

Association for Information Systems AIS Electronic Library (AISeL)

BLED 2011 Proceedings

BLED Proceedings

2011

Understanding Continued Usage Intention in e-Learning Context

A.K.M. Najmul Islam

Turku Centre for Computer Science (TUCS), University of Turku, Finland, najmul.islam@tse.fi

Follow this and additional works at: <http://aisel.aisnet.org/bled2011>

Recommended Citation

Najmul Islam, A.K.M., "Understanding Continued Usage Intention in e-Learning Context" (2011). *BLED 2011 Proceedings*. 28. <http://aisel.aisnet.org/bled2011/28>

This material is brought to you by the BLED Proceedings at AIS Electronic Library (AISeL). It has been accepted for inclusion in BLED 2011 Proceedings by an authorized administrator of AIS Electronic Library (AISeL). For more information, please contact elibrary@aisnet.org.

Understanding Continued Usage Intention in e-Learning Context

A.K.M. Najmul Islam

Turku Centre for Computer Science (TUCS), University of Turku, Finland
najmul.islam@tse.fi

Abstract

With the latest development of the Internet technologies, it has offered many e-learning systems available for the educators to conduct courses online. The advantage of using such systems in connection with on-site courses is that it increases flexibility through resources that facilitate learning anytime anywhere. However, there is little empirical evidence to suggest what factors underpin educators continued usage of such systems. This study builds a model based on the Unified Theory of Acceptance and Use of Technology to identify the factors. The model is tested among the university educators (n = 175) who use a popular e-learning system, Moodle. The results suggest that continuance intention is driven by perceived usefulness and access. Perceived ease of use, perceived behavioral control, compatibility, and social influence do not have significant impact on continuance intention. These core determinants of continuance intention altogether explained around 70% of the total variance of intention.

Keywords: *Continued use, e-learning, Course management system, Unified theory of acceptance and use of technology.*

1 Introduction

During the recent years, e-learning via the Internet has become so common phenomenon that it has boosted the use of software tools that lent structure and management for online courses. These tools are called Course Management Systems (CMS) which feature educators with easy communication to the students, the ability to track students' progress, and a mean to presenting content for online courses securely. Such e-learning tools are very attractive to the universities because they have many useful features. However, while evaluating an e-learning system like a CMS, educators' perspective must be considered. The success of such technology depends on the educators' willingness of its continued utilization. It is because, if an educator chooses

to discontinue his/her use of a particular e-learning technology, the students generally do not have another choice than to leave the technology and adapt to the educator's alternative choice. Thus, our focus in this study is mainly on the teaching aspect, which in practice means educators or instructors in their role as initiators, administrators and facilitators to students' utilization of such systems.

To research on the users' behavior in utilization of e-learning systems, the researchers often depend on the general Information System (IS) usage behavior theories (Sorebo et al., 2009; Larsen et al., 2009). IS researchers have developed a vast streams of research to identify the factors that may explain IS use. Two schools of thoughts have evolved (Larsen et al., 2009). The first addresses the initial use of IS or IS acceptance, while the second addresses the subsequent IS use or IS continuance.

The research on IS continuance is mainly dominated by the expectation-confirmation theory based IS continuance model (Bhattacharjee, 2001). However, studies built upon other frameworks such as the Technology Acceptance Model (TAM), Theory of Planned Behavior (TPB) etc are also found in the literature (e.g., Hsu and Chiu, 2004). The integration of two or more frameworks to understand IS continuance has also been extensively studied (e.g., Lee, 2010; Liao et al., 2007). One of the most popular integrative frameworks developed for IS acceptance and use is the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al., 2003). The UTAUT theory has been developed after synthesizing the previous adoption models. Thus, in this paper, we use UTAUT theory as the basis for our model to understand educators' continued usage intention of an e-learning technology in the university context.

