

Technology Mediated Education in Sri Lanka: Expectations, Challenges and Strategies

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ABSTRACT

The integration of technology into education aims at improving the effectiveness and efficiency of education in its organization, implementation and achievements. This remains valid for all countries across the globe irrespective of stratifications and hierarchies. The mediation of technology functions on the assumption that it leads to positive developments to education. Sri Lanka as a developing country in the South Asian region can be considered as one of the few countries that have always prioritized education in its national agenda. The development of technology in education is a key objective of the Sri Lankan development plan to cater to the local and global economy and its advancement.

This chapter attempts to emphasize the aims and objectives for technology mediated education in Sri Lanka by the state, the challenges faced by various stakeholders in the field of education in planning, implementing and sustaining a technology mediated education system in the primary, secondary and tertiary tiers of education in Sri Lanka and the strategies used to overcome the key challenges in schools and universities through the implementation of local and international projects.

A cross sectional study was conducted to investigate the technology mediated educational landscape in the country. A mixed method approach was used where both primary and secondary data was utilized. Secondary data was gathered under the thematic orientation of the chapter. In selecting the primary data, a stratified purposive sample was selected to gather data from key stakeholders involved in education in Sri Lanka including parents, school students, school teachers, university teachers, university students, planners through structured interviews. The findings reveal that while there has been a considerable development in technology mediated education in Sri Lanka, there are many challenges on the grass-root level that has to be tackled for an equitable system of technology education.

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The modern world has witnessed enormous developments in the field of technology that has led to the creation of a global village in which the barriers of time and space are eradicated [1]. This ever expanding role of technology has been integrated into different social phenomenon and social institutions such as economy, health care, politics, religion, media and education, bringing about a shift in how the society is viewed. Earlier the society was viewed more as an information society. However, with the involvement of technology it is now considered as a knowledge society. Such massive transformations in technology are believed to enhance human living standards. When focusing on education in particular, the integration of technology into education aims at improving the effectiveness and efficiency of education in its organization, implementation and achievements [1]. This remains valid for all countries across the globe irrespective of stratification and hierarchies. The mediation of technology brings about positive developments to education at all levels where students are able to reap more benefits of education. Sri Lanka can be considered as no exception to this.

Sri Lanka as a developing country in the South Asian region can be considered as one of the few countries that have always been able to maintain high standards of literacy in the population in comparison to other developing countries due to the varied educational policies and measures that have been carried out since the inception of formal state funded education. The development of technology in education is a key objective of the Sri Lankan development plan as the country recognizes that in the contemporary world, information and knowledge are pivotal for the advancement of the local economy. In order to cater to a global economy, technology has to be used as a tool which would revive the Sri Lankan economy. The entry point to such a transformation is the education system where the government plans to embed technology to primary, secondary, tertiary education, vocational training and adult education [2].

History of Education in Sri Lanka

When focusing on the Sri Lankan context, in order to comprehend the role of technology in education it is vital to gain an understanding of the developments and establishment of education through a historical approach. This can be categorized based on the key stages of education in Sri Lanka as piriven education, education during colonization, free education movement, and the Modern education.

Piriven Education

According to the ancient records of Mahavamsa and Dipavamsa, education can be traced back to the times of kings where it was carried out informally in temples and monasteries [3]. During this era, education was delivered mainly to the clergy and the elite of the Sinhala community and the Brahmins and Vellalars of the Tamil community, while the majority of the Sri Lankan peasants remained illiterate. Such educational endeavors concentrated highly on religious studies, while some had an emphasis on other disciplines such as geometry, painting, architecture and more practical fields of study as well. During this period of time, education was segregated on gendered lines where mainly males gained access to education, while the women were denied of piriven education.

Colonial Period

The nature of education shifted drastically from an informal educational system to a much more formal system mainly due to colonization in the 16th century. The Portuguese, the first colonizers of Sri Lanka introduced a modern education system, where Roman Catholicism was promoted in schools by varied missionary groups. This was followed by the Dutch, who introduced a Christian primary school system. In the 18th century with the arrival of the British, the prevalent educational system brought a number of changes of which the first was the transition of the medium of instruction from the vernaculars to English language. This affected a number of students as the majority of Sri Lankans faced a language barrier to education [4].

