Satisfaction and continuance with a learning management system

Comparing perceptions of educators and students

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Abstract

Purpose – The purpose of this paper is to compare the perceptions of educators and students with a learning management system (LMS). The comparison is based on survey data collected from 185 educators and 249 students in a Finnish university who use a popular LMS, Moodle.

Design/methodology/approach – The analysis of the survey data follows a two-phase strategy. In the first phase, perceptions of educators and students regarding ease of use, result demonstrability, usefulness, access, reliability, compatibility, satisfaction, and continuance intention were compared using one way analysis of variance (ANOVA). In the second phase, partial least squares (PLS) technique is employed to compare the path values and explained variances of satisfaction, and continuance intention by putting relevant variables as predictors.

Findings – The ANOVA results suggest that students have higher positive perceptions regarding ease of use, usefulness, access, reliability, and compatibility of the LMS than the educators. The PLS analysis results revealed that the amount of variance of students' satisfaction explained by its predictors was 9 percentage points lower than that of educators. It also revealed that the variance of students' continuance intention explained by satisfaction and usefulness was 12 percentage points lower than that of educators.

Practical implications – The study concludes with both theoretical and managerial implications.

Originality/value – While prior research has investigated either educators' or students' perspective, the authors have investigated both and presented a comparison. The authors have reported several differences that help practitioners make customized intervention plan.

Keywords Satisfaction, Learning management systems, Continuance, E-learning, Ease of use, Usefulness

Paper type Research paper

1. Introduction

Teaching and learning using the learning management system (LMS) has become a common phenomenon in higher education (Al-Busaidi, 2013; Islam, 2013). The LMS is web-based software tool for distributing, tracking, and managing courses over the internet. There are at least three ways to utilize LMSs (Islam, 2012). First, an LMS can be used to supplement traditional face-to-face classroom teaching. In such cases, the LMS serves as an electronic repository for the course materials. Second, educators who teach in-class may choose to use a "blended" approach by mixing the traditional teaching environment with e-learning elements. Finally, the LMS can be used in distance education for the delivery of fully online courses. These three ways can be

viewed as three distinct points on the continuum that shows how the LMS is used for a particular course.

Although, the way in which the LMS is being utilized in education differs between users, the implementation of the LMS by educational institutions has promised better quality and learner-centered education. In fact, different usage suggests that LMSs have the potential to offer learning and teaching methods that meet different educational needs. Both educators and students are important stakeholders for such systems. Educators can distribute learning materials, provide feedback to the students, share news and other course-related information, track the progress of students, and follow students' conversations using the LMS. On the other hand, students may submit their assignments, download course materials, and receive their grades from the system. In addition, the students can interact with each other, control their own learning, develop deep thinking skills, and develop a sense of community with other learners (Macfadyen and Dawson, 2012). Overall, the LMS provides the students and educators flexibility in terms of place, time, and studying at their own pace (Hung *et al.*, 2011; Kelly *et al.*, 2010).

As both educators and students are important stakeholders, the success of LMSs depends on effective utilization by both educators and students. However, most prior literature on LMS use focussed on students (Lee and Lee, 2008; Lee, 2010, Lin and Wang, 2012; Lee *et al.*, 2013). Indeed, a few studies focussed on educators (Sorebo *et al.*, 2009; Islam, 2011) but lacked to shed light on how educators' perceptions differ from that of students. We argue that the perceptions of these two types of stakeholders may be different and requires school management to plan different intervention plans. For example, contrasting the findings of several prior studies we observe that improving ease of use may improve educators' satisfaction but may not necessarily improve students' satisfaction (e.g. Larsen *et al.*, 2009; Liao *et al.*, 2007). This implies that same intervention plan may not necessarily improve both educators' and students' satisfaction and continuance intention. Thus, studies that consider both educators' and students' perceptions into account and compare them are important from practical perspective. Consequently, we address the following research question in this paper:

   RQ1. How do the perceptions of some key predictors of satisfaction and continuance intention differ between students and educators, with respect to an LMS?

In order to answer the research question, we collect attitudinal survey data from both educators and students in a Finnish university who use a popular LMS, Moodle, and compare those using the analysis of variance (ANOVA) and partial least squares (PLS) techniques.

