

Information and Communication Technology Facilitated Education in National Universities of Sri Lanka

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Abstract

The global adoption of Information and Communication Technology (ICT) has majorly captured the area of education, as it is the foremost important method to create a technology equipped generation. Uses of ICTs in education are widespread and are continually growing worldwide. However in many cases, the adoption has not kept its promises up to the expected standard. The main purpose of the study is to investigate the related factors that have a significant influence on the use of ICT facilitated education in National Universities of Sri Lanka. These factors contain the Organizational Factors, Individual Factors, Educator Factors, Technological Factors and Social/Cultural Factors. Further the study also aims at assessing whether ICT facilitated education in National Universities would improve the Digital Literacy of the students. The study uses a quantitative method to collect data on the population of graduates of national Universities of Sri Lanka. Questionnaire responses are analyzed for the findings and 176 graduates selected from the three national universities. The results of the study confirms that Organizational, Educator and Technological Factors act as barriers for effective implementation of ICT facilitated education in national universities of Sri Lanka. At the same time the expected outcome of ICT facilitated education which is improving the Digital Literacy has not achieved. Based on the findings, it is recommended that policy-makers should attempt to alleviate the concerns of barriers found and try to take steps to convert the barriers in a favorable manner.

Keywords: information and communication technology, digital literacy, university, education

INTRODUCTION

During the past decade, there has been an enormous transformation in the field of technology from Information Technology (IT)¹ to Information and Communication Technology (ICT)² (Jennifer & Yeonjeong, 2008). However, this has made many people to be aware of what information is and how that can be used in the information age for the betterment of their day today activities (Luther, 2004). ICT has enabled the compression of time and space. As a result, time and location are no longer barriers for integration and it has turned the world into a global village. Today in many cases ICT is harnessed with education to improve the efficiency

and effectiveness of delivering knowledge and skills to students. (Luther, 2004).

In a world of economic system, which is fast shifting towards knowledge-intensive economy, the need of integrating ICT in higher education is a vital fact (Wijetunge & Alahakoon, 2005). As immediate members of the labour market, the students of the higher educational sector can be focused and there by necessary steps should be taken to improve their ICT skills.

Even though Sri Lanka is a country with a small geographical span, the power of ICT plays a major role in almost all the markets' affairs (Thyra & De Silva, 2011). Even though many initiatives have been taken to improve ICT in Sri Lankan context, the policies not yet made addressing National issues (Dissanayake, 2011). ICT can be made use to improve the labour market and to bridge the gap between the information poor and rich. With the policies set by ICTA E-Sri Lanka program, modern telecommunication infrastructure will be provided throughout so that all citizens will be benefited irrespective of the location and affordability.

When talking about the overall plans for higher education, On-line access for all the University courses by 2010, On line distance education for all

1 Information Technology was taken to represent the confluence of telecommunication, video, and computing technology³ or rather technologies⁴ which support a diversity of applications (e.g., microcomputer-based specialty software applications, video, multimedia, the Internet, World Wide Web, etc.).

2 Information Communication Technology is enabling technology (both hardware and software) necessary for the delivery of voice/audio, data (high-speed and low-speed), video, fax and Internet services from Point A to Point B (or possibly to multiple points B, C, etc.) Using wired and wireless media and associated equipments that are connected via Internet Protocol (IP) and non-IP networks, where the option exists that any or all of the communicating points may be fixed or mobile during the communication process.

interested by 2012, University infrastructure ready for e-environment by 2012, NODES (National Online Distance Education Service) established by 2008 and 80,000 new students studying on network should be considered (ICT in Education UNESCO Bangkok, 2013). When it comes to the higher education sector of Sri Lanka there are World Bank funded projects such as IRQUE (Improving the Relevance and Quality of Undergraduate Education) and it focuses on enhancing the quality and relevance of study programmes, improving employability of graduates and improving the inter-cultural harmony of the country.

Information and Communication Technology cling to great promise to improve learning. Further it shapes the workforce opportunities (ICT in Education UNESCO Bangkok, 2013). This is mainly due to the fact that labour market yields labour which is equipped with ICT literacy which is known as Digital Literacy. Today World Bank funded projects such as IRQUE are been implemented in National Universities of Sri Lanka (Senaratne & Gunarathne, 2010) . At present with the current literacy rate of 92% and positive driving force by the nation, implementing ICT in education system, to become Knowledge Workers seem a possible dream (Thyra & De Silva, 2011). However making the dream a reality is questionable as today the beneficiaries are not actually advantaged through the projects and policies. There are many barriers to successful integration of ICT in teaching and learning environments such as teacher level barriers, university level barriers and student level barriers (Bingimlas & Khalidabdulla, 2009). At teacher level there are barriers such as lack of competence, confidence and accessibility and further more at other levels there are lack of resources, lack of professional development time and support etc. Most importantly the students as beneficiaries should be motivated and should possess positive perception in order to grab the opportunity as they would be exhibiting them in future. However at the student level the ICT infrastructure is not used for the intended purpose but for some others like social loafing (Pires, 2009).

