E-Learnification Of Sri Lanka Higher Education Sector: Adoption Perspective

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Abstract
The adoption rate of e-learning is found to be in a poor state which is evident from the e-learning implementations as well as the e-learning readiness scores of Sri Lanka. The objective of this research is to develop a research model to identify factors that affect the adoption of e-learning in Sri Lanka. UTAUT was used as the theoretical foundation; however other variable extensions were included to improve the variance which the model intends to explain. Cross sectional survey was conducted with 358 responses which were analyzed using correlation analysis and regression analysis. Correlation analysis found that all variables were significant. However, anxiety was found to have a negative correlation. The model was able to explain 36.7% (R2=0.367) of variance in students acceptance of e-learning. The findings show that Performance Expectancy, Effort Expectancy, attitude towards e-learning, Self Efficacy, Positive Facilitation Conditions, and Social Influence need to be improved to increase students’ acceptance.

Keywords: e-learning, Acceptance, UTAUT, Higher Education, Technology
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Abstract
The adoption rate of e-learning is found to be in a poor state which is evident from the e-learning implementations as well as the e-learning readiness scores of Sri Lanka. The objective of this research is to develop a research model to identify factors that affect the adoption of e-learning in Sri Lanka. UTAUT was used as the theoretical foundation; however other variable extensions were included to improve the variance which the model intends to explain. Cross sectional survey was conducted with 358 responses which were analyzed using correlation analysis and regression analysis. Correlation analysis found that all variables were significant. However, anxiety was found to have a negative correlation. The model was able to explain 36.7% (R\(^2\)=0.367) of variance in students acceptance of e-learning. The findings show that Performance Expectancy, Effort Expectancy, attitude towards e-learning, Self Efficacy, Positive Facilitation Conditions, and Social Influence need to be improved to increase students’ acceptance.

Keywords: e-learning, Acceptance, UTAUT, Higher Education, Technology

1.0 Introduction
Information Technology has been found to be the driving force for many industries in the present era. Educational industry itself has experienced a paradigm shift which revolutionized the way education is carried out; especially, in the higher education sector. “Technology enabled teaching and learning” has received due attention mainly because of the benefits it offers to both the students as well as the providers.

According to Rosenberg (2000), “technology has always been a part of education and training”. Jones (2004, p.67) support this statement stating that it assist in responding to the skill requirement that occur due to change in organizations. Therefore, Rosenberg (2000) states that, the organizations perception towards learning is changing. E-learning in the context of higher education addresses the skill requirements that results from the changes in the society at large. Therefore, e-learning surely has convinced the educational policy makers to consider it as a substitute for traditional learning.

Urdan and Weggen (2000) identify the requirement for technology driven learning and training is increasing due to the fast increasing need for just in time delivery and training especially in globally distributed organizations. Thus, it’s eminent that the requirement is not for just a country but rather for the World as a whole.

This leads to technology embedded training and learning strategies to race its way towards the learning arena. E-learning is defined as the attainment or achievement
and use of knowledge that is disseminated over electronic means or networks (Al-Khashab 2007, p.5; Esch 2003, p.15). Jones (2004, p.67) further states that e-learning alternatives offer “just-in-time” learning and training, that is both flexible, and at the same time cost effective.

E-learning has been used synonymously to identify both synchronous and asynchronous technology based learning. However, in this context the term e-learning, would mainly refer to the use of technology for the facilitation of distance learning.

In this highly competitive world, competition in the global scale relies mainly on the country’s position in the knowledge economy. Shifts in development trends and attributes deem any country to be in the forefront of the competition with adequate human capital and resources that could lead the country to a better prospect.

The paper is divided in to mainly three sections; section one provides an overview on the current situation in the tertiary higher education sector in Sri Lanka and the problems in adoption of e-learning, section two provides a detailed account of the hypothesis and the research methodology used, and section three provides the results and recommendations proposed to improve the adoption of e-learning within the context of Sri Lanka.

2.0 Contextual Background

Education is considered to be as a vital component in an individual’s life that imparts knowledge and skills from one generation to another. Higher education, on the other hand, is one of the levels of education specifically provided at universities, institutions, academies that would help an individual to voyage on a greater depth into a subject area. According to Weisbrod et al (2008, p.1) higher education affects the entire society at large, making all of us stakeholders. Further they go on to say that external pressures are relying on higher education to be the mediator in solving most of the economic and social problems (Weisbrod et al., 2008, p.1).

Report by The World Bank (2009) states that Sri Lanka’s competition in the knowledge based global economy is heavily depending on the human capital and on the country’s intellectual property. Based on the statistics published by The World Bank (2009), Sri Lanka ranks 82 out of 140 countries on Knowledge Economy Index
(KEI). The below figures provide a better picture of the Sri Lankan situation compared to countries in the region. The report further goes on to highlight that Sri Lanka is recorded with the highest KEI within the South Asian region but is below the average for low-middle income countries (World Bank, 2009).

Based on the above graph it can be mentioned that, Sri Lanka is performing better in both annual GDP growth and gross secondary enrolment rate compared to both Malaysia, and the average low middle income countries. However, it is lagging behind in terms of gross tertiary enrolment rate as well as the royalty payments on inventions, which directly relate to the poor state the higher education sector in Sri Lanka is in currently. The issue identified by the World Bank, in terms of the gross tertiary enrolment rate and its consequences are further elaborated in the following sections.

