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PREDICTING FACTORS AFFECTING UNIVERSITY STUDENTS' ATTITUDES TO ADOPT E-LEARNING IN INDIA USING TECHNOLOGY ACCEPTANCE MODEL

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ABSTRACT

In today's global and competitive environment which is marked by the coming of information society, using the technologies of e-learning becomes a widely accepted way of training because of the flexibility and the standardization of the overall educational process they offer. This paper examines factors that predict university students' attitudes to adopt e-learning at Panjab University in India . Understanding the nature of these factors may assist these universities in promoting the use of information and communication technology in teaching and learning. The main focus of the paper is on the university students, whose decision supports effective implementation of e-learning. Data was collected through a survey of 400 post graduate students at the Panjab University. The technology acceptance model is used as the baseline model in this study. Three more independent variables are added to the original model, namely, technological and pedagogical support , pressure to use and e-learning stressors. The results demonstrate that the most useful subset of variables that can be used in predicting students' attitude to adopt e-learning includes perceived usefulness, Intention to use, Ease of Use, pressure to use, E-learning stressors and Technical and pedagogical support ($F=135.645$, $df=6$, R square $=.674$, $P < 0.01$).

Keywords: E-learning; perceived usefulness; intention to use; ease of use; pressure to use; e-learning stress; technical and pedagogical support.

INTRUDUCTION

In today's global and competitive environment which is marked by the coming of information society, using the technologies of e-learning becomes a widely accepted way of training because of the flexibility and the standardization of the overall educational process they offer. (Tuparova,Tuparov, Karastranova and Peneva, 2006). The concept of e-learning is described in a lot of literature sources. According to Dunstan and Dick (2004) the definitions of e-learning are abound computer –based instruction (Zaham, 2000, Coppola and Myre, 2002), online or web-based training (Volery and Lord 2000; Urdan and Weggan, 2000), virtual learning environments (Hiltz, 1988; Piccolo et al, 2001) distance learning (Webster and Hackley , 1997; Hall and Sbider, 2000). Connolly and Stansfield (2006) stated the difference among blended learning, online learning and e-learning. They described online, as any class that offers its entire curriculum via the internet by allowing learners to participate regardless of geographic location (place-independently). Blended learning is a combination of online learning and traditional classroom instruction. E-learning as a generic term encompasses both (fully) online learning and blended learning.

Nipper (1989) also identified three generations of distance education. The first generation "correspondence model" is provided mostly through paper-based instruction and characterized by the mass production of educational materials. The second generation referred to as the multimedia model is provided through

integrated multimedia such as delivering courses via television or introducing material like audio, video, tapes and computer–based learning (CBL) in addition to printed material. The third generation is provided through two-way communications media such as audio/ video - conferencing and broad - cast technology.

Despite the growing technology in higher education several recent studies (Link and Marz, 2oo6; Hayashi, Chen, Ryan and Wu; 2006) have advocated that universities have been slow to bring computer use, e-learning, on line learning into the main stream and maximize the potential benefits in the classroom. They discovered that failing to acknowledge the importance of understanding e-learning was an important issue. Many students may lack the necessary skills to use e-learning effectively and are therefore handicapped. Yet colleges and universities continue to invest large sums of money in automation and electronic communication facilities. For this reason, Martinze (2004) suggests that the study of student's attitude towards e-learning can in many ways help managers better prepare in light of e-learning for the future. Asan and Koca (2006) reveal there is a relationship between students' attitude towards e-learning and positive learning outcomes. Perez Cereijo (2006) proposes that students' attitude towards e-learning provides a beneficial construct to predict learning outcomes.

The theory of technology acceptance model was really designed to test user's attitude to accept new technology. This theory proposed by Davis (1983) explains a variety of human behaviors based on intentions that are jointly determined by attitudes (figure 1). According to TAM, perceived usefulness and perceived ease of use shape an individual's attitudes for using the technology.