2 Theoretical background

2.1 UTAUT theory

Research on technology adoption has employed a number of theoretical models such as the Theory of Reasoned Action, TAM, Motivational Model, TPB, Model of PC Utilization, Innovation Diffusion Theory, and Social Cognitive Theory to examine individual's acceptance of technologies. This stream of research has culminated in the UTAUT theory (Venkatesh et al., 2003). According to the UTAUT theory, there are four core determinants of user acceptance and use: performance expectancy, effort expectancy, social influence, and facilitating conditions. Venkatesh et al. (2003) conceptualizes performance expectancy as the degree to which an individual believes that using the IS will help him or her to attain gains in job performance, and effort expectancy as the degree of ease associated with the use of the IS. They define social influence as the degree to which an individual perceives that important others believe he or she should use the IS, and facilitating conditions as the degree to which an individual believes that organizational and technical infrastructure exist to support use of the IS. In the UTAUT theory, gender, age, experience and voluntariness have been theorized as the moderators between the associations of behavioral intention/behavior and the core determinants.

2.2 E-learning continuance research

Several empirical studies on e-learning continuance are found in the literature. Chiu et al. (2005) decomposed learners' usefulness into three components: usability, quality, and value. They added disconfirmation construct with each component to their model. Their study demonstrated usability, quality and value may play role to shape e-learners' satisfaction. However, the decomposed disconfirmation approach was partially supported. Several studies combined different theories to provide integrative views of e-learning continuance. Chiu et al. (2007) extended the IS continuance model with the IS success model (DeLone & McLean, 2003) and fairness theory (Lind et al., 1993). Lee (2010) combined IS continuance model, TAM (Davis, 1989), TPB (Ajzen, 1991), and flow theory (Csikszentmihalyi, 1977). Liao et al. (2007) combined IS continuance model with TPB. Latter, Liao et al. (2009) combined technology acceptance model and IS continuance model to explain users' behavior at different stages of adoption. They divided the respondents into three groups: initial adopters, short-term-users, and long-term users. The combined model explained 74% (for initial users), 80% (for short-term users) and 79% (for long term users) variances of intention. Roca and Gagne (2008) extended the IS continuance model with self-determination theory (Deci and Ryan, 1995) and perceived playfulness. They added the three psychological needs from the self-determination theory (autonomy, relatedness and competence) in addition to perceived playfulness. They tested their model among students and concluded that variables from self-determination theory are important in shaping continued use intention. Sorebo et al. (2009) replicated the same study but their focus was on the educators' intention. They concluded that autonomy and competence are important in shaping educators' intention to continue using e-learning technology. Roca et al. (2006) extended the IS continuance model using perceived quality (information quality, service quality and system quality), perceived usability (perceived usefulness, cognitive absorption and perceived ease of use), perceived control (computer self-efficacy and internet self-efficacy) and subjective norm. They found all these variables except subjective norm are important to shape learners' satisfaction. Larsen et al. (2009) extended the IS continuance model with the task-technology fit model (Goodhue and Thompson, 1995). Limayem and Cheung (2008) extended the IS continuance model with habit and prior behavior. They concluded that habit moderates the association between intention and behavior. Chiu and Wang (2008) combined UTAUT (Venkatesh et al., 2003) with subjective task value. Subjective task value was involved attainment value (the personal importance of doing well on a task), intrinsic value (enjoyment from performing the activity) and utility value (how well the task relates to current and future goals). Cost was also involved and conceptualized as the negative aspects of engaging in the task (e.g., anxiety, social isolation, delay in responses, and risk of arbitrary learning).

3 Research model

From the literature review on e-learning continuance, we have identified two gaps. First, we observe that very few studies have been conducted to model educators' intention while they play roles as initiators and facilitators to the students' utilization of an e-learning system. Second, e-learning continuance research is dominated by expectation-confirmation based IS continuance framework. Thus, the researchers paid a little attention on UTAUT theory in the e-learning continuance context, although it had been

shown very powerful in explaining user behavior in technology acceptance and use context (Venkatesh et al., 2003; Sun et al., 2009). Thus, to fill the research gaps we build our research model based on the UTAUT theory to understand educators' continued usage intention toward an e-learning system. However, in this study, we are interested only in the associations between the core UTAUT constructs and behavioral intention with no moderating effect. The research model is shown in Figure 1.

Depending on the theory, different constructs pertain to performance expectancy (Venkatesh et al., 2003). Among these, perceived usefulness from technology acceptance and expectation-confirmation has been studied extensively in the literature (e.g., Davis, 1989; Bhattacharjee, 2001). Perceived usefulness is defined as the degree to which a person believes that using a particular system would enhance his or her job performance (Davis, 1989). In most of these studies, perceived usefulness has been found as the strongest predictor of intention. Thus, we hypothesize the following.