SIGNIFICANCE OF THE RESEARCH

Even though many initiatives have been taken in ICT education, a survey done by census and statistics department of Sri Lanka shows the computer literacy rate in 2009 as 20.3 (Department of Census and Statistics Sri Lanka, 2009). Further the household computer availability in the rural sector as 9.2%. This clearly confirms that ICT related equipments are still not affordable for many in Sri Lanka. On the contrary it says that the unemployed youths are highly computer literate than the older unemployed population. At the same time the use of e-mail in western province is 23 and rural is 18. When these facts are taken into consideration it is fair to

conclude, not that rural does not have technology but they do not make use of them. In support to the same point a survey done at University of Colombo shows that the dropout rate of students learning through e-learning is higher in Sri Lanka.

To conclude with, it is obvious that there is a gap between the initiatives taken up to now and the actual results produced in use of ICT in education. Hence the main purpose of the research is to investigate the related factors that have a significant influence on the use of ICT facilitated education in National Universities of Sri Lanka and to investigate whether ICT facilitated education in National Universities would improve the Digital Literacy of the students.

RESEARCH PROBLEMS

What are the related factors that have a significant influence on the use of ICT facilitated education in National Universities of Sri Lanka?

Would ICT facilitated education in National Universities improve the Digital Literacy of the students?

OBJECTIVES OF THE STUDY

To investigate the related factors that have a significant influence on the use of ICT facilitated education in National Universities of Sri Lanka

To investigate whether ICT facilitated education in National Universities would improve the Digital Literacy of the students.

HYPOTHESES

H1. There is a relationship between the Organizational Factors and the use of ICT facilitated education in National Universities of Sri Lanka

H2. There is a relationship between the Individual Factors and the use of ICT facilitated education in National Universities of Sri Lanka

H3 There is a relationship between the Educator Factors and the use of ICT facilitated education in National Universities of Sri Lanka

H4 There is a relationship between the Technological Factors and the use of ICT facilitated education in National Universities of Sri Lanka.

H5 There is a relationship between the Social/Cultural Factors and the use of ICT facilitated education in National Universities of Sri Lanka

H6 There is a relationship between the ICT facilitated education and Digital Literacy of the students of National Universities of Sri Lanka

LITERATURE REVIEW

In a world of rapid economic and technological change digital technologies permeate every aspect of our lives providing information for each and every nature (Drysdale, 2012). On the other hand economies encourage and seek for adult learning as it is a key fact for growth and employment performance while preserving social cohesion (Taylor and Francis

Ltd. , 2007). This is mainly due to the fact that innovative, advanced and quality education and training is a key factor of economic competitiveness. General levels of competence must increase, both to meet the needs of the labour market and to allow citizens to function well in today’s society. The introduction of computers represents additional costs for institutions yet it brings out many intangible benefits (Aluko, 2004). Aluko Mobolaji in his report also talks of the cost benefit analysis of ICT facilitated education and the higher variable costs related to learner support can be only minimized by implementing sufficiently large projects to where per student costs compare favorably with those of traditional schools. Seeing in Sri Lankan context, the e-Sri Lanka project proposes e-knowledge and job creation focusing on building the country’s human capacity in ICT. (Thyra & De Silva, 2011). When it comes to National Universities, today, many try to develop ICT facilitated education as their teaching method as it improves the Digital Literacy of the students. When it comes to efficiency of ICT facilitated learning it is necessary to see why the efficiency cannot be granted. In Sri Lankan context, a research done brings out six major factors which act as critical factors in implanting ICT facilitated education in higher education sector (Suraweera & Liew, 2010). They are organizational factors, educational factors, technology, individual factors and cultural factors. All these factors collectively affect the success of ICT facilitated education and help or prevent in giving out expected results.

Some of the researchers have also made use of existing theories to show how results of the ICT facilitated education behave. In this regard Educational Change theory (Fullen, 2000), Diffusion of Innovation theory (Greg, 2003), Control theory (Klein, 1989), Hofstede’s dimension of cultures and change theory (Laura M. Milner, 1993), Unified Theory of Acceptance (Payne & Curtis, 2008) and Use of Social Learning theory (Cherry, 2013) can be taken into consideration . The attributes of these theories will help in building up a preliminary model for the research.