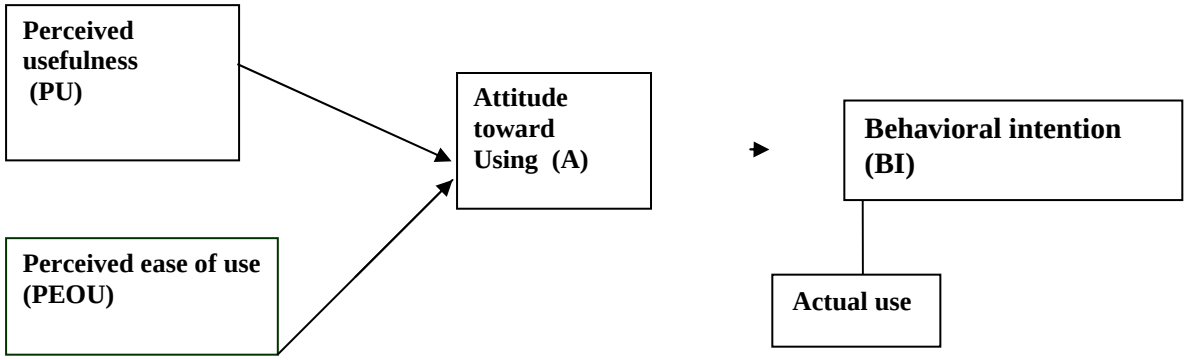

Figure 1
The technology acceptance model (Davis 1989).

Davis (1989) defined perceived usefulness (PU) as the degree to which a person believes that using a particular system will enhance his or her job performance. He defined perceived ease of use as the degree to which a person believes that using a particular system would be free of effort (Halawi and McCarthy, 2009). In addition, the original TAM has since been extended and is recognized today as TAM2.

Davis (1993) mainly suggests that added external variables be utilized in future research using TAM (Halawil and Mccarthv; 2007). A substantial amount of work has been done investigating a variety of external factors to extend technology acceptance model (Table 1).

Hence, the technology acceptance model gives relevance to the current study which investigates the factors that affect student's attitude to adopt e-learning.

Specifically, this study tries to answer the following research questions:

- What are the students' attitudes towards e-learning?

- What is the best group of factors that can predict students' attitudes to adopt e-learning?

Table
External Factors Based On Selective Literature Review

Research	Significant external factors
Pisarski, Drennan and Kennedy, 2005	locus of control , perceived usefulness
Chakraborty , Hwa Ha and Cui; 2006	cognitive style , perceived usefulness , perceived ease of use and computer self-efficacy
Jung, Loria, Mostaghel and saha 2006	perceived ease of use of the e-learning system as well as the student's perceived usefulness of that system are significant predictors of the student's attitude towards the e-learning system .
Sam, Othman and Nordin (2005)	computer self efficacy and anxiety as other external factors which influence attitudes toward the internet .
Abdel-Wahab (2008)	perceived usefulness of e-learning , perceived ease of e-learning use , pressure to use e-learning and the availability of resources needed to use e-learning
Rezaei, Mohammadi, Asadi, Kalantry (2008)	computer self efficacy and anxiety

METHOD

Designing the Instrument

To accomplish the objectives of the study, a 83 –item scale in 5-point Likert format was developed to gain as much information as possible regarding the factors that affect students 'attitude to adopt e-learning .

Table 2 shows the reliability of the measurement scale. Cronbach's alpha reliability scores were all over 0.7, which is considered very well (Hair et al. 1998). Hence, the results demonstrate that the questionnaire is a reliable measurement instrument.

Table 2
Descriptive statistics of the measurement scale

Scale	Cronbach's alpha
Perceived usefulness of e-learning	0.84
Intention to adopt e-learning	0.71
Ease of e-learning use	0.78
Technological and pedagogical support	0.70
E-learning stressors	0.81
Pressure to use e-learning	0.82
Attitude towards e-learning	o.71

Survey Sample

Stratified sampling technique was employed in the present study . 400 post graduate students at the University of Panjab from different faculties were the sample of the present study (Table 3).

Table 3
Sample details

Arts		Science	
Department	Number	Department	Number
Education	40	Computer science	40
Mass communication	40	Biotechnology	40
Geography	40	Statistics	40
Psychology	40	Physics	40
Political science	40	Chemistry	40

Personal characteristics of respondents

Approximately 94.8% of students who participated in the study were between 19 to 25 years and only 5% more than 26 years old. 46.53 % of respondents were male and 53.5% were female.

Analysis of Data

In order to test the research questions, data analysis were made throughout the SPSS version 17. To answer question 1, descriptive analysis was used to determine the percentage of negative and positive respondents. In addition, t-test was applies to find the differences across the various six variables (Perceived usefulness of e-learning , Intention to adapt e-learning, Ease of e-learning use, Technological and pedagogical support, E-learning stressors and pressure to use e-learning.

Further, a multiple regression model was computed to create a regression equation to answer the research question: what are the best groups of factors that can predict students' attitudes to adopt e-learning?

The model included six predictor variables (Perceived usefulness of e-learning, Intention to adapt e-learning, Ease of e-learning use, Technological and pedagogical support, E-learning stressors and pressure to use e-learning) simultaneously to determine the joint effect (attitude towards e-learning) of these variables .