Weidbrod et al (2008, p.1) goes on to state that the governments and other external bodies are making the educational bodies to expand programs beyond the age barrier to accommodate the older rather senior population, as an effort to adjust to the
changing labour markets. Hence, the importance of higher education is immense, in terms of its contribution to the economic and social development. However, it should also be noted that higher education industry could also be considered as one of the key drivers for development and economic growth. The World Bank (2009 cited Island, 2009) in one of their accounts state that higher education institutions “should drive and accelerate Sri Lanka’s ascent from a low income county to a middle income country”. Pursuant to Naoko Ishii, Country Director World Bank, Sri Lanka needs to improve on its intellectual capital as to reach the goal of becoming a middle income status country (Island, 2009). Thus, the importance of proper higher education is highlighted with its need to produce high quality graduates.

![Figure 3: University Admissions Statistics 2005 - 2009 (University Grants Commission, 2009)](image)

Based on the statistics published by the University Grants Commission (2009), the admission rate for public universities in 2007 stood as low as 16.53% from the number of students who were qualified for university admission. This was dropped to 16.01% in year 2008 (University Grants Commission, 2009). This is mainly due to limited infrastructure and resources in the state universities.

![Figure 4: Student Enrolments in Higher Education Sector in Sri Lanka (World Bank, 2009)](image)
Based on the above figure, it’s evident that most of the students are attached to external degree programs delivered through conventional distance learning mode. Private higher education institutions also account to an amount close to 50,000 students. One could assume that the higher numbers of students are enrolled with external degree programs due to flexibility of learning and working at the same time and also due to the reduced costs in receiving such education. However, students of external programs would still have to incur a cost for tuition at a mass class, books and reading material and also the administrative admission fees. Private higher education is comparatively far more expensive than the other options provided as most service providers offer foreign qualification where the institution would have to pay royalties.

![Figure 5](image.png)

**Figure 5 Higher Education Enrolments by Socio-Economic Groups (World Bank, 2009)**

The above figure provides an indication of tertiary enrolments from the point of view of social economic classes of students. Based on the graph, it is evident that from the highest economic class (5) 54% of men and 50% of females gets enrolled for tertiary education irrespective of whether it is public or private institutions. However, looking at the lowest economic classes, the enrolment stands for both genders at a rate of 4% which is comparatively low. This could highlight a disparity in enrolments. One could argue that the reason behind this is due to the lack of finances to enrol for a private university or even an external program. Thus, serious attention is required by the industry for the betterment of the country as well as the people to seek for better employment opportunities that could uplift the economic condition of the country.
3.0 Problem Discussion

As pointed out by Tinio (2003) e-learning is one of those technologies that can be considered as a cost effective solution to this problem which can expand the gross enrolment rate of universities. The Government of Sri Lanka with the financial support of the Asian Development Bank initiated the Distance Education Modernization Project to implement an e-learning solution for Sri Lankan Higher Education System. However, it was soon realized that the e-learning solutions acceptance rate stood at a poor level performing adversely against its objectives. The statistics show a poor acceptance rate even though computer facilities were provided free of charge.

![DEMP Student Enrolment Statistics](image1)

Although initially it was targeted to achieve a total number of 10000 students in 2010, the actual cumulative figure stands at 1431 which could be argued as a poor acceptance rate. The Economist (2003), based on a world scale of e-learning readiness ranks Sri Lanka at 55, compared to India ranked at 45 and China ranked 46, and Philippines ranked at 43. The readiness score is calculated based on the use of the internet, attitude towards new technology and the existing use of internet based learning programs in sectors such as education, society, government and industry (The Economist, 2003).

![E-learning Readiness Scores](image2)
Looking more into the internet usage of these countries, it is evident that both India and Sri Lanka have more or less the same percentage of internet users.

![Percentage of Internet Usage by Country](image)

**Figure 8** Percentage of Internet Users (Internet World Stats, 2011)

Sweden has the highest percentage of internet users, which would mean that most of the population is connected to the internet. Probing more into the e-learning readiness, it is evident that the Sweden is ranked with the highest a score of 8.42. However, the internet users are not the only contributors for e-learning readiness as it is not consistent with the other countries such as Sri Lanka and India.

![Internet Speeds by Country](image)

**Figure 9** Internet Speed by Country (Speeds Tests, 2011)

The internet speed statistics further show similar speeds for both Sri Lanka and India which indicates similar internet infrastructure for both countries. Nevertheless, the disparity between the e-learning readiness between Sri Lanka and India cannot be explained. Looking further into the usage behaviour of internet, the most used internet based application in this decade is Social Networking.

![Percentage of Facebook Users by Country](image)

**Figure 10** Percentage of Facebook Users by Country (Social Bakers, 2011)

The reason for particularly focusing on Facebook is mainly because it’s the most popular social networking site in Sri Lanka (Kaviratne, 2011). Popularity is such that the, according to Pathirana (2012) the number of complaints reported at Sri Lanka
Computer Emergency Response Team (SLCERT) in year 2011 was a figure close to 1800, where most of it is for Facebook misuse (Kaviratne, 2011). Kaviratne (2011) further goes on to say that, “Sri Lanka has risen from 82\textsuperscript{nd} to 73\textsuperscript{rd} in the top 100 countries with recorded the highest number of Facebook users, since the year 2008”. Hence it would act as a better frame of reference for the following comparison. Based on the above statistics on Facebook usage, it’s evident that 5% of Sri Lankan population is connected with Facebook. In comparison with India and China, the rate of usage is higher in Sri Lanka.

