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School Teachers' Intention to Use E-Learning Systems in Sri Lanka: A Modified TAM Approach

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Abstract
Rapid expansion of Internet technology has made the human life much easier and efficient and also heavily influence in any business activity; education sector is not an exception to this. Governments of all countries have now started to pay attention to deliver education at more convenient method; one of them is the use of technology called e-learning (electronic learning). Success of such effort by such governments and educational institutions are very much dependent on the acceptance of the system by its direct users. When it comes to the acceptance of technology, maturing stage is seen in developed countries to study the factors influencing such acceptance however a little is known about developing countries, in the case of Sri Lanka little. This study aims to address this gap by delineating the factors influencing teachers' intention to use e-learning systems in Sri Lankan school. This study deployed Technology Adoption Model (TAM) and did an amendment to fit Sri Lankan context and found that Perceived Usefulness, Perceived Ease of Use and Facilitating Condition are positively and significantly influencing such intention.
Keywords: E-Learning, Intention to Use, Teachers, Technology Acceptance Model, Sri Lanka

1. Introduction

Information and communication technology (ICT) has interwoven itself into every aspect of human life today. With the explosive expansion of Internet, particularly the World Wide Web, the positive influence of ICT in the teaching and learning has also become pivotal. ICT has penetrated into education sector in many facets, e-learning is one them, the usage of computer network , specifically internet technology, to remove time as well as distance factors to remove the virtual barrier between teachers and students by means of using e-learning tools such as Blackboard, Moodle, etc. (Raab *et al*., 2002; Tarhini *et al*., 2013). E-learning is described as the delivery of educational instructions by using computer network technology; these technologies can be intranet, extranet or the Internet (Govindasamy, 2002). This mode of learning removes obstacles such as isolated geographic locations, inconvenient time factor, and so on and enables the learners to continue education at their own pace.

When it comes to amalgamation of ICT with the teaching and learning process, especially in schools, many factors that hinder such effort have to be addressed. Some of these factors are teachers' attempt, absence of school level business tactic in this regard, non-availability of technological infrastructure (Elloumi, 2004; Surry et al., 2005; Tarhini *et al*., 2013). When an e-learning system simulate a real classroom experience and takes care of students' needs then such system is considered a success (Kilmurray, 2003; Kim and Moore, 2005; Tarhini *et al*., 2013). In spite of its rapid growth and potential benefits, the e-learning system implementation, according to existing literature, suffers failures as well as well (Arbaugh and Duray, 2002; Wu *et al*., 2006). By understanding how these innovative systems are accepted by users and making them accustomed to use such systems these failure rates of implementation and adoption can be reduced or even eliminated, hence making such efforts a success, and those who provide these e-learning tools should realize the importance of incorporating services that bring positive effect from the users of such system (Tarhini *et al*., 2013). It can be realized from the review of literature that majority of the studies have taken care of developed countries and developing countries and hence studies on the adoption of e-learning system in developing countries have less attention; in the of Sri Lanka particularly in schools' context little is known in the literature.

To study the users' intention and actual use of e-learning systems, Technology Acceptance Model (TAM) has extensively been used in developed countries' contexts (Teo *et al*., 2008) and a few in Asian studies, however little for Sri Lankan context. Due to the absence of government level policies, lack of proper infrastructure [Nasser and Abouchedid, 2000; Tarhini *et al*., 2013), propensity of senior teachers towards sticking to traditional method of teaching, dearth of professional information technology staff in school level, lack of trained teachers, etc. the successful implementation and adoption of e-learning systems in schools has challenges in Sri Lanka.

Technology adoption models such as Diffusion of Innovation, Theory of Reasoned Action, Theory Planned Behavior, and son on have been developed, tested and validated in various contexts to study the factors influencing users' adoption behavior of new technologies, however, because of its comprehensiveness and popularity, TAM has been used in many such cases of technology adoption (Venkatesh and Bala, 2008). However the TAM suffers from some limitations such as failure to address social influence and facilitating

conditions therefore this study aims to extend the TAM by adding these variables to study the users' acceptance of e-learning system in Sri Lankan schools.

2. Theoretical Framework

Many technology adoption models such as Theory of Reasoned Action, Theory of Planned Behaviour, Diffusion of Innovation, Technology Acceptance Model (TAM) etc. have been adopted, modified as well as validated in many industries and many contexts to understand and predict such acceptance and use of new technologies, out of these models the TAM has been claimed to be more comprehensive one and used and extended in many contexts. This study also used the TAM with amendments. The amended TAM is shown in Figure 1.

