EXTENDED TECHNOLOGY ACCEPTANCE MODEL (ETAM) AND LEARNING MANAGEMENT SYSTEM

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ABSTRACT

Information Technology has changed the people in all aspects of life. In education, Information technology plays a major role and the use of ICT in teaching learning process has gone to a greater extent these days. The present day scenario is that higher education institutions must incorporate technology in teaching learning process. Among the various technologies, Learning Management System (LMS) plays a vital role in teaching learning approach due to the growth of Internet technologies. LMS has been included in many higher educational institutes and currently it is one of the new learning trends. LMS doesn't replace traditional classroom setting, but it provides new opportunities for teaching learning process. The extended technology acceptance model (ETAM) which included perceived ease of use, perceived usefulness, attitude toward usage, behavioural intention to use, self-efficacy and access control was developed based on the technology acceptance model(TAM). In this study ETAM was proposed for work-related tasks with the LMS, and used ETAM as a basis for conceiving the effects of such variables on the use of LMS. This study focuses on the individual users' acceptance investigation for LMS in higher educational institutes as an effective learning tool.
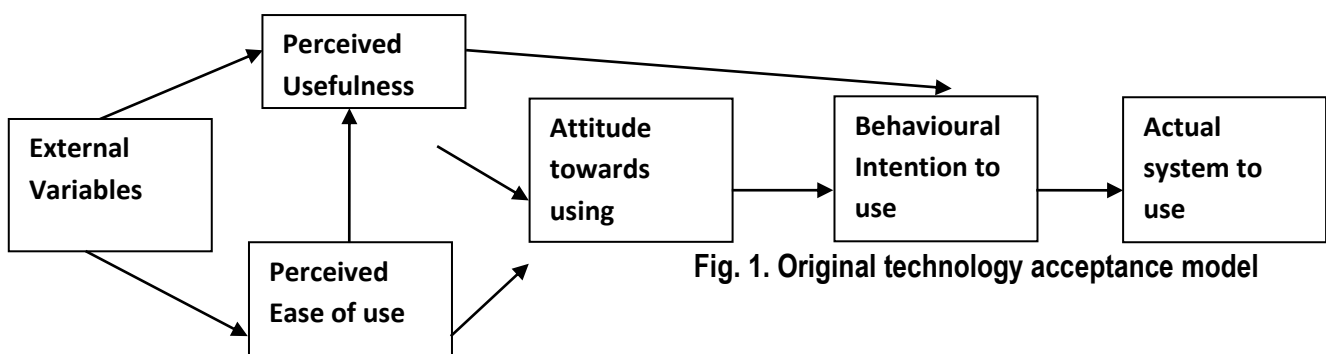
Keywords: Extended Technology Acceptance Model

INTRODUCTION

Information and Communication Technology (ICT) has made a paradigm shift from traditional teaching learning to technology enabled one in educational sector. Higher education institutes have started to amend their strategies in order to adopt new technologies so that pedagogical goals can be achieved (Dutton,2004). Learning Management System (LMS) is the widely used ICT tool in higher education institutions. An LMS, also called as learning platform, assist teachers and students alike in accessing online learning services(Paulsen,2002).Recently, MOODLE is one of the most emerging open source LMS that is used in educational sector developed by an Australian Scientist, Martin Dougiamas (Dougiamas,2004). LMS is a server-based software program that interfaces with a database containing information about users,

courses and content. A LMS is a portal for learning and teaching to occur within an integrated environment (Ullman&Rabinowitz,2004). LMS allows higher educational institutions to offer a larger number of full online or blended/hybrid (partly online and partly face-to-face) courses. Face-to-face courses that use a LMS is referred as web-enhanced courses (Schmidt,2002). LMS are also known as course management system, virtual learning environments and e-learning courseware (Gibbons, 2005). A successful execution of LMS has to consider academics who will adopt such frameworks for educating. Therefore, the aim of this research is to develop a theoretical framework based on a well-known technology acceptance model (TAM). The study investigates the use of a LMS in the teaching and learning of Computer Science undergraduate students of higher educational institute with emphasis on the attitudes and experiences of learners in relation to implementation of the LMS as a teaching and learning tool in the classroom. One of the investigators working as Assistant Professor in the department of Computer Science in a university in Coimbatore used LMS Moodle for the final year undergraduate students of BCA(Rachel,2016). The students accessed the LMS for learning materials, submitted assignment (Rachel,2016), attended quiz(Rachel,2017), discussed in forum, chat. ETAM tool was used to understand users' acceptance of LMS.

