EVALUATING STUDENT ACCEPTANCE LEVEL OF E-LEARNING SYSTEMS

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Abstract

The e-learning information systems are widely used in universities to improve their courses, although this does not always achieve the objective of facilitating the teaching-learning process, there are several factors that avoid it. The aim of this study was to adapt a research model that describes the behaviour of use and the intended use of e-learning systems in Ecuador students, based on the Technology Acceptance Model (TAM) developed by Fred Davis. A self-report questionnaire was designed to examine the student's acceptance and attitude towards e-learning system. Data from 263 undergraduate and graduate students were collected in a University of Ecuador. The model is composed of eight constructs, namely, technical support, computer self-efficacy, subjective norms, satisfaction, perceived usefulness, perceived ease of use, intention to use the system and use the system. The model was estimated using structural equation modelling (SEM), for which the software was used R. It was found that the technical support and computer self-efficacy served as the two anchors of significant perception of fundamental constructs in TAM. Satisfaction became the sole determining factor in predicting use, while subjective norms were significant to the prediction of intention to use e-learning system. Overall, subjective norms, computer self-efficacy and perceived ease of use were able to explain the most variation observed in the intention of the students to use e-learning system.

Keywords: information systems, technology acceptance model, structural equation modelling.

1 INTRODUCTION

The information and communication technologies (ICT) are hardware and software tools that facilitate to capture, to transmit and to display data and information electronically [1]. The application of ICT in education is known as e-learning [2]. It applies to both formal education and continuing education programs [3], [4].

During the last two decades, the World Wide Web (WWW) has become essential in global education. It is the initiative to collect hypermedia information from a huge area and thus give everyone access to a wealth of information [5].

With the potential of the WWW, educational institutions invest in information systems (Moodle, Blackboard and WebCT, etc.) in order to strengthen the teaching ways (classroom and distance) [6], [7], they provide new methodologies and delivery of education [8]. However, recent research on their acceptance and use, show negative results related to a high percentage of students from beginning courses who are supported by these tools and did not end their programs, despite the benefits provided by this kind of systems and the increase of its market.[9].

Most models for evaluating the acceptance of e-learning systems that were identified in the literature address only the technological aspect. Internet is considered as a global technology, but its effectiveness should be measured at the local level, since users usually work in local / national contexts [10]. Therefore, it was important to investigate the acceptance of e-learning system in Ecuador.

The revision of previous studies confirmed little research of this kind in Latin America, so it was considered important to perform research in the university context of Ecuador to establish an evaluation model of the acceptance of e-learning systems in the universities.

Since 2008 deep amendments to the Constitution of the Republic of Ecuador are made, becoming stronger with a new one in which special reforms are evident in higher education [11].

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In 2009 The National Assessment and Accreditation Council conducted an evaluation of institutional performance of the Ecuadorian Universities and Polytechnic schools. This evaluation resulted in a categorization of the universities from “A” to “E”.

The evaluation of the Universities and Polytechnic schools in 2009 considered the evidence for the practice of teaching with the support of virtual libraries, computer labs, ICT access and connectivity; which means, having effective e-learning information systems [12].

Some research has been conducted to evaluate the acceptance of the technology. Since the mid-eighties it is done with greater emphasis, and in 1986 the technology acceptance model (TAM) of Fred Davis was raised [13]. The TAM is based on the theory of reasoned action of Fishbein and Ajzen. The TAM was improved by further research to reach the TAM 2 version shown in the Fig. 1 [14]–[17].

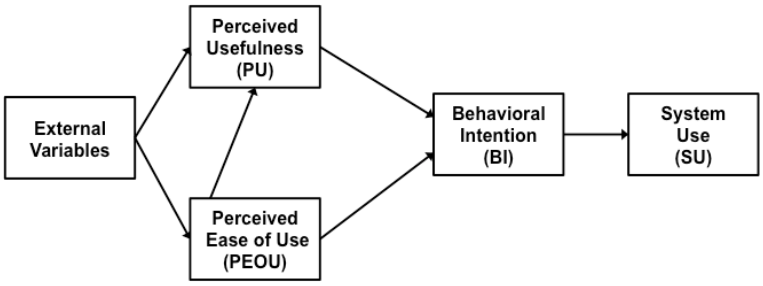

Fig. 1. Versión TAM 2 [17]

Among the various efforts to understand the process of acceptance of information systems by users, the TAM is one of the most cited frameworks [18]. In the field of e-learning TAM is used in recent research to study their acceptance [19].

Despite its popularity and usefulness, some researchers suggest investigate whether TAM should be revised, expanded or modified to take into account the rapid changes in technologies and their environments [20]. Therefore, for this study TAM was used as a framework in the context of Ecuador.

The general user attitude towards the use of an information system, such as WWW is shown as a function of construct beliefs in TAM: Perceived Usefulness (PU) (the degree to which a person believes that using a particular system would enhance their job performance) and Perceived Ease of Use (PEOU) (the degree to which a person believes that using a particular system would be free of effort) [21].