H1. Perceived usefulness positively affects educators' continued usage intention of e-learning technology.

Again, depending on the theoretical perspective, different constructs may capture the concept of effort expectancy (Venkatesh et al., 2003). Among these, perceived ease of use has been studied extensively in technology acceptance. Perceived ease of use is defined as the degree to which a person believes that using a system would be free of effort (Davis, 1989). Perceived ease of use was not included in the original expectation-confirmation based IS continuance theory (Bhattacharjee, 2001). However, many subsequent studies showed that perceived ease of use can be added to the expectation-confirmation based IS continuance theory (e.g., Hong et al., 2006; Recker, 2010). Thus, we make the following hypothesis.

H2. Perceived ease of use positively affects educators' continued usage intention of e-learning technology.

UTAUT theory posits that social influence positively affects continued usage intention. It has been supported by many studies, especially in the IS continuance context subjective norm which pertains to social influence has been found to affect continuance intention significantly (e.g., Sun et al., 2009; Kim, 2010). TPB also posits a direct positive relationship between subjective norm and behavioral intention (Ajzen, 1991). Thus, we hypothesize the following.

H3. Social influence positively affects educators' continued usage intention of e-learning technology.

One of the major limitations of UTAUT theory is operationalization of the core constructs. Each of the core-constructs in UTAUT theory was operationalized by using highest-loading items from each of the respective scales. The danger of this approach is that facets of each construct can be eliminated, thus threatening content validity (Venkatesh et al., 2003). To overcome such limitation and facilitating conditions being a construct that might capture a wide scope, we conceptualize facilitating conditions having three dimensions: access, perceived behavioral control and compatibility. Access refers to the degree of accessibility, responsiveness, stability, and availability of an e-learning system (Lee et al., 2009). Perceived behavioral control refers to people's perception of ease or difficulty in performing the behavior of interest (Ajzen, 1991). Compatibility refers to the degree to which an innovation is perceived as being

consistent with existing values, needs, and experiences of potential adopters (Moore and Benbasat, 1991). In the original UTAUT theory, facilitating conditions has been shown to affect behavior directly and had no direct association with behavioral intention (Venkatesh et al., 2003). However, many studies modeled a direct relationship between “perceived behavioral control and behavioral intention” (e.g., Sun et al., 2009; Lee, 2010) and “compatibility and behavioral intention” (e.g., Sun et al., 2009). Thus, we make the following hypotheses and argue that these are in line with the literature.

H4. Access positively affects educators’ continued usage intention of e-learning technology.

H5. Perceived behavioral control positively affects educators’ continued usage intention of e-learning technology.

H6. Compatibility positively affects educators’ continued usage intention of e-learning technology.

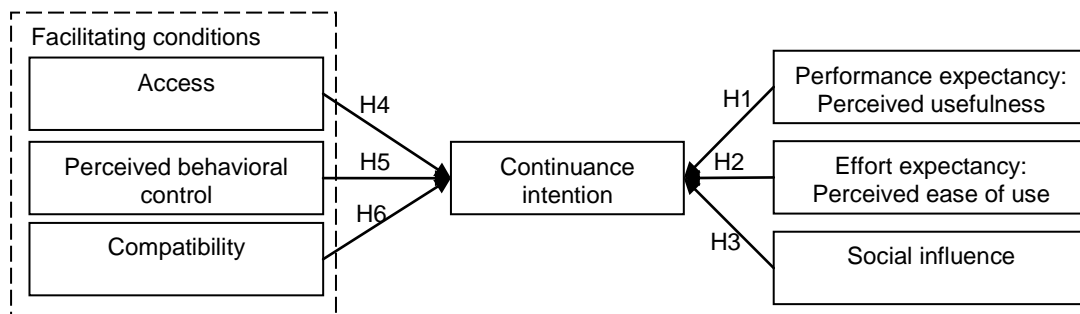


Figure 1: Research model

4 Research method

4.1 Questionnaire development

Each item corresponding to the constructs was measured using seven-point Likert scale, with answer choices ranging from “Strongly disagree (1)” to “Strongly agree (7)”. Most of these items were adapted from the literature with minor changes in wording reflecting the target technology. After the questionnaire was drafted, it was first sent to two academic researchers for their review, and then it was revised according to their comments and suggestions to make the wording of the items more precise. Then, the questionnaire was sent to 30 educators in the university for their review. Overall, the educators indicated that the questionnaire was relatively clear and easy to complete. A number of suggestions were made concerning the wording of several items and the overall structure of the questionnaire. The questionnaire was revised according to the given suggestions.