This clearly shows that Sri Lanka is performing behind other countries in terms of e-learning readiness, due to reasons other than the internet usage. Therefore, it is understood that Sri Lanka is prepared in terms of its e-readiness. However, with regards to the attitude to usage of e-learning, Sri Lanka stands at a poor position. However, for Sri Lanka to make use of the full potential of e-learning, it is paramount to investigate the factors that influence students’ intention to use e-learning.

The objective of the research was to identify the various forces influencing the acceptance of e-learning and the barriers. The research intent is to address the underlying factors that could influence undergraduate students in Sri Lanka to choose e-learning technology.

3.0 Literature Review

Holden & Karsh (2010) states that, the key to increasing usage of a particular technology was to first, increase the acceptance of that technology. Therefore, if an organization wishes to increase the usage of a particular technology such as e-learning, they are required to first investigate on the factors that could influence user’s intention, and manipulate those factors to promote acceptance, thereby increasing the usage. Various schools of thought have been identified from past literature carried out on the acceptance of information technology, and these include: The theory of reasoned action (TRA) (Fishbein & Ajzen 1975 cited Guriting & Ndubisi 2006, p.7), The theory of planned behaviour (Ajzen, 1985 cited Guriting & Ndubisi 2006, p.7), Technology acceptance model (TAM) (Davis, 1989), Technology acceptance model 2
(Venkatesh & Davis 2000), Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al., 2003).

With the multitude of constructs available in the domain of technology acceptance and the wide array of models, Venkatesh et al. (2003) proposes a unified view of technology acceptance with the introduction of Unified Theory of Acceptance and Use of Technology (UTAUT). Venkatesh et al. (2003) reviewed eight of the most influential technology acceptance theories; TAM, TRA, TPB, Combined TAM-TPB, Diffusion of Innovation (DOI), Model of PC Utilization (MPCU), Social Cognitive Theory (SCI), Motivational Model (MM).

Moran et al. (2010) states that UTAUT is a result of research on TAM which incorporates both human and social variables. AbuShanab et al. (2010) points out that Venkatesh et al. presented a shift from the fragmented view of user acceptance of technology to a unified view which amalgamated the above stated theories into a single unified theory which could better explain the user acceptance. Looking at the limitations found in the previous studies, Venkatesh et al. (2003) empirically studied the eight models in a longitudinal study which collected data at three points in time mainly using organizational employees as their sample which was divided to check a mandatory setting and a voluntary setting. The model proposes four super constructs from an evaluation of 14 base constructs from the eight models listed above (Wang et al., 2006).

The authors studied the four super constructs and its affect on usage and also several moderating variables which has been proven and studied in previous studies (Wang et al., 2009). These included; experience, gender, age, and voluntariness (Venkatesh et al., 2003).
Birch and Irvine (2009) UTAUT model testing found its $R^2$ at 70% (all three points) which would mean that the model explains 70% of variance in the intention to use technology (Venkatesh et al., 2003; Teo, 2011). Kjisanayotin et al. (2009) states that the model was able to explain 69% of the variance in behavioural intention to use, which is beyond the average variance (approximately 40%) other models used for technology acceptance. It was also revealed that predicting power of UTAUT increases with variable extensions. Zhou et al. (2010) integrates Tast Technology Fit model with UTAUT with the intention to better explain user intention. They found that UTAUT and TTF on its own can account to 45.7% and 43.3% variance in user intention respectively, however when the two models are integrated the predicting power increases to 57.5% (Zhou et al., 2010).

Further to this, it is said that UTAUT model has been accounted for 70% of variance and in some cases, more that 70% (Bandyopadhyay & Fraccastoro, 2007) of variance in behavioural intention, compared to other models which yeild an explanation just over 40% (Venkatesh et al., 2003; Mount & Fernandes, 2011). Qingfei et al. (2008) states that UTAUT is the most comprehensive model due to its extensive array of factor inclusions and also goes on to say that the powerful explanation of user acceptance is due to the incorporation of factors from TRA, TPB, and TAM. They further go on to state that UTAUT is considered as the most important to oversee IT user acceptance now as well as in the future (Qingfei et al., 2008).

One limitation they identify is the fact that it can not be applied in its purest form to specific IT applications (Qingfei et al., 2008). Although UTAUT’s superconstructs...
performance remain the same for most cases; however, when new external context specific constructs are integrated to the model, its performance tends to change (Im et al., 2011). In terms of UTAUT application in the higher education domain, the acceptance of learning technologies such as e-learning. It is said that there is limited empirical research to study the acceptance of web based systems, especially the once used for distance learning (Schaik, 2009). Moran et al. (2010) further strengthen the statement made by Schaik (2009) by saying that, although UTAUT has been successful in determining acceptance of technology in the information systems domain, its application in education, particularly in higher education field is yet to be made.

TRA, TPB, TAM, TAM2 and UTAUT have been referred in many papers as some of the most influential models used to investigate the intention to use technology as well as technology based methods and practices. UTAUT clearly stands out with a better explanation compared to its predecessors. Looking at evolution of UTAUT, it could be stated that it is transitioning from the introduction to validation stages in model evolution cycle. Still research are being conducted trying to fit UTAUT into different contexts comparing findings against its predecessors.

