

User Acceptance of e-Learning for Voluntary Studies

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Abstract: - Using e-learning system as the target technology, we investigated the role of the extended Technology Acceptance Model in user acceptance of e-learning for voluntary study. It was students themselves who decided whether they would accept the e-learning or not in voluntary studies. Data collected from 287 undergraduate students were examined. Overall, the results provided support for the model as explaining acceptance of an e-learning system. The data showed easy of use and usefulness were the dominant factors affecting the attitude of students using e-learning. The result also showed perceived enjoyment significantly impacted their intention to use e-learning and the intention to use impacted e-learning usage.

Key-Words: e-Learning, Technology Acceptance Model, Voluntary Acceptance, Extrinsic and Intrinsic Motivation

1 Introduction

E-learning is an Internet-enabled learning. It provides faster learning at reduced costs, increased access to learning, and clear accountability for all participants in the learning process. By eliminating barriers of time, distance, and socio-economic status, individuals can now take charge of their own lifelong learning [5]. E-learning is becoming an increasingly important part of education these days in Korea. The Korean government adapted the initiative to develop national resources through e-learning because e-learning could overcome the limits of time and space and contribute to knowledge expansion through interaction [6]. Ultimately, the Korean government hopes to improve the overall learning experience and create an education welfare state that offers students a better education with a wider selection of courses to strengthen national competitiveness and improve the quality of life [7].

Technology Acceptance Model(TAM)-related models are widely used to investigate the acceptance of students who use the e-learning to complement their class course [2, 8, 10, 11, 12]. When instructors required students to use the e-learning, TAM-related model could not measure the students' intention to accept the e-learning properly. The students had no choice but to accept the e-learning when the e-learning was used as a supplementary learning tool within a

traditional class or a stand-alone distance education method.

In this research, we investigated the role of the extended TAM in user acceptance of the e-learning for voluntary study. It was students themselves who decided whether they would accept the e-learning or not in voluntary studies. The benefits of an e-learning system will not be maximized unless learners use the system.

2 Literature Review

2.1 Technology acceptance model (TAM)

TAM has been widely applied to studies of technology use. TAM was adapted from the more general theory of reasoned action (TRA). The goal of TAM is to provide an explanation of the determinants of computer acceptance that is general, capable of explaining user behavior across a broad range of end-user computing technologies and user populations, while at the same time being both parsimonious and theoretically justified [4]. TAM suggests that perceived usefulness and perceived ease of use of IT are major determinants of its usage. Davis [3] defined perceived usefulness as "the degree of which a person believes that using a particular system would enhance

his or her job performance” and perceived easy of use as “the degree of which a person believes that using a particular system would be free of effort.”

2.2 Acceptance of e-Learning

Several researches have been done to identify the factors affecting students’ acceptance of the e-learning system. Brown [2] found that the individual characteristics of self-efficacy and computer anxiety significantly influenced perceived easy of use, as did the web site characteristics, easy of finding and easy of understanding. He also confirmed that in a developing country context, perceived usefulness might not predict adoption, thus amplifying the role of perceived ease of use as the main predictor of both usage and perceived usefulness. Lee et al. [8] modeled to capture extrinsic (perceived usefulness and ease of use) and intrinsic (perceive enjoyment) motivators for explaining students’ intention to use the e-learning medium. Their results showed that perceived usefulness and perceived enjoyment significantly and directly impacted students’ intention to use e-learning whereas perceived ease of use did not posit a significant impact on student attitude or intention towards e-learning usage. Ngai et al. [10] extended TAM to include technical support as a precursor and

then investigated user acceptance of a course management system named Web Course Tools (WebCT). The results showed ease of use and usefulness are the dominant factors affecting the attitude of students using WebCT and technical support had a direct effect on the perceived ease of use and perceived usefulness of WebCT. Saade & Bahli [12] also extended TAM to include cognitive absorption as an antecedent. The results found that cognitive absorption played an important role as an antecedent to perceived usefulness which increases when an individual experiences a total engagement with the e-learning (i.e. focused immersion) and enjoys the pleasure aspects of the interaction with the e-learning (i.e. heightened enjoyment). Pituch & Lee [11] studied use of the e-learning system for two distinct learning purposes: as a learning tool that supplements a traditional face-to-face class or as method of providing a stand-alone distance education course offering. The results found that system functionality and system interactivity directly influenced use of the e-learning system for distance education purposes and system functionality directly affected use of the system for supplementary learning purposes. <Table 1> summaries prior studies on e-learning acceptance.