RESEARCH METHODOLOGY

The research uses passed out graduates of the National Universities of Sri Lanka as the population and in this regard hundred and seventy six respondents are used. These graduates have done their degree after 2003 as the implementation of IRQUE3 projects were done in the year 2000. The research variables are measured on five points likert type scale with score of one representing “strongly disagree” and score of five representing “strongly

agree”. The research attempts to find solutions through the analysis of variable relationship. Therefore to get a sample of data, cluster sampling method is used. The conceptual framework of this study is shown in Figure 1. The variables used in the research are Organizational Factors, Individual Factors, Educator Factors, Technological Factors and Social/Cultural Factors.

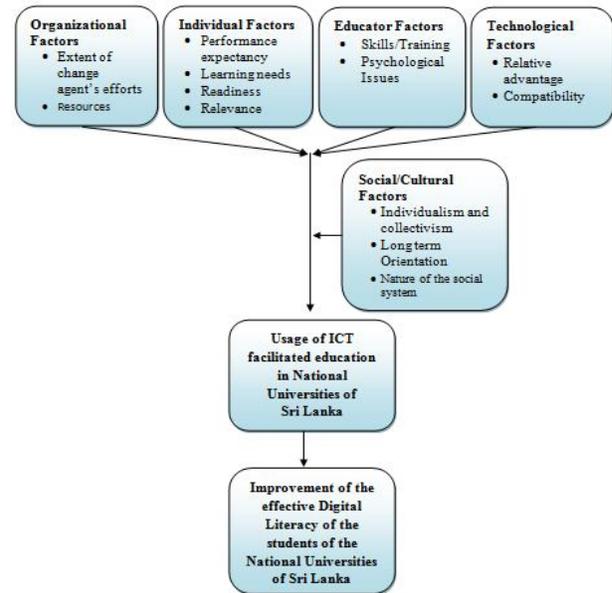


Figure 1- The conceptual framework

DATA ANALYSIS

The respondents represent three Universities namely University of Colombo, University of Jayawardenepura (Japura) and University of Kelaniya. Descriptive Analysis on the sample population is shown in Table 1.

Table 1: Descriptive Analysis on the sample population

University	No. of respondents (%)	No. of best performing students
Colombo	29.5	40
Jayawardenepura	43.2	59
Kelaniya	27.3	31

Amongst the sample population the highest number of respondents is from University of Jayawardenepura (43.2%). Further the least number of respondents is from University of Kelaniya (27.3%). At the same time University of Jayawardenepura shows the highest number of highly performed students which is fifty nine. The University of Kelaniya has the least number and it is thirty one.

Amongst the received questionnaires there is no non responsive or incomplete questionnaire accordingly all hundred and seventy six questionnaire data is used

3 A World Bank funded project implemented in Sri Lanka to Improve the Relevance and Quality of Undergraduate Education (IRQUE).

for analysis and to test the hypotheses. As a result of this reason, the survey response rate is at 100%. In order to assess the reliability Cronbach's alpha is used and as it was more than 0.7 for all variables the research said to have high reliability. At the same time as all the variables have non normal data and there is no homogeneity in variance, Spearman's correlations are used to represent the relationships between the variables measured on an interval level. Correlation between ICT facilitated education and Organization Factors is shown in Table 2. When the affective domain of ICT facilitated education is concerned, the mean score of respondents' responses is 3.99(S.D. = 1.09), and this shows that already ICT facilitated education is imposed in National Universities of Sri Lanka. As the results show that ICT facilitated education is currently existing, the factors which might affect the system are taken separately to see whether they act as barriers. When Organization factors are taken into consideration, the mean score of respondents' responses is 1.895(S.D. = 0.992), and this shows that the factor is a critical barrier towards ICT facilitated education in National Universities of Sri Lanka. Further significant Spearman correlation coefficient value is -0.407. The results indicate of a negative monotonic correlation between the two. As a result of that Hypothesis One is not accepted.