4.2 Data collection

Data was collected via a web-based survey from the educators of a university in Finland who use Moodle for their teaching purpose. A list of educators’ email addresses was

collected from the Moodle support team in the university. A total of 1012 email invitations were sent to the educators of the university who had been the registered Moodle users. Two reminders were sent to increase the response rate in two weeks gaps. The survey ran for approximately one and half months. After filtering invalid and incomplete responses, we had total 207 survey responses. In this particular study, we were interested about those users who had been conducting at least one course using Moodle at that particular academic period. After filtering the survey responses according to this criterion, we ended up with 175 usable responses. The demographic information of the respondents is given in Table 1. The response rate was low in the study. However, only faculty members who had used Moodle for conducting their courses were asked to respond. There were many users registered with Moodle who were from Open University (not belonging to any faculty) and never used Moodle to conduct teaching. Instead, they used Moodle for project management purposes. Thus, the response rate is acceptable.

		Frequency	Percent
Gender	Male	74	42.3
	Female	101	57.7
Age	21-40 years	90	51.4
	>41 years	85	48.6
Experience with the target technology	0 – 18 months	54	30.9
	>18 – 36 months	83	47.4
	>36 months	38	21.7

Table 1. Demographic information.

4.3 Data analysis

We employed partial least squares (PLS) as our analysis approach and utilized the tool smartPLS (Ringle et al., 2005). PLS is a second generation regression method that combines confirmatory factor analysis with linear regression, and this makes it possible to run the measurement and structural models simultaneously.

Table 2 shows item wise averages and loadings of each construct in the model. For each construct the assessment of convergent validity or internal consistency is also included through the composite reliability coefficient (Fornell and Larcker, 1981). Convergent validity indicates the extent to which the items of a scale that are theoretically related are also related in reality. As we can see from Table 2, all items except SI_2 have significant path loadings greater than threshold 0.7 recommended by (Fornell and Larcker, 1981). Thus, we decide to remove SI_2 from our instrument. All the constructs have composite reliability values that exceed the threshold recommended by Nunnally (1978).

Construct	Source	Item	Mean	Loading
Continuance intention(CR=0.90)	Limayem et al. (2007)	INT_1:I intend to continue using Moodle rather than discontinue its use	6.00	0.91***
		INT_2:My intentions are to continue using Moodle than use any alternative means	5.23	0.88***
		INT_3:If I could, I would like to discontinue my use of Moodle	2.36	0.81***
Perceived usefulness(CR=0.92)	Limayem et al. (2007)	PU_1:Using Moodle increases the control with my teaching plan	4.59	0.84***
		PU_2:Using Moodle enables me to accomplish teaching information sharing more quickly	5.8	0.78***
		PU_3:Using Moodle is of benefit to me	5.18	0.85***
		PU_4:The advantages of Moodle outweigh the disadvantages	5.31	0.87***
		PU_5:Overall, using Moodle is advantageous	5.65	0.80***
Perceived Ease of use(CR=0.93)	Venkatesh and Davis (2000)	PEOU_1:My interaction with Moodle is clear and understandable	4.46	0.88***
		PEOU_2:Interacting with Moodle does not require a lot of mental effort	4.38	0.75***
		PEOU_3:I find Moodle to be easy to use	4.59	0.94***
		PEOU_4:I find it easy to get Moodle to do what I want to do	4.27	0.91***
Access(CR=0.87)	Lee et al. (2009)	ACCESS_1:Moodle is responsive to my request	4.53	0.79***
		ACCESS_2:Moodle quickly loads all the text and graphics	3.96	0.80***
		ACCESS_3:Moodle provides good access	4.81	0.82***
		ACCESS_4:Moodle is stable	4.35	0.71***
Compatibility(CR=0.91)	Moore and Benbasat (1991)	COMP_1:Using Moodle fits with the way I like to teach	4.95	0.92***
		COMP_2:Using Moodle fits with my teaching style	5.17	0.89***
		COMP_3:Moodle is compatible with most aspects of my teaching	4.66	0.82***
Perceived Behavioral Control(CR=0.90)	Taylor and Todd (1995)	PBC_1:I am able to use Moodle well for accomplishing my teaching	5.03	0.84***
		PBC_2:Using Moodle is entirely within my control	4.52	0.84***
		PBC_3:I have the resources necessary to use Moodle	5.24	0.85***
		PBC_4:I have the knowledge necessary to use Moodle	5.22	0.80***
Social Influence(CR=0.76/0.83**)	Venkatesh et al. (2003)	SI_1:People important to me support my use of Moodle	4.78	0.83***
		SI_2:People who influence my behavior want me to use Moodle instead of any alternative means	3.77	0.28*
		SI_3:People whose opinions I value prefer that I use Moodle for doing my teaching	4.53	0.84***
		SI_4:In general, the school has supported the use of Moodle	4.70	0.68***