The paper proceeds as follows. In Section 2 we present the literature reviews and research model. In Section 3 we describe our study design. Section 4 is dedicated to data analysis results and discussions. In Section 5 we describe implications of our findings for theory and practice. Finally, Section 6 concludes the paper.

2. Literature review and research model
In order to achieve the long-time viability and ultimate success of the LMS, the importance of post-adoption behavior has been emphasized (Islam, 2012). In LMS post-adoption research, continued use has been seen as the key post-adoption behavior (Bhattacherjee, 2001; Roca *et al.*, 2006). It is often argued in the literature that intention

causes behavior (system use) and, following this, post-adoption literature has mostly used intention as the final dependent variable.

Although many literature viewed post-adoption as an extension to adoption and utilized technology acceptance model (TAM) (Davis, 1989) and its extensions to investigate continued use, Bhattacherjee (2001) convincingly presented the distinction between adoption and post-adoption behaviors, and proposed the information systems (IS) continuance model that explicitly focusses on post-adoption beliefs, and post-adoption satisfaction. According to this model, satisfaction along with perceived usefulness causes a user's continued use intention during the post-adoption stage. The literature that uses the IS continuance model has placed greatest importance on satisfaction and use intention, and investigated the determinants of these variables. In this paper, we have conducted a literature review on LMS continued use and satisfaction. Table I summarizes a sample of our literature review.

Three important points are found in this literature review:

(1) LMSs continuance research studies have mostly utilized IS adoption and usage theories: TAM (Davis, 1989), IS continuance model (Bhattacherjee, 2001), Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh *et al.*, 2003), etc. to explain LMS users' satisfaction and continuance intention. Two schools of thought have been employed in LMS continuance research. The first school implicitly views LMS continuance behavior as an extension of the LMS users' initial acceptance behavior, and uses the same set of variables to explain both acceptance and continued use (Cho *et al.*, 2009; Lin, 2011). These studies have utilized TAM, theory of planned behavior (TPB) (Ajzen, 1991), self-determination theory (Deci and Ryan, 1995), UTAUT, etc. to explain the continuance intention of LMS users. The second school has utilized the IS continuance model and dominates LMS continuance research. To enrich this school, researchers have integrated other theoretical frameworks, such as TAM (Davis, 1989), the TPB (Ajzen, 1991), the IS success model (DeLone and McLean, 2003), self-determination theory (Deci and Ryan, 1995), and task-technology fit (Goodhue and Thompson (1995)) with the IS continuance model.

(2) Prior research has found perceived usefulness and perceived ease of use as the two most important predictors of satisfaction. Other factors include system quality related factors, result demonstrability, compatibility, and playfulness.

(3) Most research investigated students' perspective. Indeed, few studies took educators' perspective into account. However, there is a lack of research that emphasized on comparing the perceptions of educators and students. As can be seen from Table I, prior research either focussed on educators or students.

In this paper, we develop an integrated research model based on six important predictors that have been found significant for predicting satisfaction in prior literature (see Table I). In practice, we propose that ease of use, usefulness, accessibility, reliability, result demonstrability, and compatibility influence satisfaction. In turn, satisfaction and perceived usefulness influence continuance intention. As these relationships have been verified in prior literature several times, we do not discuss the argument for these relationships in this paper. As mentioned earlier, our main goal in this paper is to investigate whether there are differences between the results obtained from the viewpoints of educators and students. In order to investigate the differences