Table 2: Correlation between ICT facilitated education and Organization Factors

			ICT Fac.Edu Mean	Org.Factor Mean
<i>Spearman's rho</i>	<i>ICT Fac. Education Mean</i>	<i>Correlation Coefficient</i>	1.000	-.407**
		<i>Sig(2-tailed)</i>	.000	.176
		<i>N</i>	176	176
	<i>Organization Factor Mean</i>	<i>Correlation Coefficient</i>	-.407**	1.000
		<i>Sig(2-tailed)</i>	0.000	.176
		<i>N</i>	176	176

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

When as the affective domain of Individual factor is concerned, the mean score of respondents' responses is 3.99(S.D. = 1.023), and this shows that the factor is a not a barrier towards ICT facilitated education in National Universities of Sri Lanka. Accordingly the significant Spearman correlation coefficient also shows a similar value with a value of 0.541. Correlation between ICT facilitated education and Individual Factors is shown in Table 3. A positive Spearman correlation coefficient corresponds to an increasing monotonic trend between ICT facilitated education in National Universities of Sri Lanka and Individual Factors. The results indicate of a substantial, positive monotonic correlation between the two. As a result of that Hypothesis Two is accepted.

Table 3: Correlation between ICT facilitated education and Individual Factors

			ICT Fac.Edu Mean	Individual Factor Mean
<i>Spearman's rho</i>	<i>ICT Fac. Education Mean</i>	<i>Correlation Coefficient</i>	1.000	.541**
		<i>Sig(2-tailed)</i>	.000	.176
		<i>N</i>	176	176
	<i>Individual factor mean</i>	<i>Correlation Coefficient</i>	.541**	1.000
		<i>Sig(2-tailed)</i>	0.000	.176
		<i>N</i>	176	176

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

When Educator factors are concerned, the mean score of respondents' responses is 1.935(S.D. = 0.918), and this shows that the factor is a barrier towards ICT facilitated education in National Universities of Sri Lanka. As shown in table 4, Spearman correlation coefficient value is -0.353. A negative Spearman correlation coefficient corresponds to a decreasing monotonic trend between ICT facilitated education in National Universities of Sri Lanka and Educator Factors. The results indicate of a negative monotonic correlation between the two. As a result of that Hypothesis three is not accepted.

Another factor which would affect ICT facilitated education is Technological factors and when as the affective domain is concerned, the mean score of respondents' responses is 1.92(S.D. = 1.002), and this shows that the factor is a barrier towards ICT facilitated education in National Universities of Sri Lanka. Further as shown in Table 5 Spearman correlation coefficient value is -0.362. A negative Spearman correlation coefficient corresponds to a decreasing monotonic trend between ICT facilitated education in National Universities of Sri Lanka and Technological Factors. The results indicate of a negative monotonic correlation between the two. As a result of that the hypothesis four is not accepted.

Table 4: Correlation between ICT facilitated education and Educator Factors

			ICT Fac.Edu Mean	Educator factor Mean
<i>Spearman's rho</i>	<i>ICT Fac. Education Mean</i>	<i>Correlation Coefficient</i>	1.000	-.353**
		<i>Sig(2-tailed)</i>	.000	.176
		<i>N</i>	176	176
	<i>Educator factor Mean</i>	<i>Correlation Coefficient</i>	-.353**	1.000
		<i>Sig(2-tailed)</i>	0.000	.176
		<i>N</i>	176	176

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

Table 5: Correlation between ICT facilitated education and Technology Factors

			ICT Fac.Edu Mean	Tech.Factor Mean
<i>Spearman's rho</i>	ICT Fac.Education Mean	Correlation Coefficient	1.000	-.362**
		Sig(2-tailed)	.	.000
		N	176	176
	Tech.Factor Mean	Tech.Factor Mean	-.362**	1.000
		Sig(2-tailed)	0.000	.
		N	176	176

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

With Social/Cultural factors the mean score of respondents' responses is 4.08(S.D. = 0.912), and this shows that the factor is not a barrier towards ICT facilitated education in National Universities of Sri Lanka. At the same time Spearman correlation coefficient value is 0.510 (see table 6). A positive Spearman correlation coefficient corresponds to an increasing monotonic trend between ICT facilitated education in National Universities of Sri Lanka and Social/Cultural Factors. The results indicate of a substantial, positive monotonic correlation between the two. As a result of that Hypothesis five is accepted.

Table 6: Correlation between ICT facilitated education and Social/Cultural Factors

			ICT Fac.Edu Mean	Social/Cultural factor Mean
<i>Spearman's rho</i>	ICT Fac.Education Mean	Correlation Coefficient	1.000	.510**
		Sig(2-tailed)	.	.000
		N	176	176
	Social/Cultural factor Mean	Tech.Factor Mean	.510**	1.000
		Sig(2-tailed)	0.000	.
		N	176	176

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

Checking whether the students have got digital literacy is another objective of the research and even though some factors seem positive in the attributes given under Digital Literacy, the total mean value is 2.46 (S.D =1.099) which shows that majority of the respondents do not have the required Digital Literacy. Further Spearman correlation coefficient value is -0.532. Correlation between ICT facilitated education and Digital Literacy is shown in Table 7. A negative Spearman correlation coefficient corresponds to a decreasing monotonic trend between ICT facilitated education in National Universities of Sri Lanka and digital literacy. The results indicate of a negative monotonic correlation between the two. As a result of that Hypothesis six is not accepted.