However, along with the recommendations forwarded by the Colebrooke Commission, the government started to establish state funded schools from 1836. The significance of this decision was that it enabled students to complete their studies in the vernaculars, giving rise to higher rates of attendance of students in schools. By the 19th century, prominence was given to the establishment of tertiary educational institutions as well as schools based on religious denomination. This led to the establishment of Buddhist, Hindu, Christian and Muslim schools.

Free Education Movement

In the year 1942, education in government schools were made officially free. Simultaneously, it was decided to utilize national languages as the medium of instruction in all schools except for private schools where English language was utilized as the medium of instruction. The course of Sri Lankan education shifted during this period of time mainly due to the actions of Dr. C.W.W. Kannangara, who proposed free education for all levels, establishment of central schools, and student welfare schemes [4]. In the year 1956, the official language act, which stated that Sinhala and Tamil as national languages and English as a link language affected many social institutions including education, where even in universities, the medium of instruction shifted to the national languages. With the intention of improving the quality of education, a number of initiatives were taken by the Sri Lankan government since the 1960s such as the establishment of the Curriculum Development Centre, National Colleges of Education and teaching centers.

Footnote: ¹Also referred to as the 'Great Chronicle' and the 'The Great Dynasty' refers to a continuous historical record of Sri Lanka originally written in Pali language.

²A historical record of ancient Sri Lanka during the times of kings tracing the trajectory of development in the island

³The Colebrooke commission presented its proposals in 1833 leading to many radical initiatives in economy, education, administration and the legal system.

The Current Situation on Education

When focusing on the Sri Lankan education sector at present, there are government schools, private schools, pirivenas, international schools, teacher training colleges and national colleges of education. The government schools can be further classified as 1AB, AC, Type 2 and Type 3 schools.

Table 2: Classification of government schools [5].

1AB	Schools having Advanced Level Science stream classes
1C	Schools having Advanced Level Arts and/or Commerce streams but no Science stream
Type 2	Schools having classes only up to grade 11
Type 3	Schools having classes from grade 1-2 or 1-8

According to the Ministry of Education there are 10194 government schools, 80 private schools, 26 special schools, 753 pirivenas, 265 international schools, 8 teacher training colleges and 20 national colleges of education [5]. The medium of instruction of the schools vary from the vernacular languages of Sinhala and Tamil to English language.

When focusing on the university education, there are mainly 15 state universities. In addition, there are higher educational institutes and private universities as well mainly in the urban parts of the country. Similar to school education, in universities as well the vernacular languages and English language are used as the mediums of instruction. However, in comparison to schools, universities are better equipped with technical infrastructure, creating a technologically equipped learning environment for undergraduate and postgraduate students. In majority of the universities, computer laboratories are established with basic software applications and internet and other facilities for the benefit of students.

Incorporation of Technology to Education in Sri Lanka

While there has been a global trend towards utilizing elements of technology for education, this has now led to a digitization of education. In Sri Lanka as well, there has been a number of initiatives to improve the quality of education and to bridge the gap between local and global standards of education with the assistance of technology. This is visible in school education as well as university education. This section focuses on these two spaces of education and how technology has been incorporated.

Technology in Schools

When focusing on the integration of technology into education in schools, the Ministry of Education has adopted two key approaches. The first was to introduce information communication technology (ICT) as a subject in schools. The second approach was to introduce ICT as a tool in the educational process. In this sense, it functioned as a technique for information gathering and dissemination and in teaching, learning and assessment. The initial introduction of ICT to Sri Lankan schools took place in 1982. Starting from less than ten schools being equipped with computers, by 2008 this has risen to 3260 schools [6]. Since the 1982 initiative was considered as insufficient to bring about a massive change

in school education this was supported with the establishment of Computer Resource Centers (CRCs) with the funding of the Asian Development Bank. Students who have completed their G.C.E. (O/L) and G.C.E. (A/L) benefited through these CRCs as they created a platform in which students gained computer literacy through Microsoft office packages and also foundational skills in professional IT skills such as basics in programming.