Most testing of models have been done in university settings taking undergraduate and postgraduate student samples. It was also evident that most research on technology acceptance models were based on self reported usage compared to actual recorded usage. At the same time, it is understood the difficulty of monitoring usage of such a large sample. In terms of the application of UTAUT in field of e-learning it tends to show promising results. Research by Wang et al. (2009) and Lin and Lee (2009) found that PE, EE and SI were significant and only Lin and Lee (2009) found that facilitating conditions was significant. It should also be mentioned that UTAUT has not been validated in the Sri Lankan context. Referring to the research by Bandyopadhyya and Fraccastoro (2007) culture was found to have a strong base on social influence indirectly to the intention to use technology. Hence, this opens up a gap which could be filled by this research.

4.0 Meta Analysis of E-Learning Acceptance Literature
Research findings ranging from 2004 – 2011 was analyzed and evaluated to identify how each construct of UTAUT performed from the point of e-learning technology. A Meta analysis was conducted which was able to better describe the findings of the previous studies based on UTAUT super constructs and few important constructs that were captured in the literature.

Meta analysis is a term used to identify statistical aggregation of research findings (Crombie & Davies, 2009). In contrary Pawson (2006) states that it could be used in instances to describe structured literature reviewing used when identifying variables, in this case to identify the ones that influence the acceptance of e-learning. The literature was selected from electronic databases such as EBESCO as well as Scientific journals accessed through Athens.

<table>
<thead>
<tr>
<th>No</th>
<th>Author(s)</th>
<th>Performance Expectancy</th>
<th>Effort Expectancy</th>
<th>Social Influence</th>
<th>Facilitating Condition</th>
<th>Other Constructs</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>(Park, 2009)</td>
<td>Perceived Usefulness (PU)</td>
<td>Perceived Ease of Use (PEOU)</td>
<td>Subjective Norm (SN)</td>
<td>System Accessibility (SA)</td>
<td>Self Efficacy (SE)</td>
<td>Study done in South Korea using 628 undergraduate students, found that SE is the most important constructs out of the ones that were tested. SN was also found to be significant. PE, PEOU and SA were found to be not significant.</td>
</tr>
<tr>
<td>2</td>
<td>(Drennon et al., 2005)</td>
<td>PU</td>
<td>PEOU</td>
<td>Autonomous and Innovative Learning Mode (AILM)</td>
<td>-Locus of Control -Innovative attitude</td>
<td>Perception of technology (PT) and AILM were used as attributes of student satisfaction where perception of technology was identified using TAM. Study used 248 university students beginning of the course work and 256 at the end. PT and AILM were found to be significantly influencing student satisfaction. In terms of TAM constructs PU had a direct impact while PEOU had an indirect impact through PU.</td>
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<td></td>
<td>(Ahmed, 2010)</td>
<td>IT Infrastructure (TECH) Organizational &amp; Technical Support (SUPP)</td>
<td>IT Infrastructure (TECH) Organizational &amp; Technical Support (SUPP)</td>
<td>Study found that all three constructs were significant and also found that both TECH and SUPP had a positive impact on INST.</td>
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<td>3</td>
<td>PE</td>
<td>EE</td>
<td>SI</td>
<td>FC</td>
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<td>4</td>
<td>(Jairak et al., 2009)</td>
<td>Attitude towards Technology (AT)</td>
<td>PE, EE, SI influenced AT however FC didn’t. And also found that except for PE all the constructs influenced BI.</td>
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<td>5</td>
<td>(Ong &amp; Lai, 2006)</td>
<td>Self Efficacy (SE)</td>
<td>Study focused on a population of 67 females and 89 males where they found that mens rating of SE, PU, PEOU and BI were higher than women. Women’s behaviour was strongly influenced by SE and PEOU where as male bahviour was influenced by PU. Gender mediated the influence of the constructs on BI.</td>
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<td>6</td>
<td>(Liu et al., 2005)</td>
<td>Material Type: *Text – Audio *Audio-Video *TextAudioVideo</td>
<td>Study uses TAM and Flow Theory.Study found that mediariich interfaces such as the once with text, audio, video were found to have a higher PU compared to text-audio and audio-video interfaces.</td>
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<td>7</td>
<td>(Ndubisi, 2006)</td>
<td>Perceived Behavioural Control (PBC) Attitude</td>
<td>Study compared TAM with TPB and found that TAM is more robust than TPB. PU, PEOU, AT were found to be salient constructs having significant impact on BI. PU, PEOU, AT variance were found to be similar. SN was found to be non significant.</td>
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<td>Page</td>
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<td>Variables</td>
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<td>8</td>
<td>(Saade &amp; Bahli, 2005)</td>
<td>PU, PEOU</td>
<td>Cognitive Absorption (CA) Temporal Dissociation (TD) Focused Immersion (FI) Heightened Enjoyment (HE) CA was found to influence both PU and PEOU, However, CA influence was less important compared to PU. PU was found to have a strong influence on BI. The influence was three times higher than the influence on PEOU on BI. FI and HE were found to have a direct influence on PU.</td>
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<td>9</td>
<td>(Ngai et al., 2007)</td>
<td>PU, PEOU</td>
<td>Technical Support (TS) AT PU, AT, PEOU were able to explain 12% of variance in using WebCT. PU and PEOU were found to be the dominant factors in the model which significantly influenced AT. TS has a significant direct effect on PU, PEOU, which in turn moderated the relationship between TS and AT.</td>
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<td>10</td>
<td>(Al-Sena et al., 2009)</td>
<td>Disbelief of ICT benefits Lack of Equipment Lack of Institutional Support</td>
<td>Lack of Time Lack of confidence (Similar to SE) Was able to validate a western theory in an arabic setting. All constructs found significantly influencing BI.</td>
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<td>11</td>
<td>(Arenas-Gaitan et al., 2011)</td>
<td>PU, Job Relevance Results Demostrability</td>
<td>PEOU Perception of External Control Study found that there is a cultural difference between Spain and Chile. However, TAM results remain more or less the same with previous studies. Strong link between PEC and PEOU was observed. And in terms of the chillian context, PEOU strongly influenced PU and in spanish context it influence BI.</td>
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<td>12</td>
<td>(van Raaij &amp; Schepers, 2008)</td>
<td>PU, PEOU, SN</td>
<td>Personal Innovativeness (PI) Computer Anxiety (CAnx) Virtual Learning Environment (VLE) was used for the study with a sample of 45 Chinese MBA students. PEOU and SN were found to influence PU which had a direct influence on VLE use, therefore PEOU and SN has a indirect influence to the use through PU. PI and CAnx had only influenced PEOU.</td>
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Based on the Meta analysis, it was revealed that most prior research found PU and PEOU’s effect on BI to be quite significant (Saade & Bahli, 2005; van Raaji & Schepers, 2008; Al-Senaidi et al., 2009; Ong & Lai, 2006; Ndubisi, 2006; Drennon et al., 2005; Ong et al., 2004; Jairak et al., 2009). PU is found to be more or less the same as PE. Hence, in this context, it means that more the student perceive that the use of e-learning would result in attaining better prospects after the degree, the higher