THEORETICAL FRAMEWORK

The technology acceptance model (TAM) was first created by Davis (1989), based on the theory of reasoned action (TRA) (Fishbein & Ajzen, 1975) in psychology research. TAM proposes that perceived ease of use and perceived usefulness of technology are predictors of user attitude towards using the technology, subsequent behavioural intentions and actual usage. Perceived ease of use was also considered to influence perceived usefulness of technology. Figure 1 presents original version of TAM (Davis, 1989). TAM has been applied in numerous studies testing user acceptance of information technology, for example, word processors(Davis et al., 1989), spreadsheet applications (Mathieson, 1991), e-mail(Szajna, 1996), web browser (Morris & Dillon, 1997), telemedicine (Hu et al., 1999), websites (Koufaris, 2002), e-collaboration (Dasgupta, Granger & Mcgarry, 2002), and blackboard (Landry,Griffeth & Hartman, 2006).

Fig. 1. Original technology acceptance model

The research model used in this study is depicted in Figure 2. It is an Extended Technology Acceptance Model (ETAM) where it has constructs like perceived ease of use, perceived usefulness, attitude toward usage, behavioural intention to use, self-efficacy and access control. Perceived usefulness refers to how the usage of LMS is comfortable to the student. Perceived ease of use tells how the usage of LMS has enhanced the performance of the student. Attitude towards usage is with an objective to study the interest in using the LMS. Behavioural intention to use is to study the reaction and communication towards the LMS. Self efficacy describes about the efficiency of the student in using LMS. Access control refers to the student's intention about privacy and security of the information stored in LMS.

Perceived Usefulness	Perceived Ease of Use	Attitude toward Usage	Behavioural Intention to use	Self-efficacy	Access control
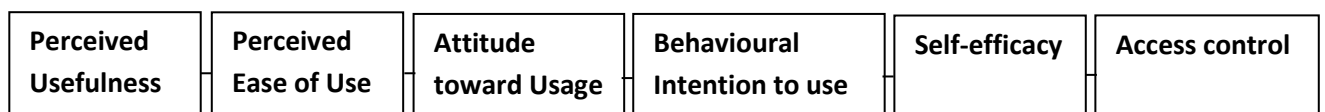
Fig. 2: Extended Technology Acceptance Model

OBJECTIVES OF THE STUDY

The main objectives of the present study are

1. To construct Extended Technology Acceptance Model (ETAM) Tool
2. To standardize the constructed tool by establishing reliability and validity

SAMPLE AND DATA COLLECTION

The investigators used normative survey method to administer the data collection. A total sample of 48 students of final year undergraduate BCA students of a university in Coimbatore who used LMS for the subject Data Analytics and Business Intelligence was taken up for the present study. The tool was distributed to the students and was given assurance that the data will be used only for research purpose. Proper instructions were given so the students were able to provide meaningful responses for the questions. The data were collected and used for further analysis.

RESEARCH TOOL

The research tool is a device used to collect data from the sample. Later the data is analyzed to measure or discover certain facts. The reliability of the facts depends on the consistency of sample, tool, data collection and data analysis. Designing a tool involves the application of scientific procedures in two phases - construction and standardization. Construction refers to the preparation/development of a new tool or adoption of an existing one. Standardization refers to substantiation of its correctness to present research environment. Standardization of ETAM tool was established by finding two important aspects, construct validity and reliability.

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CONSTRUCTION OF ETAM TOOL

The investigators intended to assess the acceptance of LMS among students. Extended Technology Acceptance Model (ETAM) tool was constructed with 85 items where it has constructs like perceived ease of use with 32 items, perceived usefulness with 19 items, attitude towards usage with 16 items, behavioural intention to use with 7 different items, self efficacy with 5 different items and access control with 6 different items. Each constructs were of four point Likert scale ratings.