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RESULTS AND ANALYSIS

The level of respondent's Attitudes Towards E-learning

The computed total attitude scores was categorized as negative and positive. As figure 2 shows that 76.0% Students were significantly positive towards e-learning. However 24% of students had negative attitude towards e- learning.

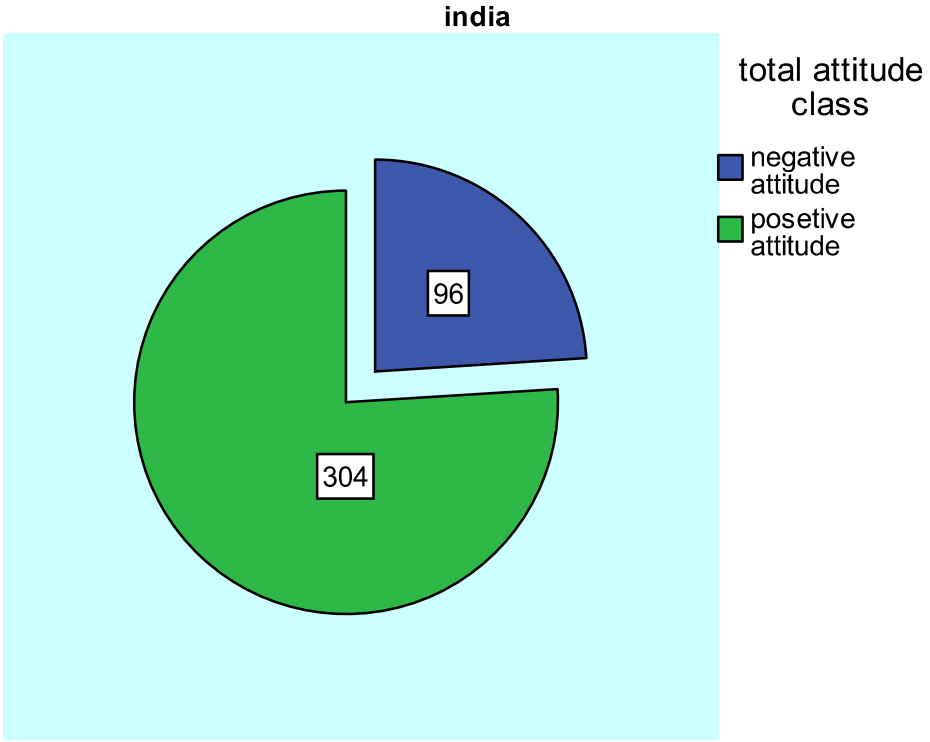

Figure 2
Pie chart showing students' attitude towards e-learning

Table 3 shows a higher mean rating that suggests that students were more in agreement with six factors. Students perceived e-learning usefulness (significant at the 0.001). They also perceived use of e-learning easy (significant at the 0.05). Furthermore, they intended to adopt e-learning (significant at the 0.001). Students believed that the university had got the ICT infra structure and pedagogical support for the applying of e-learning (significant at the 0.001). However, they were anxious about e-learning stressors such as their ability for using e-learning, slow internet connection, the quantity and quality of department computers (significant at the 0.01). Moreover, students thought that e-learning could help students reduce pressures caused by travel related stress or living in remote areas, etc (significant at the 0.001).

Table 3
Mean ratings and t-test results for six factors
between negative and positive attitudes towards e-learning

	Mean score	Standard deviation	T-test
Perceived usefulness of e-learning	4.06	.49	-8.687***
Intention to Adapt e-learning	3.77	.62	-10.224**
Ease of e-learning use	2.93	0.069	-2.545*
Technological and pedagogical support	3.12	0.89	-4.020***
E-learning stressors	3.11	1.13	-3.107**
Pressure to use e-learning	4.27	.78	-6.289***

* Significant at the level of 0.05 level
** Significant at the level of 0.01 level
*** Significant at the level of 0.001 level

Predicting Students2 Attitudes Towards E-Learning

A multiple regression equation was computed to distinguish whether students' attitude towards e-learning can be predicted by above factors. A multiple regression equation was computed that included all predictor variables simultaneously to determine the joint effect of these variables on students' attitude to adopt e-learning.

The R-squared (R2) value indicates how well a set of variables explains variation in the dependent variable. A strong model high R-squared indicates a large percentage of variation in a dependent variable.

Table 4 reveals that the R2 value for this dataset was .468. This indicated that %46/8 of the students' attitude toward e-learning was explained by the independent variables of mentioned ABOVE. Figure 3 confirms these results.