| 13 | (Ong et al., 2004) | PU | PEOU | Perceived Compatibility | Computer Self Efficacy (CSE) | CSE was found to be a significant determinant of PU, PEOU and PC (negatively significant). PU consistent with prior literature had a positive impact on Behaviour where as PEOU had a positive impact on BI. PC was also found having a positive impact on BI. |
| 14 | (Lee et al., 2011) | PU | PEOU | SN | Organizational Support (OS) Management Support (MS) | Individual Self Efficacy (SE) Task Equivocality (TE) | Survey carried out in Taiwan with a sample of 357 employees found that OS to influence SN. MS and TE found to affect PU. MS and SE was found to influence PEOU. MS has a positive impact on BI. |

Table 1 E-Learning Acceptance Literature

Figure 12 Meta analysis of UTAUT super constructs based on previous e-learning acceptance studies
the students intention to follow of make use of the e-learning program. PEOU is said to be the same as EE in UTAUT and therefore, the higher the student perceive the system to be easy to use the higher the chances for the student to make use of the system.

It was also noted that SN or in UTAUTs’ case SI was mostly significant and influencing the intention or the other constructs such as PE, EE or AT. However, in most of the UTAUT research given above, it tends to not influence BI. SI or social influence is said to be how people important to the student, such as; parents, friends, institution, government etc., believe that student should use the system. Due to the interesting findings in both e-learning domain and other UTAUT studies it’s important to study and understand how SI would influence in a Sri Lankan context. Facilitating conditions were not found to be a major construct as most of the instances this construct would influence behavioural intention through PE and EE. Park (2009) found that system accessibility; another facilitating condition, was not found to be significant. However, Ahmed (2010) found that organizational & technical support and IT infrastructure sub factors which would come under FC, was found to be significant. Jairak et al (2009) who utilized UTAUT, found that FC didn’t have an impact on AT but was found to influence BI. Facilitation conditions could be in terms of the, organization or system. The higher the support perceived from these factors the higher intention to use the system. Thus, it’s worthwhile to study how the construct would perform in Sri Lankan context.

Other than the four super constructs, Attitude toward technology (AT) has been highlighted by several studies within the e-learning context as well as in other technologies in general. Ndubisi (2006) found that AT has a direct impact on BI and the variance it identified was similar to the variance of PU, PEOU. The findings of Jairak et al. (2009) further strengthen the findings of Ndubisi (2006). Ngai et al (2007) found that AT has a weak effect on usage were as PU and PEOU had a direct effect on usage which was recorded stronger than effect of AT. They said that since in an academic context, students are forced by the institution or lecturers to use the system as a requirement of the institution students would not develop any positive attitude in instances where lecturers do not require them to do so. This is in contrary to the findings of Jairak et al (2009), Ndubisi (2006) as well as Teo (2011) who found that
AT had a significant effect on intention to use education technology. Therefore, it is required to check the effect of AT in influencing behavioural intention to use e-learning in the Sri Lankan context.