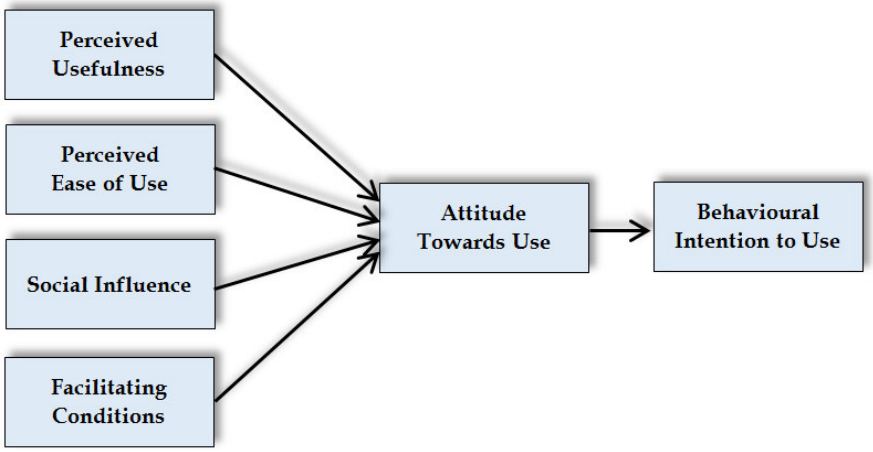

Figure 3: Research Model

The TAM has been in wide use by researchers in the IT field to get better understanding of the adoption of IT, its acceptance and usage in organizations (Davis *et al*., 1989) and in various settings such as online shopping, e-Government adoption, etc. The TAM was developed based on the theoretical foundation of the TRA and TPB (Davis, 1989; Lee *et al*., 2003). It was customized with the purpose of modeling users' acceptance of computer systems having the intention of explaining the key determining factors of computer adoption. TAM can be attributed to cognitive theory, according to which when people observe others performing a behaviour these people's perceptions of their own ability to perform the behaviour are influenced, and self-efficacy (Compeau and Higgins, 1995).

Perceived Usefulness is "the degree to which a person believes that using a particular system would enhance his or her job performance". Perceived Ease of Use is "the degree to which a person believes that using a particular system would be free of physical and mental efforts" (Davis et al. 1989) are the two particular beliefs that primarily drive for technology acceptance. These two beliefs, Perceived Usefulness and Perceived Ease of Use, influence a person's attitude towards using a system and which in consequence influences the person's behavioural intention to use a system and the behavioural intention, in result, determines the actual use of a system. Based on this the following hypotheses were derived:

H1: *Perceived Usefulness has positive and significant influence on attitude towards using e-learning systems.*

H2: *Perceived Ease of Use has positive and significant influence on attitude towards using e-learning systems.*

Social Influence is *"The degree to which an individual perceives important that others believe he or she should use the new system"* and it contains three constructs, they are: *Subjective Norm (the person's perception that most people who are important to him think he should or should not perform the behaviour in question)*, *Social Factors (the individual's internalization of the reference group's subjective culture, and specific interpersonal agreements that the individual has made with others, in specific social situations)*, and *Image (the degree to which use of an innovation is perceived to enhance one's image or status in one's social system)* (Venkatesh *et al*., 2003). It is the *degree to which peers influence the use of a system* (Al-Shafi, 2008). According to Venkatesh *et al*. (2003), this influence can be positive or negative but it is considered to be an important factor in many facets of teachers' professional lives and it is likely to be influential in the case of attitude towards using e-learning system. A person's decision is very much his family, colleagues as well as friends. This research will measure the Social Influence with the assumption that teachers' attitude towards using e-learning system is influenced by positive references by their social links and the following was hypothesized:

H3: *Social Influence has positive and significant influence on attitude towards using e-learning systems.*

Facilitating Conditions is "The degree to which an individual believes that an organizational and

technical infrastructure exists to support the use of the system" and it contains three constructs, they are: Perceived Behavioural Control (reflects perceptions of internal and external constraints on behaviour and encompasses self-efficacy, resource facilitating conditions, and technology facilitating conditions), Facilitating Conditions (objective factors in the environment that make an act easy to do, including the provision of computer support), and Compatibility (the degree to which an innovation is perceived as being consistent with existing values, needs, and experiences of potential adopters). It has been found by researchers in technology studies that innovation use is positively influenced and significantly predicted by Facilitating Conditions (Venkatesh et al., 2003). This research will measure the Facilitating Conditions by having the resources required to bring positive attitude among the teachers to use the e-learning system and accordingly the following was hypothesized:

H4: *Facilitating Conditions has positive and significant influence on Attitude Towards using e-learning systems.*

Attitude toward Using is a person's previous attitude toward performing that behaviour and he or she thinks about decisions to be taken and possible outcomes of that action before taking decisions whether or not to get into in given behaviour. Behavioural Intention is *"The person's subjective probability that he or she will perform the behaviour in question"* (Venkatesh *et al.*, 2003). It is a person's intention to adopt and make use of the technology in the future. The behavioural intention is utilized in many researches to predict the technology adoption (Dwivedi and Irani, 2009). The behavioural intention is perceived to have direct influence on the actual use of e-learning systems. Accordingly the following were hypothesized.

H5: *Attitude towards Use has positive and significant influence on Behavioural Intension to use e-learning systems.*

3. Methodology

The study employed quantitative study based on questionnaire survey which is in consistent with previous studies on information technology adoption and especially e-learning (Venkatesh and Bala, 2008). Instrument was developed based on measurements from the literature and each question was measured on a five point Likert-scale. Population of this study was all government school teachers in the Eastern province of Sri Lanka. According to a government official there are 1042 schools in 17 Educational Zones with 26,000 teachers. Sample size was determined to be 394 based on the formula devised by (Yamane, 1967). Due to the lack of time and resources availability respondents were selected conveniently and 500 questionnaires were self-administered and 367 were complete.

4. Analysis and Findings

4.1 Respondents' Profile

The respondents included teacher who already used social media tools such as blogs to deliver learning materials and those who had never used any electronic media for teaching. More than 58% of the respondents were computer literate. 60% of the respondents had completed education up to diploma level and the 33% had completed degree and only about seven percent with postgraduate degree.

4.2 Instrument's Reliability and Validity

Both reliability and validity of an instrument is considered vital characteristics of a research instrument. In quantitative researches, the reliability makes sure that the measurements in the instruments are consistent and validity of an instrument ensures measuring power of it (Swanson and Holton, 2005; Creswell, 2013). Crobach's Alpha coefficient is used by researchers to measure the reliability of instrument and this study also used the same and results are shown in Table 1.

Table 7: Results of Reliability Test

Scale	No. Of Items	Cronbach's Alpha
Perceived Usefulness	6	.908
Perceived Ease of Use	6	.877
Social Influence	3	.730
Facilitating Conditions	8	.897
Attitude Towards Use	4	.883
Behavioural Intention to Use	3	.822

According to the Table 1, all constructs have achieved the threshold of 0.7 (Boudreau *et al*, 2001) and are in Excellent and High Reliability zones (Hinton *et al*, 2004).

In order to ensure the face validity of the instrument, a pilot test using 28 experienced teachers and Assistant Directors of Education was conducted. Their understandability and advises were incorporated into the instrument so that some wordings in the questions were changed. In order to ensure construct validity of the instrument, Factor Analysis was done. This so called dimension reduction method was conducted by making use

of Principal Component Analysis (PCA) and the rotation method was Varimax. The results of the factor analysis is shown in Table 2.

Table 8: Total Variance Explained by Constructs

Constructs	KMO Measure of Sampling Adequacy	Total Variance Explained – Eigenvalues (in %)
Perceived Usefulness	.899	68.75
Perceived Ease of Use	.857	62.34
Social Influence	.788	65.13
Facilitating Conditions	.903	71.34
Attitude Towards Use	.836	74.36
Behavioural Intention to Use	.705	74.02

According to Table 2, Sampling adequacy of all constructs were good (Hutcheson and Sofroniou (1999) as cited by Field, 2009) because of the KMO and high variance explained by the constructs.

4.3 Correlation and Regression Analysis

Correlation and regression analysis was carried out to see the relationships among the variables and their directions as well as to see how much variance is explained by the predictor variables. Results of Pearson correlation analysis is shown in Table 3 and it can be seen that all variables have positive and strong relationships (Cohen, 1988).