In addition, General Information Technology (GIT) was introduced as a school subject in 2004 to all Grade 12 students irrespective of their study stream after being piloted in 2002 [7]. This course was conducted in the English language; however, students were given the opportunity to request for clarifications in their vernacular languages. While examinations were conducted from 2005 onwards, this was not considered for university admissions. In 2006, ICT was integrated in to the G.C.E. (O/L) as a technical subject and as a main subject for G.C.E. (A/L) from 2007 [8]. The aim of this initiative was to 'set a national standard in ICT education at school level and to provide the path to higher education at tertiary level. Furthermore, students who fail to earn a placement in a university would be in possession of a substantial foundation to build up their academic and professional careers' [8]. In addition, in 2013 Technology was introduced as a study

stream in the G.C.E. (A/L) examination on par with Mathematics/ Science, Commerce and Arts streams. This new study stream aimed to provide a resolution to the inequalities that exist in the selection of subjects in the G.C.E. (A/L) examination, to create individuals who possess technical skills to fit the job market and who are able to provide viable solutions to the problems of the world and improve their professional education [9].

The initiatives taken by the Sri Lankan government along with the Ministry of Education aimed at providing the fundamentals of technology to the Sri Lankan student by embedding it into the syllabi at varied levels and providing the basic infrastructure for technology related education. However, on a global scale, incorporating technology into education surpasses it being included into a set syllabus or the physical frameworks. Today, in most of the developed countries as well as some developing countries technology is used in education through other means as well such as the creation of blended learning platforms, gamification of education, etc. Such measures are yet to be developed in the school system.

At the moment, the availability of computers in schools can be presented as follows based on the provincial level.

Table 3: Availability of computers in Schools by Province [5].

Province	Computers Available	Computers Available %	Computers Not Available	Computers Not Available %	Total
Western	938	69	421	31	1359
Central	870	57	649	43	1519
Southern	626	56	486	44	1112
Northern	593	59	409	41	1002
Eastern	557	50	554	50	1111
North Western	593	47	657	53	1250
North Central	422	52	390	48	812
Uva	444	49	456	51	900
Sabaragamuwa	600	53	529	47	1129
Sri Lanka	5643	55	4551	45	10194

The table 3.1.1 highlights that while 55% of schools in Sri Lanka have access to computer facilities, around 45% of the schools have no access to such facilities. This is rather alarming considering the fact that close to half of student the population does not have access to computer and other technology related facilities to be used in their studies. When focusing on the distribution of facilities, the Western province has the most access to facilities (69%), while the North Western province has the least access (47%). This once again highlights the stratifications that lie in the distribution of facilities in the different parts of the country. The students in urban areas have more access to technology related resources in comparison to those in the rural areas. However, it is interesting to note that even among the urban schools; there are inequalities in the distribution of resources based on the classification of state funded schools (Table 2.4.1).

Technology in Universities

As mentioned earlier, in Sri Lanka there are both state and private universities located in different parts of the country. In these universities there are mainly two modes of learning promoted. They are traditional learning and open distance learning. Of these, the majority of the universities adopt traditional teaching and learning

pedagogies. However, there are exceptions to this, such as in the Open University of Sri Lanka where Open Distance Learning (ODL) takes place. In addition, in some universities, external degrees can be followed through the ODL mode to a greater extent.

In traditional universities, in addition to the classroom teaching and learning process, there are Learning Management Systems (LMS) for both students and academic staff. Through the LMS, students and academic staff are provided with platforms for the courses they follow and teach. In each course, the academic staff is able to share information such as lecture notes, PowerPoint presentations, supplementary reading material, audios and videos, interact with students via discussion forums, messages and even conduct assessments such as quizzes, online assignments, essays, etc. This assists the students to reap the maximum benefits of the platform and engage with the course in the classroom as well as in a virtual platform. Simultaneously, there are Student Information Systems (SIS) that assist the administrative staff of the university to monitor students and keep necessary records in a much more organized manner. This consists of personal records, scholarships received such as Mahapola or Bursary schemes in the tertiary education system, performance and grading.