Apart from attitude, Self Efficacy (SE) is also another construct that stands out from the body of literature. Study by Park (2009) found that SE is the most influential construct with highest effect on behavioural intention. From a different research context, it was identified as a significant determinant effecting PU, PEOU, and PC as an external variable (Ong et al., 2004). Study by Lee et al (2011) too found a positive effect on PEOU having an indirect effect on BI. The construct is further explained to say that men rate SE higher than women, and that women’s behaviour is strongly influenced by SE compared to men. However, some research outside e-learning context have found that SE has no impact on BI (Wang & Wang, 2010) and some found it to have an impact on BI (Moran et al., 2010; AbuShanab et al, 2010). Thus, it requires further investigation to find if SE has a direct impact on the behavioural intention as there is a high possibility that a student might use an e-learning system if the student believes that the student has the capability of using computer system. Students of Sri Lanka are now given IT training and has included IT to its core curriculum with the objective of increasing IT literacy rate to 75% by the year 2016 (De Alwis, 2011). This would mean that most students would be having high computer self efficacy which could lead to higher intention to use systems.

Anxiety is also another construct that has been discussed in previous studies related to e-learning, as well as the studies generally conducted on technology. Anxiety is identified mainly in terms of the anxiety caused by technology. Moran et al (2010) found that computer anxiety had no impact on BI which is the same with the results of van Raaji and Schepers (2008). However, van Raaji and Schepers (2008), found that it had only influenced PEOU, which indirectly affected BI. However, AbuShanab et al (2010) found that it had a negative impact on BI. This would also need to be further investigated as to whether Sri lankan students would not use the system, if anxiety exist in using computers. It is needed to be mentioned that although students have access to internet, the amount of computers owned is still less. Most students access the internet through educational organizations or internet cafes thus, they would not be familiar with systems at the level of familiarty expected from a person who owns a
computer. Therefore, it is interesting to find how the element of surprise in using systems would affect anxiety.

5.0 Conceptual Framework for Research

Based on the above critical discussion, it was decided to investigate the following constructs to identify the impact of it on behavioural intention. The constructs comprise of the four super constructs (Performance Expectancy, Effort Expectancy, Social Influence, Facilitating Conditions) with Technology based Anxiety, Computer Self Efficacy and Attitude. Dependent Variable: Behavioural Intention to Use e-learning and Independent Variables: Performance Expectancy (PE), Effort Expectancy (EE), Social Influence (SI), Facilitating Conditions (FC), Attitude towards technology (AT), Technology induced Anxiety (Anx), Self Efficacy (SE).

The following figure depicts a graphical representation of the variables and the hypothesis the research aims to explain and validate.

![Conceptual Framework](image)

6.0 Hypothesis Development

6.1 Performance Expectancy

Performance expectancy (PE) is defined as “the degree to which an individual believes that using the system will help him or her to attain gains in job performance”
According to Venkatesh et al. (2003) PE has been found to be the strongest construct to predict intention and found to be significant in both mandatory and voluntary settings across all the individual models within their study as well as in previous studies (Taylor & Todd, 1995; Venkatesh & Davis, 2000). Based on this definition, the following hypothesis is proposed.

\[ H_01 : \text{The performance expectancy does not have an impact on behavioural intention} \]
\[ H_\alpha_1 : \text{The performance expectancy has an impact on behavioural intention} \]

### 6.2 Effort Expectancy

Venkatesh et al. (2003) defines Effort Expectancy (EE) as the “degree of ease associated with the use of the system”. They go on to say that effort based constructs are expected to be more significant in early stages of the introduced behaviour which fades away over time (Venkatesh et al., 2003). Based on this definition, the following hypothesis is proposed.

\[ H_02 : \text{The effort expectancy does not have an impact on behavioural intention} \]
\[ H_\alpha_2 : \text{The effort expectancy has an impact on behavioural intention} \]

### 6.3 Attitude towards Technology

Davis et al. (1989) identify the attitude as the positive and negative feeling about completing the behaviour at hand. This could also be identified as the pleasant or unpleasant feeling about a particular behaviour (Bagozzi et al., 1992). Based on this definition, the following hypothesis is proposed.

\[ H_03 : \text{The Attitude towards using Technology does not have an impact on behavioural intention} \]
\[ H_\alpha_3 : \text{The Attitude towards using Technology has an impact on behavioural intention} \]

### 6.4 Social Influence

Social influence (SI) is defined as “the degree to which an individual perceives that important others believe he or she should use the new system” (Venkatesh et al., 2003). All three sub constructs behave similarly where it is found to be nonsignificant in voluntary settings however finds it to be significant when the context changes to a
mandatory setting (Venkatesh et al., 2003). Based on this definition, the following hypothesis is proposed.

\( H_04: \) The Social Influence does not have an impact on behavioural intention

\( H_{a4}: \) The Social Influence has an impact on behavioural intention

6.5 Facilitating Conditions

Facilitating conditions (FC) is defined as the “degree to which an individual believes that an organizational and technical infrastructure exists to support use of the system” (Venkatesh et al., 2003). Venkatesh et al. (2003) reveals that the construct is found to be significant in both voluntary and mandatory settings in the early stages of the implementation however, fades away over time. Venkatesh et al. (2003) further goes on to state that if both PE and EE constructs are present or significant the FC construct becomes non significant in predicting intention. Based on this definition, the following hypothesis is proposed.

\( H_05: \) The Facilitating Conditions does not have an impact on behavioural intention

\( H_{a5}: \) The Facilitating Conditions has an impact on behavioural intention

6.6 Self Efficacy

According to Ajzen (1991) Self efficacy, is concerned with one’s perception of how well he or she could perform an action required for a particular behaviour. Based on this definition, the following hypothesis is proposed.