The investigators thoroughly persuaded the literature about the features, accessibility of LMS and TAM tools developed by other researchers. The face and content validity was established by rewording and simplifying several items based on the feedback received from five experts in the field of Computer Science and Education. The technology Acceptance model tool developed earlier had fewer items for each constructs whereas the investigators have extended and developed with 85 items. (Refer Appendix 1)

STANDARDIZATION OF ETAM TOOL

Standardization of a tool is very important to develop the tool in a very structured form and to consider it for generalization. This can be achieved by establishing validity and reliability of the tool. Since generalization only leads to the implementation of any research tool, it becomes a must to have a standardized research tool to assess the acceptance of LMS among undergraduate students.

MEASURES

Measurement validity in terms of reliability and construct validity was evaluated. The reliability analysis was conducted in order to ensure the internal validity and consistency of the items used for each variables. Hair et al. (1998) recommended that Cronbach alpha values from 0.6 to 0.7 were deemed the lower limit of acceptability. An alpha of more than 0.7 would indicate that the items are homogeneous and measuring the same constant. Table 1 shows the reliability of the constructs. The reliability measures of the ETAM constructs were above the minimum recommended level of 0.70 and hence, the results demonstrate that the questionnaire is a reliable measurement instrument.

Table 1-Cronbach's Alpha (Reliability)

Constructs	No.of Items	Cronbach's alpha
Perceived Ease of Use	32	0.985
Perceived Usefulness	19	0.968
Attitude Towards Usage	16	0.960
Behavioural Intention to Use	7	0.957
Self Efficacy	5	0.946
Access Control	6	0.968

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To examine construct validity of measures adopted in this study, a factor analysis was performed. Principal factor analysis with varimax rotation was conducted to assess the underlying structure for the eighty five items of the ETAM questionnaire. Table 2 displays the items and factor loadings for the rotated factors.

Table 2: Factor loadings for the rotated factors

Scale Item	Factor Loadings					
	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6
	Perceived Ease of Use	Perceived Usefulness	Attitude Towards Usage	Behavioural Intention to Use	Self Efficacy	Access Control
PEU5	0.936					
PEU31	0.882					
PEU10	0.874					
PEU2	0.852					
PEU23	0.84					
PEU24	0.837					
PEU22	0.825					
PEU28	0.819					
PEU11	0.813					
PEU9	0.809					
PEU15	0.800					
PEU17	0.800					
PEU30	0.792					
PEU16	0.782					
PEU21	0.781					
PEU8	0.779					
PEU1	0.761					
PEU3	0.738					
PEU25	0.736					
PEU32	0.706					
PEU27	0.700					
PEU26	0.688					
PEU13	0.685					
PEU18	0.685					
PEU19	0.682					
PEU14	0.680					
PEU29	0.669					
PEU7	0.649					
PEU12	0.642					
PEU4	0.624					
PEU6	0.593					

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PEU20	0.592				
PU5		0.97			
PU14		0.863			
PU10		0.862			
PU1		0.846			
PU4		0.818			
PU13		0.814			
PU8		0.805			
PU11		0.789			
PU18		0.773			
PU15		0.765			
PU7		0.757			
PU19		0.747			
PU9		0.745			
PU16		0.743			
PU2		0.742			
PU3		0.736			
PU6		0.716			
PU17		0.715			
PU12		0.618			
ATU5			0.960		
ATU2			0.888		
ATU16			0.885		
ATU1			0.882		
ATU8			0.864		
ATU4			0.837		
ATU10			0.822		
ATU11			0.805		
ATU9			0.800		
ATU7			0.767		
ATU14			0.765		
ATU12			0.761		
ATU3			0.757		
ATU13			0.749		
ATU6			0.682		
ATU15			0.621		
BIU2				0.912	
BIU 1				0.904	
BIU 3				0.797	
BIU 7				0.745	

BIU 6				0.736	
BIU 5				0.677	
BIU 4				0.597	
SE5					0.912
SE3					0.820
SE4					0.777
SE2					0.716
SE1					0.663
AC5					0.838
AC4					0.826
AC6					0.820
AC3					0.792
AC2					0.700
AC1					0.682
% of Variance Explained	32.939	30.467	24.532	3.197	2.070	1.517
Cumulative percentages	32.939	63.405	87.937	91.134	93.204	94.720

Principal axis factoring was used with Varimax rotation and Kaiser Normalization, N = 48

Rotation converged in twenty seven iterations.