TAM postulates that external variables influence indirectly involved elements such as PU and PEOU; and these external variables provide a better understanding of what influences the PU and PEOU [13]. Therefore, the perceived usefulness and perceived ease of use have played an important role in decisions that affect technology adoption [22].

In previous research similar to this, the most used technique identified was the structural equation modeling (SEM). in this technique, related to latent variables, they refer either to the terms of construct or latent variable, latent variables that are not observed directly they are measured through indicators or indicator variables (items) that are directly observable [23].

The aim of this research was to adapt a model that describes the behavior of use and intended use of e-learning systems students in Ecuador based on the TAM.

2 METHODOLOGY

The survey research model was applied to 400 undergraduate and graduate from Ecuador in 2014. The survey included 35 measure items using a standard seven-point Likert-type scale ranging from "Strongly disagree" to "Strongly agree".

The target sample for this survey was Ecuadorian e-learning system users, studying full or part time for Masters or undergraduate degrees (in a number of disciplines) at one university located in Milagro City. Participation was on a voluntary basis and no financial incentive was offered.

The current research, as the majority of empirical study in technology acceptance, used a non-probability convenience sampling technique since it enables the researcher to collect data from the participants based on their availability.

A total of 263 completed surveys (66% response rate) were received. Data from this survey were exported from the web tool to Microsoft Excel, and then converted to a text file delimited by commas; a file readable by the software R. The sample size was adequate for analysis in accordance with the criteria [24].

The study data were obtained with the help of a web tool developed at the university. The survey was anonymous and sent to respondents via email with a reference link. The items used were adapted from previous studies (see Table 1).

Table 1. Construct measurement and sources

Construct	Item	Measure	Source
Technical Support (TS)	TS1	The e-learning system provides support when there is a technical problem.	[25]
	TS2	A phone line is available at any time to address technical problems with the e-learning system.	
	TS3	You can make inquiries by fax when a technical problem occurs with the e-learning system.	
	TS4	Questions can be asked by email when a technical problem occurs with the e-learning system.	
	TS5	You can make queries in the e-learning system when there is a technical problem.	
Computer Self-Efficacy (CSE)	CSE1	I can complete learning tasks in the e-learning system if no one is around to tell me what to do.	[26]
	CSE2	I can complete learning tasks in the e-learning system if I had never used a software package like this.	
	CSE3	I can complete learning tasks in the e-learning system if I only have user manuals as a reference or guide.	
	CSE4	I can complete learning tasks in the e-learning system if I have previously seen someone using the system.	
	CSE5	I can complete learning tasks in the e-learning system if someone helps me with an induction into the system.	
Subjetive Norms (SN)	SN1	My teachers think I should participate in activities based on e-learning systems.	[27]
	SN2	My classmates think I should participate in activities based on e-learning systems.	
	SN3	The university officials think I should participate in activities based on e-learning system.	
	SN4	Generally, I would do what my teacher think I should do.	
Satisfaction (S)	S1	I am pleased to use the e-learning system as a learning tool.	[28]
	S2	The e-learning system is effective for gathering knowledge.	
	S3	The e-learning system is efficient for the analysis of knowledge.	
	S4	The e-learning system is efficient for the construction of knowledge.	
	S5	The e-learning system is efficient for the exchange of knowledge.	

Table 1. Cont.

Construct	Item	Measure	Source
Perceived Usefulness (PU)	PU1	It achieves learning in a faster way with the e-learning system.	[29]
	PU2	It Improves the learning performance with the e-learning system.	
	PU3	It is easier to learn with the use of the e-learning system.	
	PU4	It is useful for general learning, the use of the e-learning system.	
	PU5	It is necessary for learning the use of the e-learning system.	
Perceived ease of use (PEOU)	PEOU1	It is easy to operate the e-learning system.	[29]
	PEOU2	The interaction with the e-learning system is clear and understandable.	
	PEOU3	The e-learning system is flexible to interact with.	
	PEOU4	It would be easy to be skilled in the use of the e-leaning system.	
	PEOU5	I consider that the e-learning system is easy to use.	
Behavioral Intention (BI)	BI1	I will adopt the use the e-learning system in the next semesters.	[30]
	BI2	I will use the e-learning system in all my courses.	
	BI3	It is important to use the e-learning system.	
System Usage (SU)	SU1	I tend to use the e-learning system frequently.	[31]
	SU2	I spend a lot of time exploring within the e-learning system.	
	SU3	I get involved a lot with the e-learning system.	

To extract and analyze the results, SEM was used with a focus on partial least squares (PLS) method and confirmatory factor analysis (CFA).

The reliability and validity of the scale were evaluated by CFA, which is used to determine whether a set of observed variables explains a latent factor or not; that is, confirming a model previously proposed [32].

The paths analysis was performed with R software package PLSPM. CFA was performed with R software package lavaan, and SEM estimation procedure used was the estimation of a maximum likelihood. A set of fit indices are used to examine the structural model.