Article	Theories used	Target population	Key findings
Chiu and Wang (2008)	UTAUT	Students	Computer self-efficacy, attainment value, utility value, perceived playfulness, performance expectancy, and effort expectancy affect continuance intention
Cho et al. (2009)	TAM	Students	Perceived usefulness, satisfaction, and prior experience affect continuance intention. Perceived interface design issues affect continuance intention through perceived usefulness
Larsen et al. (2009)	IS continuance model, task-technology fit	Educators	Confirmation affects satisfaction. Satisfaction and utilization affect continuance intention
Lee (2010)	IS continuance model, TAM, TPB, fairness theory	Students	Confirmation and perceived usefulness affect satisfaction. In turn, satisfaction, perceived usefulness, attitude, concentration, subjective norm, and perceived behavioral control affect continuance intention
Liao et al. (2007)	IS continuance model, TPB	Students	Confirmation and perceived ease of use affect satisfaction. Satisfaction, subjective norm, and perceived behavioral control affect continuance intention
Liao et al. (2009)	IS continuance model, TAM	Students	Confirmation and perceived usefulness (only for short-term users) affect satisfaction. In turn, satisfaction, perceived usefulness (only for initial adopters), and attitude affect continuance intention
Liao and Lu (2008)	Innovation diffusion theory	Students	Compatibility and result demonstrability affect continuance intention
Limayem and Cheung (2011)	IS continuance model	Students	Confirmation and perceived usefulness affect satisfaction. Perceived usefulness, and satisfaction affect continuance intention. Habit moderates between intention and usage
Lin (2011)	TAM	Students	Satisfaction (only for less experienced users), and attitude affect continuance intention. Satisfaction is negatively affected by negative critical incidents
Lin and Wang (2012)	IS success model, task technology fit	Students	Satisfaction is predicted by confirmation and perceived usefulness. Continued use intention is predicted by perceived usefulness and satisfaction
Liu et al. (2010)	TAM	Students	Perceived usefulness, perceived ease of use, and perceived interaction affect continuance intention
Pituch and Lee (2006)	TAM	Students	System functionality, perceived ease of use, and perceived usefulness affect use of supplementary learning. System functionality, system interactivity, perceived usefulness, perceived ease of use, and use of supplementary learning affect use of distance education

Table I.
E-learning
post-adoption
research

(*continued*)

Article	Theories used	Target population	Key findings
Roca *et al.* (2006)	IS continuance model, TAM, TPB	Students	Information quality, system quality, service quality, confirmation, perceived usefulness, cognitive absorption, and perceived ease of use affect satisfaction. Satisfaction affects continuance intention
Roca and Gagne (2008)	TAM, self-determination theory	Students	Perceived usefulness, perceived playfulness, and perceived ease of use affect continuance intention
Sorebo *et al.* (2009)	IS continuance model, self-determination theory	Educators	Confirmation, perceived usefulness and perceived playfulness affect satisfaction. Perceived usefulness and perceived playfulness affect continuance intention

Table I.

between the viewpoints, we follow an exploratory approach rather than hypotheses building and testing. The research model is shown in Figure 1.

The operational definitions of the constructs are presented in Table II.

3. Research design and method

3.1 Survey questionnaire development

Two questionnaires were developed in order to collect data: one for educators and another for students. Both questionnaires had three parts: demographic questions, questions related to the constructs of the research model, and open ended questions asking to report the respondents' satisfaction and dissatisfaction with the target system.
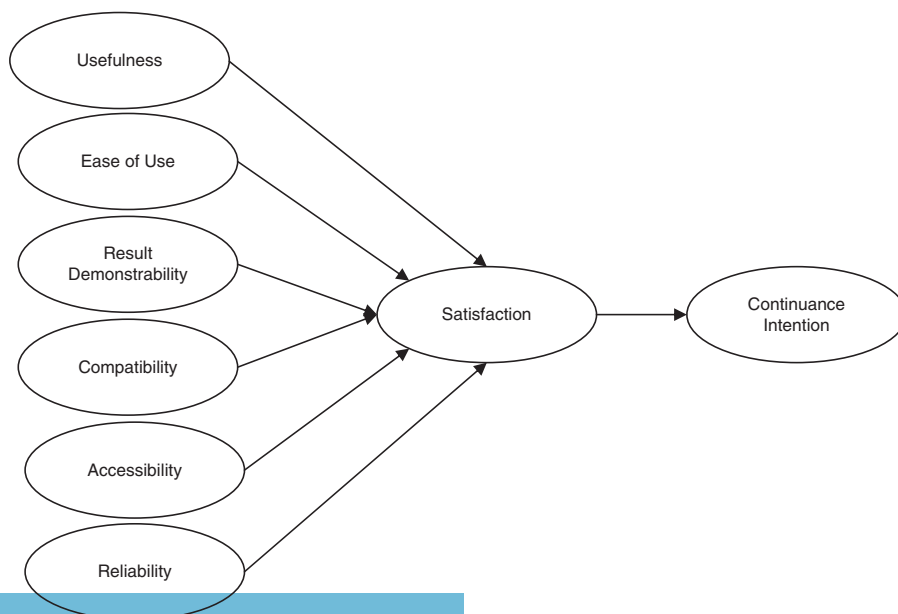