CONCLUSION

LMS provide a great opportunity for teaching and learning in higher educational institutions. LMSs can be used in many ways that support a more instructive and collaborative mode of teaching. This study represents research in developing the Extended Technology Acceptance Model (ETAM) for students' acceptance of the LMS within the academic setting. A standardized research tool designed in this way would definitely pave way to excel education through LMS.

REFERENCES

Davis F.D. (1989)."Perceived usefulness, perceived ease of use, and user acceptance of information technology," MIS quarterly, pp. 319-340.

Dasgupta, S., Granger, M. & Mcgarry, N. (2002). User acceptance of e-collaboration technology: an extension of the technology acceptance model, Group Decision and Negotiation, 11, 87-100.

Dutton W.H. & Loader B.D. (2004).Digital academe: new media in higher education and learning:Routledge.

Fishbein, M. & Ajzen, I. (1975).Belief, attitude, intention and behavior: an introduction to theory and research. Reading, MA: Addison-Wesle.

Gibbons, S. (2005). "Library course-management system: An overview. ALA Library Technology

Reports", 41(3), 7-11.

Hu, P.J., Chau, P.Y.K., Sheng, O.R.L., & Tam, K.Y. (1999). Examining the technology acceptance model using physical acceptance of telemedicine technology. Journal of Management Information Systems,16(2), 91-112.

Koufaris, M. (2002). Applying the technology acceptance model and flow theory to online consumer behavior. Information Systems Research, 13 (2), 205-223.

Landry, B.J.L., Griffith, R. , & Hartman, S. (2006). Measuring student perceptions of blackboard using the technology acceptance model. Decision Sciences, 4(1), 87-99.

Martin Dougiamas (2004). "Moodle: A Virtual Learning Environment for the Rest of Us",ISSN 1072-4303, September, Volume 8, Number 2.

Mathieson, K. (1991). Predicting user intentions:comparing the technology acceptance model with theory of planned behavior. Infromation Systems Research, 2(3), 173-191.

Morris, M.G., & Dillon, A. (1997). The influence of user perceptions on software utilization: application and evaluation of a theoretical model of technology acceptance, IEEE Software,14(4), 56-75.

Rachel.V et al (2016). "Learning Management System using Open Source Moodle for Computer Science students in Higher Educational Institute", International Journal of Computer Science & Engineering Technology (IJCSET).

Rachel.V, Dr.M.Parthasarathy(2016)."Moodle Assignment Tool Submission and Assessment for Computer Science students of Higher Educational Institute", International Journal of Engineering Applied Sciences and Technology (IJEAST).

Rachel.V, Dr.M.Parthasarathy(2017)." Moodle Online Test (Quiz) for Computer Science Students of Higher Educational Institute", SSRG International Journal of Computer Science and Engineering (SSRG-IJCSE) – volume 4 Issue 6.

APPENDIX-1

<div style="border:1px solid">

QUESTIONNAIRE FORM

</div>

Dear Respondent,

This is a research survey carried out on the usage of Learning Management System (LMS). Please provide the data by completing the questionnaire. Thank you for your ultimate support.

V.Rachel

Ph.D Research Scholar

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Read the items carefully and decide how you feel about it. To do this, you have to put a tick mark[√] in the relevant columns. Please do not omit any statement. The information you furnish will be confidential and will be used for research purpose only.[Note:SA-Strongly Agree,A-Agree,D-Disagree,SD-Strongly Disagree]

S.No	Questions	SA	A	D	SD
	Perceived Ease of Use (PEU)				
1	I find LMS is easy and friendly to use				
2	LMS is flexible and interactive to learn subjects				
3	The interface is pleasant				
4	It is easy to become skilful in using LMS				
5	I find LMS not easy to use because of my lack of experience				
6	Interacting with LMS requires much mental effort				
7	The language used in LMS is easy to understand				
8	Accessing the activities (Assignment, Quiz, learning materials, forum) are easy				
9	Activities such as assignment, learning material, quiz and forums in LMS are clear and understandable				
10	LMS is a package where learning materials, assignment, quiz, forums are				