\( H_06: \) The Self Efficacy does not have an impact on behavioural intention

\( H_{a6}: \) The Self Efficacy has an impact on behavioural intention

6.7 Anxiety

Computer anxiety, according to van Raaji and Schepers (2008), is the fear that arises about the implications of computer use such as system breakdowns, harddisk crashes as well as loss of data. It has always been related to computer adoption in a negative way. van Raaji and Schepers (2008) also states that it could be that people might be
uneasy and afraid to look foolish, if problems arise using a system which is perceived to be easy to others. Based on this definition, the following hypothesis is proposed.

\[ H_0: \text{The Technology Induced Anxiety does not have an impact on behavioural intention} \]
\[ H_a: \text{The Technology Induced Anxiety has an impact on behavioural intention} \]

7.0 Research Methodology and Data Analysis

The research approach utilized for this research is the deductive method of reasoning. The main reason for the selection is due to the fact that the research looks at explaining causal relationships between variables identified in the conceptual framework which was used to develop the hypothesis that are tested with data appearing in quantitative form.

Mainly due to the nature of this research and its domain, the cross-sectional study using the survey method was selected as the strategy for the research in terms of collecting the data. The research study looks at the total population of Sri Lankan students who do not get selected for state university admission. According to the University Grant Commission (UGC) the student number stands at an average of 130,000. Saunders et al (2007b, p.212) further states that a minimum sample of 384 is needed with a margin of 5% error or in other words with a confidence level of 95% for a population above 100,000. Hence, looking at an estimated response rate between 40 – 45%, approximately 400 questionnaires were distributed among the different higher education institutes in Sri Lanka.

The questionnaire consists of five demographic variables; gender, age group, nationality, education level, experience with computers, in addition to the 31 items of 8 unobserved variables identified in the conceptual framework. These 31 items were measured with a Likert scale ranging from 1-5, where 1 being strongly disagree and 5 being strongly agree. According to Kothari (2002) correlation method is widely used to identify the relationship between two or more variables in a dataset. Correlation was therefore selected to be used as the method to be used for statistical inference to identify the relationship between the variables. However, when it comes to the particular type of correlation method, Spearmans correlation was selected as the data was found to be not normally distributed.
8.0 Results

A pilot study was conducted involving 17 students in order to test the measurements scale and identify if the questionnaire produce reliable responses. The responses from the questionnaires were then entered in to SPSS 16.0 and reliability testing was done using Cronbach’s alpha method. The alpha value received is 0.799 which is more like 0.8. According to Field (2006) states that alpha values found above 0.8 is considered as good values. Thus, the reliability of the questionnaire measurement could be considered as reliable.

8.1 Profile of Respondents

Out of 358 responses received for the research survey. The population comprised of 59.8% of males and 40.2% of females, where the highest number of respondents belong to the category ranging from 15 – 20. Majority of respondents had at least attained Advance Level qualification and majority had more than 3 years of computer experience.

8.2 Spearman Correlation Analysis

The below figure identifies the research model with its results. The relationships that are highlighted are primary hypothesis that were declared to be investigated. However, auxiliary hypothesis have been identified that could further explain the intention to use e-learning. In terms of the primary hypothesis, all variables were found to be correlating with behavioural intention; however, anxiety was identified to show a negative correlation with behaviour. In other words, increase in anxiety will decrease the behavioural intention. Therefore, increase in the anxiety brought in by e-learning solution would result in lower intention to use it.
Based on the auxiliary hypothesis it is evident that almost all the constructs have been found to have a relationship with attitude, and the correlation these variables have with attitude is higher than the correlation (R value) with behavioural intention. Attitude is anyway found to be the most dominant, highly correlated construct out of the primary variables used for the study against the behavioural intention. Thus, all constructs could also be indirectly influencing through attitude construct.
8.3 Regression Analysis

<table>
<thead>
<tr>
<th>Dependent Variables</th>
<th>Independent Variables</th>
<th>R Value</th>
<th>R Square</th>
<th>ANOVA df</th>
<th>ANOVA F</th>
<th>ANOVA Sig.</th>
<th>Constant</th>
<th>R Value</th>
<th>Formula</th>
</tr>
</thead>
<tbody>
<tr>
<td>BI</td>
<td>PE</td>
<td>.481</td>
<td>.231</td>
<td>1, 356</td>
<td>107.05</td>
<td>.000</td>
<td>2.036</td>
<td>.460</td>
<td>BI=2.04+.460PE</td>
</tr>
<tr>
<td>EE</td>
<td></td>
<td>.402</td>
<td>.161</td>
<td>1, 356</td>
<td>68.479</td>
<td>.000</td>
<td>2.170</td>
<td>.440</td>
<td>BI=2.17+.440EE</td>
</tr>
<tr>
<td>SI</td>
<td></td>
<td>.364</td>
<td>.132</td>
<td>1, 356</td>
<td>54.366</td>
<td>.000</td>
<td>2.329</td>
<td>.384</td>
<td>BI=2.33+.384SI</td>
</tr>
<tr>
<td>FC</td>
<td></td>
<td>.330</td>
<td>.109</td>
<td>1, 356</td>
<td>43.573</td>
<td>.000</td>
<td>2.360</td>
<td>.366</td>
<td>BI=2.36+.366FC</td>
</tr>
<tr>
<td>AT</td>
<td></td>
<td>.513</td>
<td>.263</td>
<td>1, 356</td>
<td>127.02</td>
<td>.000</td>
<td>1.911</td>
<td>.489</td>
<td>BI=1.91+.489AT</td>
</tr>
<tr>
<td>SE</td>
<td></td>
<td>.411</td>
<td>.169</td>
<td>1, 356</td>
<td>72.319</td>
<td>.000</td>
<td>1.983</td>
<td>.486</td>
<td>BI=1.98+.486SE</td>
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<tr>
<td>TAnx</td>
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<td>.008</td>
<td>1, 356</td>
<td>2.794</td>
<td>.095</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PE x EE x SI x FC x AT x SE x TAnx</td>
<td></td>
<td>.606</td>
<td>.367</td>
<td>3, 354</td>
<td>29.017</td>
<td>.000</td>
<td>.663</td>
<td>.204</td>
<td>BI=.663+.204PE+.060EE+.257AT+.076SI+.260SE-.008TAnx-.047FC</td>
</tr>
</tbody>
</table>