Figure 1.
Research model

Construct	Definition
Accessibility	The degree of accessibility, responsiveness, and availability of the LMS (Lee *et al.*, 2009)
Ease of use	The degree to which an individual perceives using the LMS is free of effort (Davis, 1989)
Reliability	The dependability of the LMS operation (Wixom and Todd, 2005)
Result demonstrability	The degree to which the results of using the LMS are observable and communicable to others (Karahanna *et al.*, 1999)
Usefulness	The prospective user's subjective probability that using an LMS will increase his or her job performance (Davis, 1989)
Compatibility	The degree to which an LMS is perceived as being consistent with the existing values, needs and experiences of its users (Moore and Benbasat, 1991)
Satisfaction	Users' affect with (feelings about) prior use of the LMS (Bhattacherjee, 2001)
Continuance intention	Users' intention to continue using the LMS (Bhattacherjee, 2001)

Table II.
The conceptualization of the constructs

We measured each item corresponding to the constructs using seven-point Likert scale, with answer choices ranging from "Strongly disagree (1)" to "Strongly agree (7)." The items were adapted from the literature with minor changes in wording reflecting the target context. We adapted the measures of continuance intention, usefulness, and satisfaction from Limayem *et al.* (2007) and Bhattacherjee (2001). The measures of reliability were adapted from Wixom and Todd (2005) while the measures of accessibility and ease of use were adapted from Lee *et al.* (2009) and Hong *et al.* (2006) respectively. Finally, the measures of compatibility and result demonstrability were adapted from Moore and Benbasat (1991).

The draft questionnaires were first sent to two academic researchers for their review, and then these were revised according to their comments and suggestions to make the wording of the items more precise. Then, the educators' version of the questionnaire was sent to 30 educators for their review. Similarly, students' version of the questionnaire was sent to ten students. Overall, the educators and students indicated that the questionnaires were relatively clear and easy to complete. A number of suggestions were made concerning the wording of several items and the overall structure of the questionnaires. The questionnaires were then revised according to the given suggestions. The final questions corresponding to the constructs of interest are presented in Appendix.

3.2 Data collection
We conducted this research using Moodle (http://moodle.org/about/) as the target system in a Finnish multidisciplinary university. The university has seven faculties: Humanities, Mathematics and Natural Science, Medicine, Law, Social Sciences, Education, and School of Economics. The university has been using Moodle since 2007 as its main platform for creating course pages online.

Data were collected via two web-based surveys: one survey to collect data from the educators who use Moodle for their teaching purpose, and another survey to collect data from the students who use Moodle in their study. A list of educators' and students' e-mail addresses was collected from the Moodle support team in the university. First, to collect data from the educators, a total of 1,200 e-mail 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 185 survey responses.

Second, to collect data from students, a total of 1,000 e-mail invitations were sent to randomly selected students of the university who had been registered in Moodle as student users. One reminder was sent to increase the response rate in one-week gap. The survey ran for approximately two weeks. After filtering invalid and incomplete responses, we had total 249 survey responses that could be used in this study. The demographic information of the respondents is given in Table III.

4. Results and discussions

We employed IBM SPSS 19 for ANOVA analysis while PLS approach was conducted utilizing the tool smartPLS (Ringle *et al.*, 2005). We followed the procedures outlined by Gefen and Straub (2005) to test discriminant and convergent validity. Discriminant validity refers to whether the items measure the construct in question or other (related) constructs (Gefen and Straub, 2005). We verified discriminant validity using correlation matrix analysis. Table IV shows the correlation matrix with the square root of average variance extracted (AVE) values presented diagonally. The square root of the AVE values for the variables are consistently greater than the off-diagonal correlation values, suggesting satisfactory discriminant validity between the variables (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. Convergent validity is ensured by comparing the item loadings, composite reliability (CR), and AVE values. As shown in Table V, all items have significant ($p < 0.001$) path loadings greater than the threshold 0.7, recommended by Fornell and Larcker (1981). All the constructs have composite reliability values between 0.87 and 0.95, fulfilling the recommended value proposed by