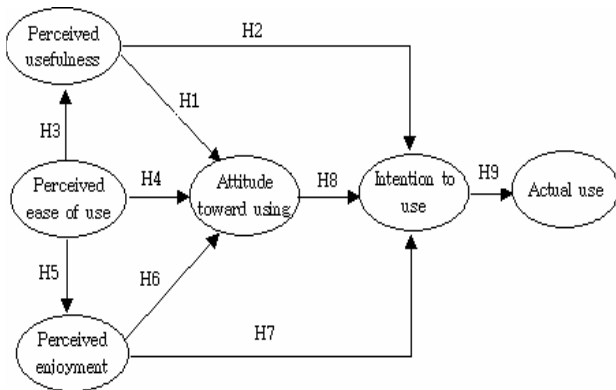
<Table 1> Summary of Studies on E-Learning Acceptance

Authors	Research subjects	Relationship tested	Result
Brown [2]	78 South African University students	Easy of finding → Perceived easy of use Easy of understanding → Perceived easy of use Self-efficacy → Perceived easy of use Computer Anxiety → Perceived easy of use Perceived easy of use → Perceived usefulness Perceived easy of use → Usage Perceived usefulness → Usage	Supported Supported Supported Supported Supported Supported Not supported
Lee et al. [8]	544 university students in Hong Kong	Perceived easy of use → Perceived usefulness Perceived easy of use → Perceived enjoyment Perceived easy of use → Attitude toward using Perceived usefulness → Attitude toward using Perceived enjoyment → Attitude toward using Perceived usefulness → Intention to use Perceived enjoyment → Intention to use Attitude toward using → Intention to use	Supported Supported Not supported Supported Supported Supported Supported Supported
Ngai et al. [10]	836 university students in Hong Kong	Technical support → Perceived usefulness Technical support → Perceived easy of use Perceived easy of use → Perceived usefulness Perceived easy of use → Attitude toward using Perceived usefulness → Attitude toward using Perceived easy of use → Actual use	Supported Supported Supported Supported Supported Supported

		Perceived usefulness → Actual use Attitude toward using → Actual use	Supported Not supported
Saade & Bahli [12]	102 university students in Canada	Cognitive absorption → Perceived easy of use Cognitive absorption → Perceived usefulness Perceived easy of use → Perceived usefulness Perceived easy of use → Intention to use Perceived usefulness → Intention to use	Supported Supported Supported Supported Supported
Pituch & Lee [11]	259 university students in Taiwan	Perceived easy of use → Perceived usefulness Perceived easy of use → Actual use Perceived usefulness → Actual use System functionality → Actual use System interactivity → Actual use System response → Actual use Self-efficacy → Actual use Internet experience → Actual use	Supported Supported Supported Supported Supported Supported Not supported Not supported

3 Research model and hypotheses

The TAM shows external variables influence on both perceived usefulness and perceived ease of use and these two beliefs then influence intentions to use a technology, which subsequently determines usage. Perceived easy of use also influences perceived usefulness [13]. Although people’s intention to use information technology are influenced mainly by perceived usefulness and perceived ease of use, recent studies [8, 9, 14] find that motivations are important predictors of behavioral intention to use a new technology. Figure 1 depicts the research model used in this study.



<Figure 1 . The Research Model>

Based on Lee et al.’s [9] study for the e-learning as complementary tools in a traditional classes, we will examine whether previous research findings remain valid for voluntary studies when students themselves decide whether they will accept the e-learning or not for their personal studies.

Research hypotheses are summarized as follows.

- H1.** There is a positive relationship between perceived usefulness and attitude toward using e-learning.
- H2.** There is a positive relationship between perceived usefulness and intention to use e-learning.
- H3.** There is a positive relationship between perceived ease of use and perceived usefulness.
- H4.** There is a positive relationship between perceived ease of use and attitude toward using e-learning.
- H5.** There is a positive relationship between perceived ease of use and perceived enjoyment.
- H6.** There is a positive relationship between perceived enjoyment and attitude toward using e-learning
- H7.** There is a positive relationship between perceived enjoyment and intention to use e-learning.
- H8.** There is a positive relationship between attitude toward using e-learning and intention to use e-learning.
- H9.** There is a positive relationship between intention to use e-learning and actual use.

