01/School-Census-Report-2020-V3.pdf

Nguyen, T. (2015). The effectiveness of online learning: beyond no significant difference and future horizons. *MERLOT Journal of Online Learning and Teaching*, *11*(2), 284-291.

Roman, M. & Plopeanu, A. (2021). The effectiveness of the emergency eLearning during COVID-19 pandemic, The case of higher education in economics in Romania. *International Review of Economics Education*, *37*, p.100218.

Salkind, N. J. (2015). *Zigma Freud & descriptive statistics: An introduction to understanding reliability and validity in Statistics*. Sage Publications, London.

Sarka Hubackova, S. (2014). Pedagogical foundation of e-learning. *Procedia - Social and Behavioral Sciences*, *131*, (2014) 24-28.

Sivalogathasan, V. (2019). Open distance learning for future practices and challenges in Sri Lanka. *Sri Lanka Journal of Management Studies*, *1*(1), 19-36.

Sun, A. & Chen, X. (2016). Online education and its effective practice: a research review. *Journal of Information Technology Education*, *15*, 157-190.

Syed, A. M., Ahmad, S., Alaraifi, A., & Rafi, W. (2021). Identification of operational risks impeding the implementation of eLearning in higher education system. *Education and Information Technologies*, *26*(1), 655-671.

Waheed, M., Kaur, K. & Kumar, S. (2016). What role does knowledge quality play in online students' satisfaction, learning and loyalty? An empirical investigation in an E-Learning context. *Journal of Computer Assisted Learning, 32*(6), 561-575

Wang, C., Zhang, Y. & Chen, S. (2021). The empirical study on college students' e-learning effectiveness and its antecedents towards COVID-19. *Frontiers in Psychology*, *12*, 573590. https://doi.org/10.3389/fpsyg.2021.573590

Ziaul, M., 2020. E-Learning during the period of pandemic (COVID-19) in the Kingdom of Saudi Arabia: An empirical study. *American Journal of Educational Research*, *8*(7), 457-464.