		Educators		Students	
		Frequency	%	Frequency	%
Gender	Male	80	42.2	101	40.6
	Female	105	57.8	148	59.4
Age	Less than 21 years	0	0	31	12.5
	21-30 years	43	23.2	166	66.7
	31-40 years	53	28.6	25	10.0
	> 40 years	89	48.2	27	10.8
Experience with Moodle	0-18 months	57	30.8	88	35.4
	> 18-36 months	88	47.6	83	33.3
	> 36 months	40	21.6	78	31.3

Table III.
Demographic information of the respondents

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Accessibility	0.88							
Compatibility (2)	0.56	0.88						
Result demonstrability (3)	0.52	0.53	0.84					
Ease of use (4)	0.61	0.67	0.56	0.87				
Usefulness (5)	0.62	0.68	0.70	0.60	0.87			
Reliability (6)	0.64	0.35	0.50	0.50	0.41	0.95		
Satisfaction (7)	0.60	0.69	0.60	0.70	0.69	0.42	0.90	
Continuance intention (8)	0.55	0.60	0.59	0.40	0.68	0.57	0.70	0.87

Table IV.
Correlation among variables and square root of average variance extracted

Construct	Item	CR	Combined sample AVE	Loading
Ease of use	PEOU-1	0.93	0.76	0.88
	PEOU-2			0.76
	PEOU-3			0.94
	PEOU-4			0.91
Satisfaction	SAT-1	0.94	0.81	0.89
	SAT-2			0.94
	SAT-3			0.86
	SAT-4			0.91
Usefulness	PU-1	0.90	0.75	0.88
	PU-2			0.90
	PU-3			0.82
Result demonstrability	RD-1	0.88	0.71	0.83
	RD-2			0.85
	RD-3			0.84
Compatibility	COMP-1	0.91	0.77	0.92
	COMP-2			0.89
	COMP-3			0.83
Accessibility	ACCESS-1	0.87	0.78	0.85
	ACCESS-2			0.91
Reliability	REL-1	0.95	0.91	0.95
	REL-2			0.96
Continuance intention	INT-1	0.92	0.76	0.91
	INT-2			0.87

Table V.
Constructs' internal
consistencies and
reliability values

Notes: CR, Composite reliability. $*p < 0.001$

Nunnally (1978). Finally, all AVE values exceed the threshold of 0.5 as recommended by Fornell and Larcker (1981). Overall, these tests of validity and reliability provide us with a high degree of confidence about the scale items used in testing our research model.

4.1 ANOVA results
We compared the means of the measured constructs between the educators and students by using one-way ANOVA. The results are summarized in Table VI. Overall, the analysis suggests that students, in general have higher positive perceptions than educators with the LMS. Especially, the difference was significant for ease of use,

Construct	Mean educators	Mean students	Difference significance
Ease of use	4.16	4.99	$p < 0.001$
Usefulness	5.02	5.34	$p < 0.05$
Result demonstrability	5.02	4.95	Non-significant
Accessibility	4.18	4.62	$p < 0.01$
Reliability	4.18	4.54	$p < 0.05$
Compatibility	4.58	5.21	$p < 0.001$
Satisfaction	4.27	4.53	Non-significant
Continuance intention	4.54	4.77	Non-significant

Table VI.
Averages of the
constructs

usefulness, accessibility, reliability, and compatibility. The positive perceptions of students can be explained by the fact that the educators usually use the system deeper than the students. For example, educators might need to develop a course page from the scratch. They have to put the required functionalities in the course pages. On the other hand, students usually use the course page functionalities that are developed by the educators. As a result, the students usually face less number of problems during their usage. Consequently, the students have more positive perceptions regarding ease of use, reliability, and accessibility of the system. This fact is also depicted from the students' comments to the open-ended survey questions. For example one student commented the following:

> […] As a student user, my use of Moodle is very limited and thus, I rarely face problem with the system […].

The positive perception regarding usefulness and compatibility can be explained by the fact that students are allowed to participate in many courses without attending in-class activities. Downloading learning materials at any time, receiving course-related news, group discussion facilities with the possibility of storing old discussions for future reference, and online examination are very useful features for students who cannot attend in-class sessions. Many educators allow participation in many courses while being in different geographical location. Consequently, students felt that the LMS is useful for them and compatible with the way they want to study. A student commented the following in this regard:

> […] I often cannot attend the lecture due to my work, however through the Moodle course pages I always get the information about what is going on. It helps me to remain upto date with the course […].