4 Research methodology

4.1 Development of instruments

The survey instruments consisted of 27 items (see Table 2) to assess 6 constructs of the proposed model. Items used to measure the construct were adapted

from prior research literature. Pre-testing and pilot testing of the measures were conducted by selected users of e-learning as well as faculty members in the IS research area. The pre-test respondents were asked to rate the relevance of the items in terms of each construct with e-learning. Then some wording was changed to account for the context of using an e-learning.

The measures for perceived usefulness(PU), perceived easy of use(PEU), attitude toward using(A), and behavioral intention to use(I) were adapted from

Davis' prior studies [3] and other related studies [1, 8, 9, 10, 11] with modifications to fit the specific context of the e-learning. The measures for perceived enjoyment(PE) was mainly based on [8, 9]. All items were measured using a seven-point Likert-type scale ranging from (1) "strongly disagree" to (7) "strongly agree." To investigate the actual use, the respondents were asked to rate the frequency of usage on a seven point scale with 7 being "more than once a day" and 1 being "not at all."

<Table 2> Summary of Measures

Construct	Measurement instrument	References
Perceived Usefulness (PU)	PU_1 Using the e-learning will improve my learning performance.	[1, 3, 10, 11]
	PU_2 Using the e-learning will allow me to accomplish learning tasks more quickly.	
	PU_3 Using the e-learning will enhance my effectiveness in learning.	
	PU_4 The e-learning gives me greater control over learning.	
	PU_5 Overall, I find the e-learning to be advantageous to my learning.	
Perceived Easy of Use (PEU)	PEU_1 Learning to operate the e-learning is easy for me.	[1, 3, 10, 11]
	PEU_2 My interaction with the e-learning is clear and understandable.	
	PEU_3 It is easy for me to become skillful at using e-learning.	
	PEU_4 I find the e-learning easy to use.	
	PEU_5 I find the e-learning to be flexible to interact with.	
	PEU_6 Overall, I believe that e-learning is easy to use.	
Perceived Enjoyment (PE)	PE_1 Sometimes I lose track of time when I am using the e-learning.	[8, 9]
	PE_2 Time flies when I am using the e-learning.	
	PE_3 I have fun interaction with the e-learning.	
	PE_4 The actual process of using the e-learning would be pleasant.	
	PE_5 I often spend more time on the e-learning than I intended.	
	PE_6 I would find using the e-learning be enjoyable.	
Attitude toward Using (A)	A_1 The e-learning is fun.	[1, 3, 8, 10]
	A_2 The e-learning provides an attractive learning environment.	
	A_3 Using the e-learning is a good idea.	
	A_4 Overall, I like using the e-learning.	
Intention to Use (I)	I_1 I intend to take more courses using the e-learning in the future.	[1, 8, 9]
	I_2 I intend to use the-learning regularly.	
	I_3 I intend to recommend others to use the e-learning.	
	I_4 I intend to use the e-learning frequently.	
Actual Use(U)	U On average, how many hours per week do you spend using the e-learning?	[3]

4.2 Sample and data collection

Our study aimed at investigating students' adoption of e-learning for voluntary studies. The unit of analysis in our research is the individual user of the e-learning. The data were gathered by means of a questionnaire. Overall, of the 570 that were distributed, 287 usable

questionnaires from undergraduate students in K university in Korea, who use e-learning voluntarily for personal purposes, were received and used for analysis. Forty-seven percent of the respondents were female, and 52.2 percent have used e-learning for more than 1 year. The returned sample characteristics are illustrated in Table 3.