Note: *The item was removed

**Composite reliability (CR) = initial coefficient/coefficient after one item is removed

***p<0.001

Table 2. Construct items, means and internal consistencies.

Testing for discriminant validity involves checking whether the items measure the construct in question or other (related) constructs. Discriminant validity was verified with both correlation analysis and factor analysis as recommended by Gefen and Straub (2005). First, the inspection of discriminant validity among variables is based on the correlation between variables and the square root of their respective average variance extracted (Fornell and Larcker, 1981). As Table 3 shows, the squared average variance extracted value for the variables is consistently greater than the off-diagonal correlation values, suggesting satisfactory discriminant validity among variables. Second, from Table 4 we see that all items have cross loadings coefficients lower than the factor loading on their respective assigned latent variable, suggesting that discriminant validity on the item level is met for all the constructs.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Access (1)	0.79						
Compatibility (2)	0.60	0.88					
Perceived ease of use (3)	0.68	0.69	0.87				
Continuance intention (4)	0.65	0.72	0.60	0.87			
Perceived behavioral control (5)	0.48	0.67	0.71	0.62	0.84		
Perceived usefulness (6)	0.68	0.78	0.62	0.81	0.62	0.83	
Social influence (7)	0.40	0.45	0.39	0.43	0.45	0.44	0.79

Table 3. Correlation among variables and squared root of average variance extracted.

	Access	Compatibility	Intention	PBC	PEOU	PU	SI
ACCESS_1	0.786463	0.515772	0.593880	0.419606	0.583447	0.568843	0.303539
ACCESS_2	0.796663	0.395571	0.410875	0.299866	0.527207	0.488704	0.304013
ACCESS_3	0.824423	0.574608	0.594821	0.446229	0.551278	0.610426	0.431421
ACCESS_4	0.706908	0.321391	0.317850	0.250392	0.437239	0.404879	0.128569
COMP_1	0.525831	0.920228	0.641234	0.658706	0.616833	0.735583	0.460072
COMP_2	0.531361	0.891297	0.658304	0.557715	0.546627	0.669185	0.391780
COMP_3	0.539619	0.822454	0.594184	0.539408	0.637164	0.643171	0.340420
INT_1	0.613314	0.663457	0.912857	0.597102	0.549628	0.766565	0.384090
INT_2	0.617805	0.635904	0.876759	0.556211	0.532145	0.728307	0.436037
INT_3	0.430778	0.563661	0.807900	0.432989	0.434741	0.608755	0.276200
PBC_1	0.527877	0.700857	0.621303	0.843748	0.609300	0.677219	0.405587
PBC_2	0.395710	0.559563	0.513029	0.841294	0.570565	0.524240	0.259863
PBC_3	0.347718	0.458914	0.462797	0.850484	0.574477	0.447106	0.384167
PBC_4	0.260471	0.454167	0.417345	0.802890	0.587595	0.354477	0.462199
PEOU_1	0.555218	0.611709	0.549818	0.672384	0.880262	0.511484	0.357237
PEOU_2	0.508778	0.441995	0.340040	0.441714	0.749328	0.374476	0.213716
PEOU_3	0.667997	0.607141	0.534810	0.642440	0.941519	0.584028	0.387911
PEOU_4	0.639499	0.683849	0.581581	0.658672	0.910902	0.611412	0.345103
PU_1	0.571677	0.681398	0.658595	0.536908	0.525993	0.837328	0.440403
PU_2	0.508439	0.505124	0.620203	0.433748	0.392752	0.777794	0.220751
PU_3	0.633857	0.734896	0.666400	0.582792	0.578769	0.849824	0.440328
PU_4	0.611087	0.680287	0.717753	0.496324	0.527966	0.868801	0.415281
PU_5	0.490979	0.595950	0.704159	0.507797	0.472526	0.803882	0.268306
SI_1	0.243365	0.380831	0.328507	0.322557	0.251313	0.337779	0.822415
SI_3	0.280228	0.413147	0.366497	0.381698	0.254599	0.375951	0.849058
SI_4	0.430957	0.267630	0.309015	0.353234	0.407744	0.315455	0.678554