In universities where the ODL is practiced, technology plays a major role in comparison to traditional universities. In traditional universities, face to face interaction between the student and the lecturer is pivotal. In such a setting, the students have the opportunity to pose questions and learn in a rather teacher-centric setting. This is the most common approach in Sri Lanka education in primary, secondary and tertiary levels. However, in the ODL system, the student is presented with an alternate virtual space as his classroom. In Sri Lanka, ODL consists of two types of courses. They are the fully online courses, where there is no face to face interaction between the student and the lecturer. In this model, all the material is provided in the LMS and students are expected to complete the tasks according to the set timetable and complete the online assignments and assessments as well. This is mostly preferred due to its accessibility, availability and flexibility enabling students to remove themselves from physical, social and economic barriers to learning and time constraints. The second type of courses belongs to the blended model, where the face to face interaction via in-class lectures and virtual platform are both utilized. The specialty of this model is that this can be used for courses that demand hands-on experience, laboratory practice and technical training where fully online courses would be insufficient to meet the requirements of the course objectives. In Sri Lanka, the ODL system is favored by many students who are employed because the system tends to be more flexible and allows them to follow courses based on their availability. In addition, students from rural parts of the country also prefer the ODL system to the traditional universities because ODL system rarely demands participation in the classroom physically which can be geographically challenging for most students. Another specialty of the ODL system both in the fully online model and the blended model is that the students are given the opportunity to work at their own pace. In education psychology, it is highlighted that there are different types of learners. Each type uses a different learning strategy. For instance while some are visual learners, others can be auditory, logical, verbal, kinesthetic, intrapersonal and interpersonal learners. In the traditional setting, only a few types of learner are favored due to the very characteristics of traditional teaching. The ODL system allows academics to broaden their teaching by catering to many types of learners through the different technologies available such as videos, texts, audio recordings, individual activities and group forums.

Expectations/Goals/Targets

According to the Vision 2025 of the Sri Lankan government, technology and digitalization are viewed as two key areas that need to be prioritized as the IT literacy of the country remains at a 27.5 per cent and only 15.1% of Sri Lankan households have access to internet access [10]. It is stated that the economy requires a shift where digital technologies would be incorporated to empower the economy. As part of this larger goal, the government proposes a number of objectives in different sectors such as in economy, education and governance. When focusing on the education sector, the improvement of technical infrastructure in rural areas, introduction of ICT literacy into the school curriculum at an early stage in school education are proposed. These aim at creating high skilled youth for the labour force which would be pivotal in reviving the Sri Lankan economy.

In Sri Lanka, the formal education of students in schools and universities tend to adopt a teacher centric pedagogy of teaching and learning. While this has been practiced for many years since the very beginning of institutional education in Sri Lanka through attempts such as piriven education, today other pedagogies are

adopted. It is in this light that technology mediated education enters the education sphere as an alternative pedagogy. Collaborative learning which adopts a more student centric approach with the assistance of technology is one such novel development. Ames refers to such technologies as charismatic technologies where technology is integrated to learning [11]. The specialty of this technology is its appeal to the audience, where the technology is able to create direction, conviction by appealing to the worldview of its users, reducing uncertainties and handling contradictions. While this is practiced in the developed world, in the Sri Lankan context this can be viewed as a potential development which would benefit school children. Gamification of education can be considered as one example of how charismatic technologies can be used to assist in school education. Gamification refers to 'the use of game design elements in non-game contexts' [12]. In education, gamification is able to motivate students through technology by using elements of games such as points, different levels, succession bars into learning contexts. A case study on gamification and collaborative learning was conducted by Halloluwa, Vyas, Usoof and Hewagamage (2017) in a rural setting in Sri Lanka with the participation of primary school children and teachers. In the study, a tablet based application was designed for the chosen students for mathematics and was tested using an experimental method where the two groups were taught through traditional teacher-centric learning and gamified collaborative learning. The study revealed that the principles of gamification provided the participants with a better learning experience as opposed to the traditional learning pedagogy. This was solidified by the teachers as well who emphasized that the technology enabled them to act more as facilitators and guide the students. In addition to this, the usage of mobile devices for education is also conspicuous. According to this approach, mobile devices such as smart phones, computer tablets, and iPads are used by students for educational purposes. However, it is debated whether the impacts of such usage would be purely positive or negative [13-16].