When revising the evolution of TAM applied to evaluate the acceptance of e-learning systems, four additional constructs to what TAM postulates were identified. These were:

- Technical Support (TS), it is defined as a trained person to help users in solving problems related to computers (hardware and software), help desk, hot line for complaints and suggestions, technical support lines, fax, phone, etc. [25].
- Computer self-efficacy (CSE), refers to the trust that a person has about their ability to perform successfully a task that involves the use of computers [33].
- Subjective Norms (SN), it refers to the perception that a person has about the people who they consider important (called "reference"), and the consideration that they should or should not take part in an specific action [34].
- User satisfaction (S), in the context under study, user satisfaction is the extent to which the e-learning system meets their information requirements [35].

The relationship between the four external variables presented and PU - PEOU as well as the framework of this study are presented in Fig. 2. The hypotheses are presented below:

- H1.1, H2.1, H3.1, H5.1: PU is positively influenced by TS, CSE, PEOU and SN.
- H1.2, H2.2: PEOU is positively influenced by TS and CSE.
- H3.2, H4.2, H5.2: BI is positively influenced by PEOU, PU and SN.
- H4.1: S is positively influenced by PU.
- H6.0, H7.0: SU is positively influenced by S and BI.

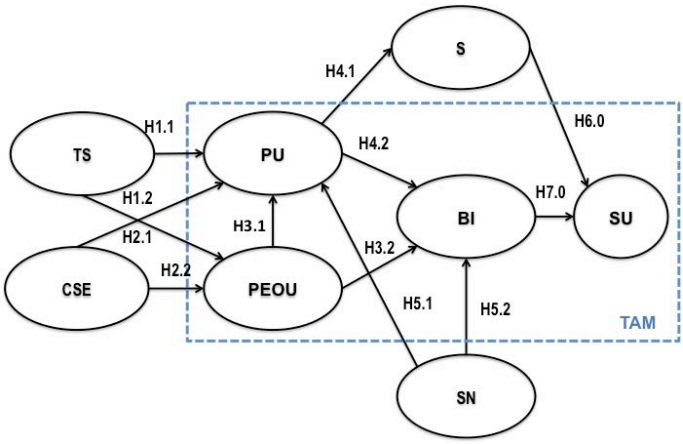

Fig. 2. Research Model

3 RESULTS

A confirmatory factorial analysis was made and the goodness fit indexes used were: Chi-squared (χ2), Degrees of freedom (df), Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), Root Mean Squared Error of Approximation (RMSEA) and Standardized Root Mean Square Residua (SRMR).

Goodness of fit statistics were performed to demonstrate the acceptability of the proposed model. Comparative fit indices with corresponding recommended values, provided evidence of an acceptable model fit (χ^2 / df = 2.618, CFI = 0.94, TLI = 0.93, RMSEA = 0.078 y SRMR = 0.068).

The paths analysis results are shown in Fig. 3. The estimated values fit indices have shown the goodness fit of the structural model to the data for the research model proposed in this study. The values were in the recommended range, the hypothesis can be accepted except H2.1 (influence of computer self-efficacy on perceived usefulness).

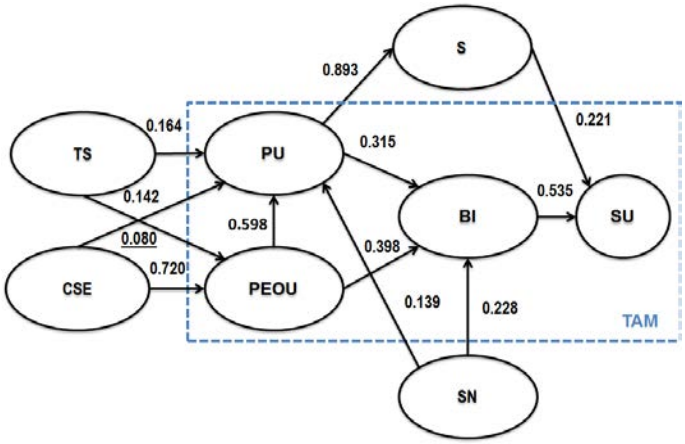

Fig. 3. Structural Paths (no significant paths are underlined)

4 DISCUSSION AND CONCLUSION

The analysis showed the predictive relevance and validity of the model for acceptance in e-learning systems by students. Among the main reasons for this finding may be the ease with which young

people use technology today. This is evidenced by the positive influence of computer self-efficacy on perceived ease of use in this study.

The perceived ease of use stands out as the most important factor that influences the behavior intention of using e-learning systems in Ecuadorian students.

Subjective norms have high influence on behavioral intention to use and a low influence on the perceived usefulness of e-learning systems. This result should be contrasted with another experiment changing the relationship from subjective norms within the proposed model.

There are a lot of studies to evaluate e-learning systems acceptance related to the TAM, but this work was characterized by the inclusion of technical support, subjective norms and computer self-efficacy. This emphasizes that the implementation of e-learning systems should focus on the social context and not on the technological one.

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