Note: Perceived Behavioral Control (PBC), Perceived Ease of Use (PEOU), Perceived Usefulness (PU), Social Influence (SI)

Table 4. Factor analysis results.

5 Results and discussions

The test of the structural model includes estimates of the path coefficients, which indicate the strengths of the relationships between the dependent and independent variables, and the R-square values, which represent the amount of variance explained by the independent variables. Figure 2 shows the results of the test of the hypothesized structural model. Two out of our six hypotheses were supported. As expected, perceived usefulness ($\beta = 0.54$; $p < 0.05$), and access ($\beta = 0.15$; $p < 0.01$) had significant impact on continued usage intention. On the other hand, compatibility ($\beta = 0.13$), perceived behavioral control ($\beta = 0.14$), perceived ease of use ($\beta = 0.04$) and social influence ($\beta = 0.03$) had no significant effect on continued usage intention. These predictors altogether explained 70.2% of the total variance in intention.

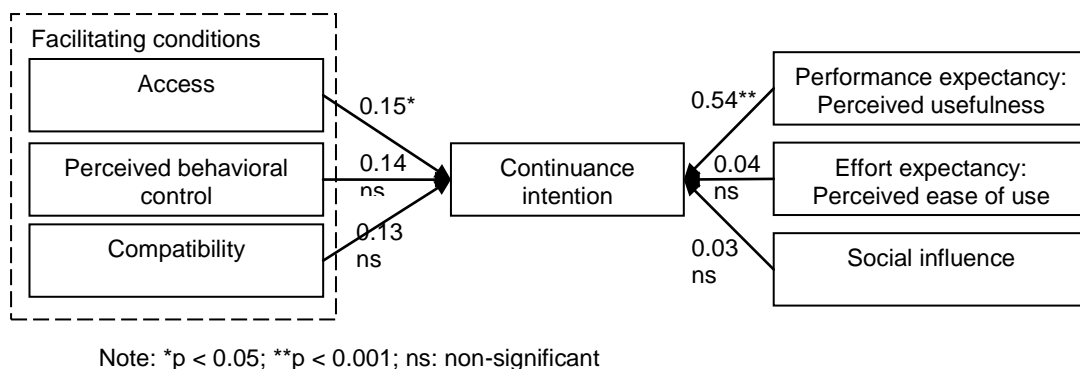


Figure 2: Structured Equation Model results

Overall, the associations of UTAUT theory were partially supported in explaining educators' continued usage intention of e-learning system. Perceived ease of use had no significant impact on continuance intention. This is in line with the extant literature which suggests that perceived ease of use would not have significant direct impact on intention for continued usage context (Bhattacharjee, 2001; Venkatesh et al., 2003). Social influence had no significant effect on continuance intention too. The reason might be that the target e-learning system was a voluntary system. The educators were mostly free to choose other methods to create course pages. Thus, this finding is also in line with the original UTAUT theory (Venkatesh et al., 2003) where the association between social influence and intention was found significant only for mandatory usage condition. Perceived usefulness was found to be the most dominant predictor of continued usage intention. This is also in line with the extant literature. Specifically, many studies found perceived usefulness as the most dominant predictor of intention to use (e.g., Limayem and Cheung, 2008; Roca et al., 2006). We included three factors (access, perceived behavioral control and compatibility) to conceptualize facilitating conditions. We found that only access significantly affected continued usage intention. It may be so that the other constructs (perceived behavioral control and compatibility) of facilitating conditions are important during initial use but they fail to maintain importance when the users become experienced in using the system.