Table 9: Results of Correlation Analysis

		PU	PEOU	SI	FC	Attitude	Intention
PU	Pearson Correlation	1	.726**	.667**	.640**	.971**	.669**
	Sig. (2-tailed)		.000	.000	.000	.000	.000
	N	367	367	367	367	367	367

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

Table 10: Model Summary: Predictors: (Constant), FC, PEOU, SI, PU

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.997[a]	.994	.994	.08042840

Table 11: Coefficients: Dependent Variable: Attitude

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-.070	.006		-10.821	.000
	PU	.714	.041	.686	17.560	.000
	PEOU	.189	.031	.166	6.162	.000
	SI	-.012	.030	-.011	-.396	.692
	FC	.278	.052	.160	5.302	.000

In order to realize the how significantly the predictor variables determines school teachers' attitude towards using the e-learning systems regression analysis was done. The coefficient of determination of the contribution of Perceived Usefulness, Perceived Ease of Use, Social Influence and Facilitating Conditions to Attitude Towards Using E-Learning system, the R^2, value from Table 4 which is 0.994 (Adjusted R^2 0.994) indicates a shared variance of about 99% between predictor variables and mediating variable, which means 99% of the variances in teachers' attitude towards using e-learning systems can be accounted for by the knowledge of these independent variables.

According to Table 5, one of the dependent variable, Social Influence, is not significantly contributing towards the determination of teachers' attitude towards using e-learning systems.

Table 12: Model Summary: Predictors: (Constant), Attitude

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.659[a]	.434	.432	.75355947

The coefficient of determination of the contribution of Attitude Towards Using e-learning system to Intention to Use E-Learning system, the R^2, value from Table 6 which is 0.434 (Adjusted R^2 0.432) indicates a shared variance of about 43% between the mediating variable and the dependent variable meaning that 43% of the variances in teachers' intention to use e-learning systems can be accounted for by the knowledge of the attitude towards using the systems.

4.4 Response to Hypotheses

Hypotheses developed for this study and their results are shown in Table 7.

Table 7: Summary of Hypotheses

No.	Research Hypotheses	Results
H1:	*Perceived Usefulness has positive and significant influence on attitude towards using e-learning systems.*	Supported
H2:	*Perceived Ease of Use has positive and significant influence on attitude towards using e-learning systems.*	Supported
H3:	*Social Influence has positive and significant influence on attitude towards using e-learning systems.*	Not Supported
H4:	*Facilitating Conditions has positive and significant influence on Attitude Towards using e-learning systems.*	Supported
H5:	*Attitude towards Use has positive and significant influence on Behavioural Intension to use e-learning systems.*	Supported

5. Discussion and Conclusions

This study attempted to realize school teachers' intention to use e-learning systems by using TAM and made the model more comprehensive by adding two variables namely Social Influence and Facilitating Conditions. The findings of the study delineated that the school teachers would like to use e-learning systems and also all hypothesized relationships were supported except the one with Social Influence. In addition this study has proved that TAM can be applied in educational context in developing countries (Tarhini *et al*., 2013), especially in Sri Lanka and the results are in alignment with previous studies such as Tarhini *et al*. (2013).

The overall coefficient of contribution of PU, PEOU, SI and FC to Attitude towards usage, 99.4%, is an outstanding acceptance of fitness of TAM model in Sri Lankan context which is extremely better than studies in other developing countries such as Lebanon (Tarhini *et al*., 2013). The coefficient of contribution of Attitude to Intention, 44%, is also considerable when it comes to intention of teachers to use e-learning systems.

The results of this study emphasizes that teachers in Sri Lanka should be made aware of the usefulness utilizing e-learning systems, when they realize that usage of such systems would make their professional life easier. When the teachers have an opportunity to enjoy easiness in using such e-learning systems and also when they feel that their existing working style and workload would be eased if they use this new system they will take to such system without any hesitation, this should be communicated to them and decision makers in the government side should consider acquiring more user friendly e-learning systems and provide ample amount of training to the teachers.

The insignificant contribution of SI makes it obvious that when e-learning systems are implemented in schools by government then without considering how others feel or what other teachers' sense this, all teachers will have to use the system provided that government instructs the use as mandatory. Significant contribution of FC explains that the presence of needed infrastructure sounds to be vital when it comes to the positive attitudinal change of teachers towards using e-learning system. When the government provides necessary infrastructure and facilities needed to use the system, the teachers would like to use the system.

As with other researches this study was also accompanied by limitations. The geographical scope was confined to Eastern province of Sri Lanka and due to time and other resource constrains selection of respondents was based on convenience which made the responses biased to a particular region of the country and therefore the generalizability of this study to whole Sri Lankan needs some care. Further this research considered only teachers therefore if students population can be included this study would have been more comprehensive. This study assumed that the usage of e-learning system would be mandatory when implemented by the government schools; voluntariness could be considered in future studies. Hence, future researches could take these limitations into account and come out more comprehensive.

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