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	all at one web portal				
11	It is convenient to download learning materials in .ppt, .doc. and .pdf format				
12	It is easier to listen to the audio based learning materials				
13	It is easier to view the video based learning materials				
14	Allows to access learning materials as many times as needed				
15	It is convenient to upload assignment as a file in any format (.doc, .pdf and .ppt)				
16	It is convenient to submit assignment by typing text in text editor				
17	LMS helps to add images easily in assignment preparation				
18	Hyperlinks in activities (Assignment, Quiz, learning materials, forum) are properly connected				
19	Accessing links to the external web resources is easy				
20	It is convenient to attend Multiple Choice online quiz				
21	It is convenient to attend Short answers in Quiz				
22	It is convenient to attend Descriptive answers in Quiz				
23	Easy to participate in the survey				
24	Easy to communicate with other students through 'chat' feature				
25	Easy to communicate with other students through 'message' feature				
26	Easy to communicate with teacher through 'chat' feature				
27	Easy to communicate with teacher through 'message' feature				
28	LMS can be accessed anytime through internet from inside the campus				
29	LMS can be accessed anytime through internet from outside the campus				
30	LMS can be accessed through smart phones				
31	LMS can be accessed through ipad/tablet devices				
32	Easy to handle technical difficulties if arises				
	Perceived Usefulness (PU)				
1	LMS improves my academic achievement(Internal/External marks)				
2	Has a positive effect on my learning				

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3	LMS with the support of traditional teaching method helps me to learn better				
4	Learning materials uploaded are available throughout the semester and hence it gives flexibility to learn anytime				
5	LMS gives me learning materials and other information that I need at right time				
6	Helps in accessing unit wise 'learning materials' according to the syllabus				
7	The calendar in LMS helps to know the assignment submission date				
8	The calendar helps to know the quiz participation date				
9	Helps to improve questioning and answering performances in forum participation				
10	Submission of assignment, attending quiz, downloading learning materials can be done from anywhere				
11	LMS allows me to complete assignment on time than would otherwise be not possible if submission done manually				
12	Feedback on assignment given by the teacher is very useful to learn further				
13	LMS allows me to participate in quiz on time than would otherwise be not possible				
14	Attending Quiz helps to test the knowledge gained from learning materials distributed through LMS				
15	Attending Quiz helps to test the knowledge taught in traditional teaching				
16	Knowing the immediate answer(feedback) at the end of the quiz helps to correct the mistakes				
17	Helps to know the marks immediately after submission of quiz				
18	News forum in LMS is useful to know the events				
19	RSS Feed in LMS is useful to know the current News				
	Attitude Toward Usage (ATU)				
1	Learning through LMS is a good idea				

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2	LMS makes me to realize anywhere and anytime learning				
3	I feel positive towards LMS				
4	LMS has all the functions and capabilities required for a learning environment				
5	LMS has to be an essential part of this graduation programme				
6	Wish all the subjects be taught by face-to-face/traditional learning method and supported through LMS				
7	Wish all the subjects be taught by face-to-face/traditional learning method only				
8	Wish all the subjects be taught through LMS only				
9	Interested in using LMS for all subjects				
10	LMS is useful only when teacher provides appropriate learning materials and relevant activities				
11	Believe I could become successful in using LMS				
12	Learning the subjects through LMS is more difficult than learning in a traditional classroom				
13	The organization of information on the screens of LMS is clear and understandable				
14	LMS requires proficiency in Information Technology (IT)				
15	Learning through LMS is acceptable				
16	LMS is becoming more popular in universities and colleges				
	Behavioural Intention to Use (BIU)				
1	I intend to be a user of LMS frequently in my learning activities				
2	I like to use new learning methods other than traditional way of learning				
3	I intend to learn more about the features of LMS				
4	I would recommend other students to use LMS				
5	I intend to continue using LMS every semester				
6	I intend to use LMS as part of my daily learning activities				
7	I will use LMS in the future if I get any opportunity				

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	Self-Efficacy				
1	I could use the LMS if only I had the manual for reference				
2	I could use the LMS if I see someone else using it before trying it myself				
3	I could access learning materials on the LMS even if there is no one around to show me how to use it				
4	I feel confident using the LMS				
5	I have the necessary skills for using LMS				
	Access Control				
1	The submission of assignment material by me is accessible only by the teacher				
2	I cannot see other student's assignment material				
3	I cannot see other student's assignment marks				
4	The feedback for assignment given by the teacher is accessible only by me				
5	I cannot see other's student's feedback given by the teacher				
6	I cannot see other student's quiz marks				