4.2 Structural model results
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^2 values, which represent the amount of variance explained by the independent variables. Figure 2 shows the results of the hypothesized structural model for both educators and students.

For educators, perceived ease of use ($\beta = 0.29$, $p < 0.01$), perceived usefulness ($\beta = 0.17$, $p < 0.05$), result demonstrability ($\beta = 0.15$, $p < 0.05$), accessibility ($\beta = 0.16$, $p < 0.05$), reliability ($\beta = 0.15$, $p < 0.05$), and compatibility ($\beta = 0.23$, $p < 0.01$) had significant effect on satisfaction, accounting for 72 percent of the variance in that measure. In turn, satisfaction ($\beta = 0.38$, $p < 0.001$) and usefulness ($\beta = 0.48$, $p < 0.001$) had a significant influence on continuance intention, accounting its 64 percent variance.

For students, perceived ease of use ($\beta = 0.20$, $p < 0.01$), perceived usefulness ($\beta = 0.18$, $p < 0.05$), accessibility ($\beta = 0.14$, $p < 0.05$), and compatibility ($\beta = 0.25$, $p < 0.01$) had significant effect on satisfaction. These predictors explained 61 percent variance in satisfaction. In turn, satisfaction ($\beta = 0.31$, $p < 0.001$) and usefulness ($\beta = 0.39$, $p < 0.001$) had a significant influence on continuance intention, accounting its 52 percent variance.

Comparing the two structural models, two interesting differences are observed.

First, the predictors explained around 9 percentage points less variance of satisfaction for students than the educators. Similarly, satisfaction and usefulness explained 12 percentage points less variance of continuance intention for students than the educators. These results imply that students develop their satisfaction and
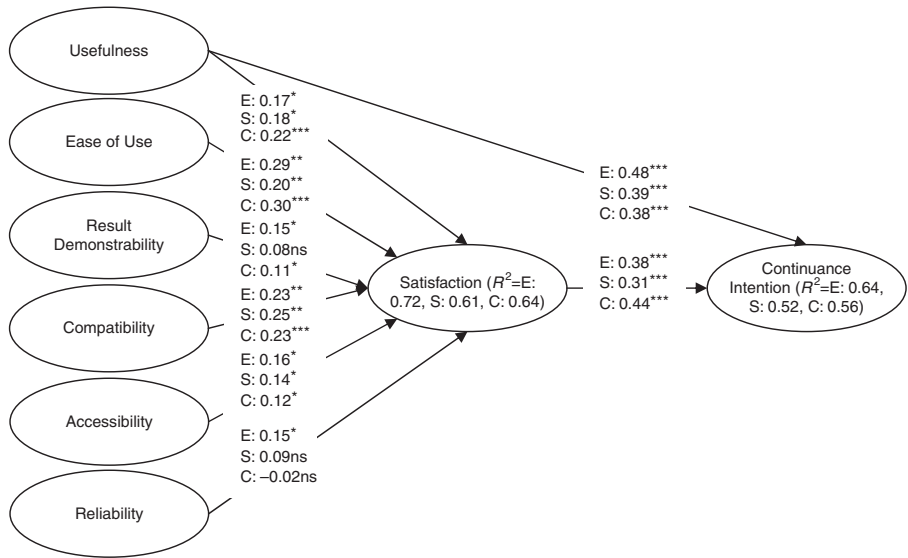
Usefulness

Ease of Use

Result
Demonstrability

Compatibility

Accessibility

Reliability

E: 0.17*
S: 0.18*
C: 0.22***

E: 0.29**
S: 0.20**
C: 0.30***

E: 0.15*
S: 0.08ns
C: 0.11*

E: 0.23**
S: 0.25**
C: 0.23***

E: 0.16*
S: 0.14*
C: 0.12*

E: 0.15*
S: 0.09ns
C: −0.02ns

Satisfaction (R^2=E: 0.72, S: 0.61, C: 0.64)

E: 0.48***
S: 0.39***
C: 0.38***

E: 0.38***
S: 0.31***
C: 0.44***

Continuance Intention (R^2=E: 0.64, S: 0.52, C: 0.56)

Figure 2.
PLS analysis results

Notes: E, Educators; S, Students; C, Combined. $*p<0.05$; $**p<0.01$; $***p<0.001$

continuance intention from other factors too. Graf *et al.* (2009) pointed understanding students' learning style in online environment and applying appropriate teaching style is critical for successful learning. In fact, analysis of the open-ended survey questions revealed that students' satisfaction may also depend on educators' teaching style. One student commented the following:

[…] Moodle is an excellent tool, but in many cases the lecturers do not know how to use it effectively […].