In the tertiary education system, a clear direction of education to match the global education landscape is through the introduction of virtual campuses. The University of Colombo has made such an initiative where a virtual center is established through which degree programmes can be offered to external students. While this can be viewed as an initial step, there are plans of developing this further to a position of a fully online campus. In addition, the improvement of technical infrastructure in universities and promoting highly competitive study programmes in technology related disciplines, providing foundational training in technology for all undergraduates, incorporating an online component to different courses are some other targets of higher education to integrate technology to education. Such objectives for the future in Sri Lankan education aim to position Sri Lankan education in a better position through the integration of technology.

Challenges

While the Sri Lankan education system has made attempts to improve the level of technological usage in education, there are a number of limitations that pose challenges towards the integration of technology. According to the National Education Commission (2007), some of the essential factors for the development of information communication technology in schools are the selection and allocation of necessary resources to schools, development of infrastructure and the credibility of ICT education system. This is echoed in the works of Ilmudeen who elaborated on these limitations in the education sector in terms of technology [2]. He presents a classification of limitations under four key areas.

These are limitations in infrastructure, staff requirements, ICT curricula, language usage.

When focusing on the infrastructure in the education system, schools lack computer laboratories, computers and internet connectivity, funds or mechanisms to maintain laboratories and to purchase new equipment and devices. There are also schools located in the rural parts of the country that have no electricity (3 per cent of the school population according to the Ministry of Education in which case the ability to reach out and provide technology mediated education becomes extremely difficult [5]. In terms of staff requirements, there are limitations in ICT human resources such as trainers, instructors, lack of IT literacy among official personnel mainly in higher levels, insufficient training and teaching manuals and study guides. When observing the ICT curriculum especially in schools, it is not still considered as a major subject and merely functions as an optional subject. In addition, the mechanisms that function for monitoring the programmes to ensure the quality of the said programmes are insufficient. There is also a shortage of appropriate course content and software in school education to suit the culture, national languages and curriculum.

Educational leadership can be identified as another area which is related to pedagogical use of technology. In the Sri Lankan context, this has become one of the key challenges in school education where principals and teachers are the key practitioners of ICT. Dexter states that leadership in schools for ICT is important as it 'fosters digitally competent pupils, by facilitating necessary infrastructure and a good working environment together with explicit plans and visions on pedagogical use of ICT' [17, 18]. However, in the school systems in Sri Lanka the negative impact of situational leadership on ICT usage is visible in many schools where the attitudes of the senior staff members including the principals and other sectional heads affect the implementation of ICT. Some of the key factors that were identified that contribute to this condition are the lack of interest, commitment, sole dependency on the government and ministries to implement programmes and traditional values and attitudes towards teacher-centered pedagogy of the educational leadership.

In addition, the usage of English language in technology related disciplines and also platforms have posed another challenge where language becomes a barrier for access among students. In addition, majority of the material such as books, journals and articles are written in English making it difficult for students to access the recourses available.

Strategies

With the intention of broadening the spectrums of technology integration in education, the Sri Lankan government has initiated a number of projects with the assistance of local agencies such as the Ministry of Education, and also international organizations such as the UNDP, World Bank, ADB, USAID and other private organizations. These strategies mainly aim to develop the infrastructure required for technology mediated education, and skill enhancement.

Of these initiatives, E-Sri Lanka can be considered as an initiative that aimed at developing the Sri Lankan economy, reducing poverty and improving quality of life [19]. This surpasses the boundaries of education and attempts to integrate technology to a number of institutions which in turn will affect the education system as well. The Nanasala project, on the other hand, can be considered as more

directly involved with education as it provides people with access to technology related facilities such as internet and to provide training to develop ICT skills of individuals. Through this project the ICTA, provides organizations with the necessary equipment such as computers, printers, scanners, photocopiers, telephones and VSAT internet connection for free to establish Nanasala centers [2].