Table 7: Correlation between ICT facilitated education and Digital Literacy

			ICT Fac.Edu Mean	Digital Literacy Mean
<i>Spearman's rho</i>	ICT Fac.Education Mean	Correlation Coefficient	1.000	-.532**
		Sig(2-tailed)	.	.000
		N	176	176
	Digital Literacy Mean	Tech.Factor Mean	-.532**	1.000
		Sig(2-tailed)	0.000	.
		N	176	176

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

RESEARCH FINDINGS, CONCLUSION AND RECOMMENDATIONS

The findings show that there is a significant relationship with the factors: Organizational Factors, Individual Factors, Educator Factors, Technological Factors and Social/Cultural Factors and the ICT facilitated education. Out of six, four factors prevent in giving results expected from ICT facilitated education. When it comes to Organizational Factors, the relationship was created with Resistance to change, Organizational culture, Technical Support, Time, Training and Funding availability. The results show that there is a negative relationship with these factors and they prevent in giving the quality education through ICT facilitated education.

On the contrary, with Individual Factors and ICT facilitated education is positively linked. The indicators used here are Resistance to change, Availability of skills and training, Learner needs, Motivation, Attitudes and Technophobia. Here there is a positive relationship. The result show that Individual Factors do not act as a barrier to ICT facilitated education and currently the students are motivated and encouraged to use it for the betterment of knowledge gaining. The Educator Factors too act as a barrier to ICT facilitated education. Resistance to change, Availability of skills and training, Motivation, Technophobia and Self confidence were used to measure the educator factor. When the Educator Factors increase the effectiveness of ICT facilitated education decreases and this shows that the factor brings out negative values to the quality of the education.

The Technological Factor also acts as a barrier and this is assessed with Digital divide, High connection cost, Availability of Internet broadband connection and access, Availability of Hardware and Availability of Software. Technology is required to implement ICT facilitated education as this education is IT enabled. However according to the Sri Lankan situation still there are laps and this makes it a barrier to implement ICT facilitated education in National Universities of Sri Lanka.

Society and culture are other two factors which have the ability to hold the ICT facilitated education yet the research results show that Social/Cultural Factors (Power distance, Individualism, collectivism, Poverty and Ways of communication) do not act as a barrier in National Universities of Sri Lanka.

When it comes to the Digital Literacy the research results show that the expected outcome was not given through the ICT facilitated education in National Universities of Sri Lanka. The Digital Literacy of the sample was poor even though they have learnt from ICT facilitated education. Results show that the skills and knowledge gained in Digital Literacy (General Computer, Software, ICT Knowledge and Skills, Digital Media Literacy, Common IT Applications Use, Cyber Safety, Information and Research Literacy and Hardware) are not up to the expected standard.

FUTURE RESEARCHES

The research could be used as a base to new researchers done on different disciplines such as ICT facilitated education in Fine Arts, Medicine, and Engineering etc. As the nature of the students, knowledge delivery methods, the extent to which technology and the expected outcome of the system may differ drastically, the research results can be used in comparison. Given the substantial weight of society and culture in determining the effectiveness of ICT facilitated education, future studies should examine the effect of this factor in different educational settings. This factor is particularly important in developing countries, where technology is often seen as an alien tool that may or may not fit within the existing school or domestic culture.

The results of the research were assessed with quantitative data yet to strengthen the accuracy and reliability it is important to use both qualitative and quantitative data. In-depth qualitative procedures or a combination of both qualitative and quantitative methods will be necessary to attain this goal. Future researchers could use the results of the research and compare it with the results done using both quantitative and qualitative data. Even though the study uses five factors which have a direct influence to the usage of ICT facilitated education in National Universities of Sri Lanka, there can be other factors influencing the effectiveness of such a system. By incorporating them, an argument judgment can be given on the state of ICT facilitated education in national universities of Sri Lanka.

The research identifies the barriers to the successful implementation of ICT facilitated education in National Universities of Sri Lanka and the current status of the digital literacy of the students of such system. The results of the study can be used specially by policy makers to assess what kind of policies

would prove enabling for ICT integration in education and what kind of policies would act to ensure that the introduction of ICT in education does not accentuate the already existing digital divide and does not become a source of further inequality.

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