<Table 3> Profile of Respondents

	Frequency	Percentage
Gender		
Female	135	47.0%
Male	134	46.7%
N/A	18	6.3%
Place to access e-learning		
Home	191	66.7%
Computer Lab	25	8.7%
Library	17	5.9%
Internet Café	6	2.1%
N/A	48	16.7%
Duration to use e-learning per session		
< 30 min.	43	14.9%
bet. 30 min. and 1 h.	114	39.7
bet. 1 h. and 2 h.	45	15.7%
> 2 h.	2	1.0%
N/A	83	28.9%

5 Analysis and results

5.1 Analysis of validity and reliability

In this study, construct validity and reliability were examined. To test construct validity, a principal components analysis(PCA) was performed with varimax rotation. Table 4 shows that the PCA yield three distinct factors for users' perception. When interpreting the rotated factor pattern, an item was said to load on a factor if the factor loading is 0.4 or greater. Besides, eigenvalues were examined to decide the number of factors to extract. An eigenvalue greater than 1 was used as a criterion to determine the number of factors[11]. Factor loadings for all variables were greater than 0.4. Together, the three observed factors accounted for 71.9 percent of the total variance

<Table 4> PCA for PEU, PE, and PU

Scale items	PEU	PE	PU	Cronbach's α
PEU_1	.862			.892
PEU_2	.818			
PEU_3	.799			
PEU_4	.679			
PEU_5	.685			
PE_1		.778		.805
PE_2		.777		

PE_3		.731		.792
PU_1			.773	
PU_2			.740	
PU_3			.620	Cumulative %
Eigenvalue	3.490	2.239	2.083	
% of variance	31.72	21.27	18.94	

On the other hand, Table 5 shows that the PCA also yield three distinct factors. The results confirm the existence of three factors with eigenvalues greater than 1.0 that accounted for 80.8 percent of total variance.

<Table 5> PCA for A, I, and U

Scale items	A	I	U	Cronbach's α
A_1	.855			.889
A_2	.801			
A_3	.797			
A_4	.626			
I_1		.843		.909
I_2		.840		
I_3		.733		
I_4		.652		
U			.963	Cumulative %
Eigenvalue	3.162	3.016	1.094	
% of variance	35.14	33.51	12.16	

The internal consistency was assessed by computing Cronbach's α s. These coefficients are represented for each of the constructs in Table 4 and 5. The value range from 0.792(for perceived usefulness) to 0.909(for intention to use). Given the exploratory nature of the study, validity and reliability of the scales were adequate [10].

5.2 Hypothesis testing

In order to test the hypotheses, multiple regression analysis was performed. Multicollinearity occurs when any single independent variable is highly correlated with a set of other independent variables in multiple regression analysis. As multicollinearity rises, the ability to define any variable's effect is diminished. A common cutoff threshold is a tolerance value of .10, which corresponds to a VIF value above 10. For all independent variables in this study, the VIFs were less than 1, ruling out multicollinearity. The results of the analysis are summarized in Table 6. It is clear from Table 6 that there is support for all hypotheses except hypotheses H4.

<Table 6> Results of Multiple Regression Analysis (**: p < 0.01)

Dependent variable	Indep. variable	R ²	F	p-level	Beta	t	p-level	Hypotheses
Attitude toward using	Perceived usefulness	.622	157.54	.000**	.431	7.60	.000**	H1 : Supported
	Perceived ease of use				.090	1.72	.087	H4 : Not supported
	Perceived enjoyment				.422	7.66	.000**	H6 : Supported
Perceived usefulness	Perceived ease of use	.377	173.71	.000**	.636	13.18	.000**	H3 : Supported
Perceived enjoyment	Perceived ease of use	.327	140.26	.000**	.588	11.84	.000**	H5 : Supported
Intention to use	Perceived enjoyment	.461	121.61	.000**	.260	3.81	.000**	H7 : Supported
	Perceived usefulness				.543	7.89	.000**	H2 : Supported
Intention to use	Attitude toward using	.622	471.12	.000**	.811	21.71	.000**	H8 : Supported
Actual use	Intention to use	.174	61.25	.000**	.550	7.83	.000**	H9 : Supported

6 Conclusion

The e-learning becomes more popular in Korea because of several potential benefits. Our results can summarized as follows. First, perceived usefulness posits a direct effect on both attitude toward using and intention to use. Second, perceived easy of use impacts both perceived usefulness and perceived enjoyment. However, there is no positive relationship between perceived ease of use and attitude toward using e-learning. Third, perceived enjoyment is a dominant factor affecting attitude toward using and intention to use. Forth, the results for voluntary studies are generally consistent with previous research on complementary studies. Last, we showed students' positive attitude toward using increased the frequency and duration to use e-learning per session, namely actual use.

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