A number of initiatives have been taken by the government to improve the quality of technology related education in the school level through the allocation of public funds and loan grants such as General Education Project (GEP II), Secondary Education Modernization Project I (SEMP I), Secondary Education Modernization Project II (SEMP II) and Technical Education Development Project (TEDP). These initiatives aimed at firstly, creating awareness among students about Information communication technology which would lead to familiarity with using varied computer technologies, secondly, using ICT as a platform to study other subjects and thirdly to assist in increasing the efficiency of school administration. As there exists an urban rural divide in Sri Lanka, in which IT literacy can be considered as one of the clear demarcations between the two fractions, strategies such as GEP II, SEMP I, SEMP II and TEDP aim at smoothening the urban rural divide and fostering an ICT culture in which education system can be a pioneer [20].

In 2003, the General Education Project (GEP) II was launched. This aimed at improving the quality of ICT education in schools. As part of this project, four hundred computer laboratories (each consisting of ten computers) were established in eight provinces of the country based on a quota system where each province has access to fifty laboratories. In addition, training workshops were conducted for teachers at the National Institute of Education where ICT was prioritized.

The Secondary Education Modernization Project I (SEPM I) was carried out from 2000 to 2006 with the funds of the Asia Development Bank. This project aimed at enhancing the quality of secondary schools through the provision of modern teaching facilities. It operated under the rationale that improving secondary education would lead to economic and social development of the country and minimize disparities. In this sense, the project focuses more on empowering the rural students by providing them with IT literacy and technical knowledge which would shape them into being better employment candidates. In addition, since 2005, the Ministry of Education organizes ICT competitions for students to encourage ICT usage among students.

Secondary Education Modernization Project II (SEPM II) was carried out from 2004 to 2009 with the objective of a secondary education system that caters to the labour market and its requirements. This was achieved through the improvement of infrastructural elements related to modernizing schools and the training of teaching staff and administrative staff in the provincial, zonal and divisional levels to make optimal usage of the newly established systems. The specialty of the SEMP is that it also catered to the creation of a network connecting different stakeholders in the school education sector such as schools, Computer Resource Centers (CRCs), Ministry of Education, National Institute of Education, National Colleges of Education, ICT centers and also project management stations of SEMP. The Ministry of Education also set up a website (schoolnet.lk) to develop an online education system in which students and teachers are given access to quality, interactive educational material on varied subjects such as Science, Mathematics and English. The objective of the website is to set up

a network connecting all the schools island wide where interactive learning, teaching and assessment.

The Technical Education Development Project (TEDP) launched in 2012 funded by the Asian Development Bank was built on the ideals of the Skills Development Project launched from 2000 to 2007. The objective of TEDP was to 'strengthen the institutional capacities of six technical colleges, a teacher training institution, and relevant government ministries to provide TEVT to meet labor market demand for higher-level technicians and technologists' (Asian Development Bank, 2012, p.1). The project was responsible for upgrading the courses related to technology, improving the administration of technical colleges through improved education management information system (EMIS), geographic information system (GIS), and output-based budgeting (OBB) and transforming the status attributed to National Institute of Technical Education of Sri Lanka to University of Vocational Technology.

Future Directions and Recommendations

As Sri Lanka aspires to be the knowledge hub of Asia, the IT sector of the country is becoming increasingly more demanding to be on par with the its global competitors. Consequently, more opportunities are created in the IT sector for youth with IT skills. The education sector of the country has to take the maximum advantage of this situation by improving the ICT knowledge of students so that they can be competent in both local and foreign job markets alike.

To create a future generation of ICT competent youth, the foundation should be laid at the grass root level through school education. Firstly, it is vital to create a strong infrastructure for technology in schools irrespective of rural urban divide so that all students from across the country can access technology from their schools. In addition, once the infrastructure has been provided, it needs to be maintained on a provincial level. Secondly, it is vital to train teaching staff and maintain high numbers of teachers, instructors and trainers to teach students. Thirdly, through the school curriculum, ICT has to be more prioritized so that students gain new knowledge and monitored [21-25].

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