Table 2 Regression Results

Although correlation identifies the relationship nature among variables however, it lacks the ability to identify the causality in the relationship. This means although relationships are identified through the use of correlation, question on what causes what could not be answered. Thus, regression analysis was used to identify the causality of the variables against behavioural intention. Regression analysis, predicting behavioural intention from performance, expectancy, effort expectancy, social influence, facilitating conditions, attitude towards technology, self efficacy, and technology anxiety, was found to be significant, \( F(3,354)=29.017, \ P<0.05 \) (or: \( F(3,354)=29.017, \ P=0.000 \)). The \( R^2 \) recorded was 36.7% of variance of behavioural intention is explained by the main constructs tested.

\[
BI=.663+.204PE+.060EE+.257AT+.076SI+.260SE-.008TAnx-.047FC
\]

According to the formula it’s evident that PE, EE, AT, SI, SE, should be increased and the technology anxiety should be reduced. However, when it comes to the facilitating conditions the interpretation is different. Facilitation condition increase
could be interpreted in two ways; increased of positive conditions such as more compatibility and more availability as well as negative conditions such as higher negative compatibility and not being available. Looking at the results, the increase (positive way) in facilitating conditions alone would increase behavioural intention. When negative conditions increase the intention would decrease, hence the facilitating conditions overall should be positively increased to decrease its overall impact towards the behavioural intention.

9.0 Conclusion and Recommendations

The problem under investigation was mainly with the tertiary student enrolments which was due to state universities inability to accommodate students due to less infrastructure. However the solution to this problem: an e-learning distance learning solution, was found to have a low acceptance rate.

Based on the literature review conducted in technology acceptance theoretical frameworks and its applications in e-learning. UTAUT was selected as the theoretical based for the research study where the model was extended by including more variables with the intention to improve explanation power of the proposed model.

Quantitative research method was selected having survey as the research strategy, utilizing questionnaire as the research tool. 400 questionnaires were destributed however, only 358 responses were collected. Data analysis was done using SPSS where, correlation and regression were applied to identify the relationships and causality. Correlation analysis found that out of the all except for anxiety all others have a positive association with behavioural intention. And the association is even higher for attitude which would mean attitude has a higher impact on behavioural intention. The regression analysis found that facilitation conditions on it own would have a positive impact; however, when all variables are accounted would act in a negative way. However, it was interpreted as a positive FC influence whereas negative FC discourages users intention. Further, the regression also revealed 36.7% ($R^2 = 0.367$) variance in explained by the proposed regression formula. In terms of the results, it could be taken in as input to improve the existing progrmas as well as new programs with the intention to improve the acceptance.
In the case of performance expectancy, the students were needed to be explained the importance of this solution and highlight the performance improvements expected in the future on successful completion. The usefulness of the system or moreover the usefulness of the features available in the system would be highlighted to the users. This could be only done through proper rollout or deployment of the system. Students are needed to be given adequate training which would focus on how to use the system, at the same time, the benefits and the usefulness of each feature. In terms of effort expectancy, the way forward to make it easy is by making the system less complex as possible and giving a comprehensive user training. Usability improvements could also be taken as a strategy to improve the effort expectancy of such systems. Social influence improvement is only possible if the system or environment foster community building. One strategy could be to link with social networking sites which could bring in the community aspect which could influence the students to use the e-learning solution.

Facilitating Conditions for e-learning system could be categorized as institutional and system support. Institutional support include support that range from providing online and offline technical support, providing terminals to access the system, network reliability, interoperability with network infrastructure. These positive facilitation conditions need to be improved where as the negative compatibilities or conditions that hinders the use, need to be overcome. Although there are no specific methods to improve attitude, past literature shows that positive attitude could be developed with adequate marketing campaigns (Azmi & Bee, 2010). However the results also show that indirectly by improving the other variables it would improve the attitude towards the e-learning solution. Anxiety could be reduced by having clearly defined instructions both in visual and verbal, which help to overcome it (Scarpiello, 2003). Self efficacy in improved by mastery experience which results in building positive emotional state (Kirk, 2011). Future research is recommended in lines of testing other variable extentions that could improve the overal explanation power of the model.
References