The statistical significance of the predication equation was analyzed by looking at the ANOVA Table: 2. the data showed significance at the P<.000 level (F=135.645).

Table 4
Analyses of variance: Regression

	Sum of squres	df	Mean Square	F	Sig	R Square	Adjusted R square
Regression	12106.132	6	2017.689	57.602	.000a	.468	.460
Residual	13765.945	393	35.028				
Total	25872.078	399					

- Predictors: (Constant), intention to use, e-learning stress, pressure to use, ease of e-learning use, technological and pedagogical support , perceived use of e-learning
- Dependent Variable: total attitude mark

To further investigate the findings that showed significance, the Beta weights (standardized coefficients) were analyzed. The standardized Beta coefficients provide a measure of the contribution of each variable to the model (see Table 5.) these values represent the contribution of each independent variable to the dependent variable. The t and p values provide an indication of the impact of each independent variable on attitude towards e-learning. A large absolute t value and small p value suggest that a predictor variable is having a large impact on the criterion variable. Table: 2 shows that the most useful subset of variables that can be used in predicting students' attitude towards e-learning includes Usefulness (U) , Intention (I) Ease of Use (EOU), pressure to use (PTU), E-learning stress (ES), Technical and pedagogical support (TPS). Accordingly, the best regression model that can be used in predicting student's attitude towards e-learning is:

Attitude=-21.489 +.287 U + .287 I + .237 (EOU) +.079 (PTU) + .091 (ES) + .082 (TPS)

Table 5
Multiple regression analysis: Coefficients

Variables	Unstandardized Coefficients		Standardized Coefficients	t	P (sig)
	B	Std. Error	Beta		
(Constant)	-21.489	3.362		-6.392	.000
Perceived usefulness of e-learning	.203	.032	.287	6.253	.000
Intention to adapt e-learning	.440	.065	.287	6.725	.000
Ease of e-learning use	.289	.052	.237	5.609	.000
Technological and pedagogical support	.111	.056	.082	1.976	.049
E-learning stress	.102	.050	.091	2.037	.042
Pressure to use e-learning	.213	.108	.079	1.968	.050

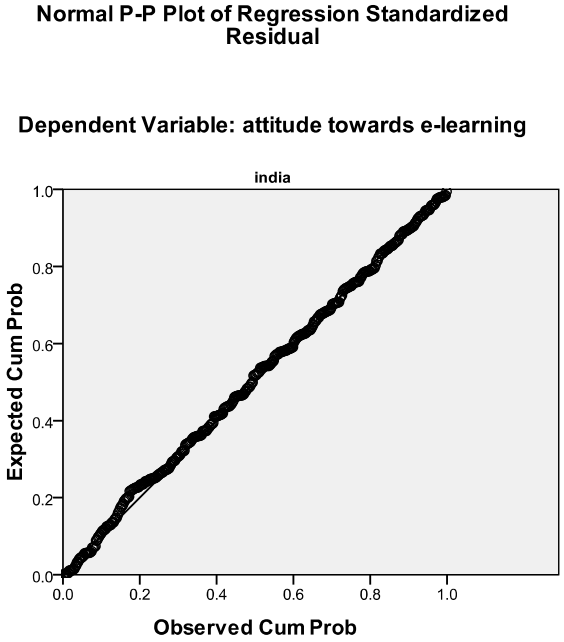

Figure 3
Normal probability plot

DISCUSSION

The objective of this study was to find the best group of predictors that can be used in modeling students' attitudes to adopt e-learning .This study investigates factors which affect students' attitude to adopt e-learning. The theory of technology acceptance model was really designed to test users' attitude to accept new technology. Drawing on a recent review of TAM research, this paper investigates factors which affect students' attitude to adopt e-learning. The results show that there are six factors that can be used in predicting students' attitude to adopt e-learning. These factors are perceived Usefulness of e-learning (U), Intention to use (I), Ease of Use (EOU), pressure to use (PTU), E-learning stressors (ES), Technical and pedagogical support (TPS). In addition, perceived Usefulness of e-learning (U), Intention to use (I), Ease of Use (EOU) are more important in determining attitude than another factors. The findings are In agreement with Devis (1989) who found the strong links among , perceived usefulness (U), perceived ease of use (EOU), intentions (I) and user's attitude (A). Hence, Program managers can focus on these factors that are expected to affect students' attitude to adopt e-learning.

Although the factors that are used to model e-learning explain 46/8 % of the variation of the dependent variable (attitude to adapt e-learning), further studies should be carried out to explore more variables that can be used to get better insight into the research questions.

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