6 Implications

Our study has two theoretical implications. First, IS continuance research is mostly dominated by the expectation-confirmation framework. However, from the theoretical perspective, our UTAUT based approach provides a refined view of how continued usage intention is shaped by its determinants. This might open up opportunities for future research on the comparison of different theoretical perspectives to understand IS continuance. Second, we included three factors to conceptualize facilitating conditions. We encourage researchers to look for more factors for facilitating conditions as well as for other core constructs of UTAUT. This kind of decomposed UTAUT might lead us better understanding of both IS acceptance and continuance. It might also eliminate the content validity related limitation of the UTAUT theory.

Our findings have practical implications too. First, the dominant effect of perceived usefulness on intention provides potential fruitful avenues to the e-learning technology designers for affecting users' continuance intention to use e-learning technologies. The research results suggest that design and developing a useful system is an antidote against IS discontinuance in the e-learning context. The educators will discontinue using an e-learning technology, if it is not useful for their purpose, even if other conditions are fulfilled. Second, we found that access is another important determinant of continuance intention. Thus, our study results recommend practitioners to plan for appropriate actions and strategies to ensure stability. The service providers who host the e-learning services in the Internet also should put enough effort to ensure fast access to the service.

7 Conclusions

This study followed the UTAUT based approach to understand educators' continued usage intention of an e-learning system. We developed a research model according to the UTAUT theory. Then, we conducted a test using survey data from 175 university educators, and analyzed the data using structured equation modeling. Study's findings show that continuance intention is mainly determined by perceived usefulness and access. No significant influence of social influence, perceived ease of use, perceived behavioral control and compatibility were found on continued intention. Overall, UTAUT theory was partially supported in continued usage context of e-learning technology.

There are several limitations of this study which might be the avenue of future research. First, the research model does not include the demographic variables and voluntariness which have been conceptualized as the moderators in the original UTAUT theory. In the future, we plan to test the moderating effect of these variables on different associations of the theory. Second, our research solely focused on the usage intention of educators in the university. We might end up with different findings from students' perspective. In our opinion, the success of such e-learning system depends on effective utilization of the tool by both educators and students. Thus, it would be interesting to study the students' continued usage intention too. Third, this research was conducted in the university settings. Now-a-days, the business organizations are also becoming interested about the use of such e-learning systems. Careful consideration should be made before generalizing the findings of this study to such contexts. Thus, similar kind of studies should be repeated in the business organization contexts.

References

- Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, 50 (2), 179–211.
- Bhattacharjee, A. (2001). Understanding Information Systems Continuance: An Expectation-Confirmation Model. *MIS Quarterly*, 25(3), 251–370.
- Chiu, C. M., Hsu, M. H., Sun, S. Y., Lin, T. C. and Sun, P. C. (2005). Usability, quality, value and e-learning continuance decisions. *Computers & Education*, 45(4), 399–416.
- Chiu, C. M., Sun, S. Y., Sun, P. C. and Ju, T. L. (2007). An empirical analysis of the antecedents of web-based learning continuance. *Computers & Education*, 49(4), 1224–1245.
- Chiu, C. M., and Wang, E. T. G. (2008). Understanding Web-based learning continuance intention: The role of subjective task value. *Information & Management*, (45), 194–201.
- Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*, 13(3), 319–340.
- Deci, E.L., and Ryan, R.M. (1995). Human autonomy: The basis for true self-esteem. In: M. Kemis (Ed.), *Efficacy, agency, and self-esteem* (pp. 31-49). New York: Plenum.
- DeLone, W. H. and McLean, E. R. (2003). The DeLone and McLean model of information systems success: A ten year update. *Journal of Management Information Systems*, 19(4), 9–30.
- Fornell, C. and Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research*, 18(1), 39–50.
- Gefen, D. and Straub, D. (2005). A practical guide to factorial validity using PLS-Graph: Tutorial and annotated example. *The communications of the Associations for Information Systems*, 16(5), 91–109.
- Hong, S.-J., Thong, J. Y. L. and Tam, K. Y. (2006). Understanding continued information technology usage behavior: A comparison of three models in the context of mobile internet. *Decision Support Systems*, 42(3), 1819–1834.
- Hsu, M. H. and Chiu, C. M. (2004). Predicting electronic service continuance with decomposed theory of planned behaviour. *Behaviour & Information Technology*, 23(5), 359–373.
- Kim, B. (2010). An empirical investigation of mobile data service continuance: Incorporating the theory of planned behavior into expectation-confirmation model. *Expert Systems with Applications*.
- Larsen, T. J., Sorebo, A. M. and Sorebo, O. (2009). The role of task-technology fit as users' motivation to continue information system use. *Computers in Human Behavior*, 25, 778–784.
- Lee, M.-C. (2010). Explaining and predicting users' continuance intention toward e-learning: An extension of the expectation-confirmation model. *Computers & Education*, 54, 506-516.
- Lee, S., Shin, B. and Lee, H. G. (2009). Understanding post-adoption usage of Mobile Data Services: The role of supplier-side variables. *Journal of the Associations for Information Systems*, 10(12), 860–888.

- Liao, C., Palvia, P. and Chen, J.-L. (2009). Information technology adoption behavior life cycle: Toward a technology continuance theory (TCT). *International Journal of Information Management*, 29, 309-320.
- Liao, C., Chen, J. L. and Yen, D. C. (2007). Theory of planning behavior (TPB) and customer satisfaction in the continued use of e-services: An integrated model. *Computers in Human Behavior*, 23(6), 2804–2822.
- Limayem, M. and Cheung, C. M. K. (2008). Understanding information systems continuance: The case of Internet-based learning technologies. *Information & Management*, 45(4), 227–232.
- Lind, E. A., Kulik, C. T., Ambrose, M. and Deverapark, M. V. (1993). Individual and corporate dispute resolution-using procedural fairness as a decision heuristic. *Administrative Science Quarterly*, 38(2), 224–251.
- Moore, G. C. and Benbasat, I. (1991). Development of an instrument to measure the perception of adopting an Information Technology innovation. *Information Systems Research*, 2(3), 192–222.
- Recker, J. (2010). Continued use of process modeling grammars: the impact of individual difference factors. *European Journal of Information Systems*, 19, 76-92.
- Roca, J. C., Chiu, C. M. and Martínez, F. J. (2006). Understanding e-learning continuance intention: An extension of the technology acceptance model. *International Journal of Human-Computer Studies*, 64(8), 683–696.
- Roca, J. C. and Gagne, M. (2008). Understanding e-learning continuance intention in the workplace: A self-determination theory perspective. *Computers in Human Behavior*, 24(4), 1585–1604.
- Sorebo, O., Halvari, H., Gulli, V. F. and Kristiansen, R. (2009). The role of self-determination theory in explaining teachers' motivation to continue to use e-learning technology. *Computers & Education*, 53, 1177-1187.
- Sun, Y., Bhattacharjee, A. and Ma, Q. (2009). Extending technology usage to work settings: The role of perceived work compatibility in ERP implementation. *Information & Management*, 46, 351–356.
- Taylor, S. and Todd, P. A. (1995). Understanding information technology usage: A test of competing models. *Information Systems Research*, 6(2), 144–176.
- Venkatesh, V. and Davis, F. D. (2000). A theoretical extension of the technology acceptance model: Four longitudinal field studies. *Management Science*, 46(2), 186–204.
- Venkatesh, V., Morris, M. G., Davis, G. B. and Davis, F. D. (2003). User acceptance of information technology: toward a unified view. *MIS Quarterly*, 27(3), 425–478.
- Csikszentmihalyi, M. (1977). *Beyond boredom and anxiety*. San Francisco: Jossey-Base.
- Nunnally, J. C. (1978). *Psychometric theory* (1st ed.). New York: McGraw Hill.
- Ringle, C.M., Wende, S. and Will, A. (2005). *Smart PLS 2.0 M3*, University of Hamburg, www.smartpls.de.