Another student commented the following:

[…] Lecturers do not really provide any incentive for using Moodle, for example discussion board. The discussion board is an excellent way to share ideas which could be utilized heavily if proper incentive is announced by the teachers […].

Second, the effect of perceived ease of use on satisfaction was much stronger for educators than for students. Prior literature on technology adoption/post-adoption research found inconclusive findings regarding the role of perceived ease of use on satisfaction and post-adoption usage. Many studies suggested that as users become more comfortable with a system, the influence of perceived ease of use diminishes (Venkatesh *et al.*, 2003). The ANOVA results revealed that the students had very positive perceptions on ease of use of the target system. Thus, the finding is in line with the prior literature. However, as described earlier the higher ease of use perception might be mostly due to limited use by students rather than experience.

5. Implications
5.1 Theoretical contributions
Our study has three major theoretical implications. First, while prior research has investigated either educators' or students' perspective, we have investigated both and

presented a comparison. Our results suggest that students have higher positive perceptions regarding the LMS than educators. As the perceptions vary between the two groups, we call for more research on comparing different stakeholders' perceptions in order to develop customized intervention plan. This kind of future research would bring valuable implications for both research and practice.

Second, we observed that the predictors explained around 9 percentage points less variance of satisfaction of students than educators. This finding suggests that students put importance in some other factors as well to develop their satisfaction. Especially, our qualitative text data analysis revealed that educators' teaching styles play major roles in developing students' satisfaction. In addition, prior research suggested that hedonic factors play vital role in shaping users' satisfaction (e.g. Roca and Gagne, 2008; Mäntymäki and Islam, 2014). Thus, future studies should empirically investigate the influence of teaching style, and hedonic factors on students' satisfaction.

Finally, we found that the effect of ease of use on satisfaction was stronger from educators than that of students. This finding implies that the role of perceived ease of use on developing satisfaction may depend on the respondents' usage profile (i.e. breadth and depth of use), rather than mere experience. This may explain why prior research found inconclusive findings regarding the role of perceived ease of use on satisfaction and usage behavior during post-adoption stage.

5.2 Practical implications

Our research findings have three practical implications. First, we observed that perspectives of educators and students regarding the LMS might vary. This finding suggests that positive perceptions of one group of users do not ensure positive perception of other group of users. So, we suggest the school administration to evaluate the perspective of both educators and students before making important managerial decisions.

Second, we found that students in general have more positive perceptions than educators regarding the LMS. Our results revealed that students' use of an LMS is limited. Based on these findings we suggest putting more effort in motivating educators toward the LMS use. Proper trainings should be arranged for both educators. This would improve educators' perceptions regarding the target LMS. Educators are advised to encourage their students to use important LMS features for learning.

Finally, we found that educators' teaching style may improve students' satisfaction. Thus, we suggest educators choose teaching style based on the students learning style and type of courses. We advise educators playing more active roles in the course pages when necessary. For example, they should put topics in the discussion forum and monitor it. They may decide to announce some extra points for those students who actively participate in the discussions.

6. Conclusion

This study compared the perceptions of educators and students with an LMS. We collected attitudinal data from 185 educators and 249 students using a popular LMS, Moodle in a Finnish university. We compared the construct averages using ANOVA. We continued the comparison by PLS path analysis. Our findings suggest that students possess more positive perceptions than educators regarding the LMS. The predictors explained 9 percentage points less variance of satisfaction for

students than educators. We also found that satisfaction and usefulness explained 12 percentage points less variance of continuance intention for students than the educators.

Our study has a number of limitations that could serve as the avenue for further research.

First, the research was cross-sectional. The beliefs of the users regarding a system will change as the users gain experience with the system. Such changes cannot be captured with the type of cross-sectional study undertaken. Thus, future studies should compare the perceptions in longitudinal settings.

Second, the study has been conducted using a single LMS in a single Finnish university. Thus, cautious should be taken before generalizing the findings to other contexts. Future studies should be carried out in different contexts in order to find more generalizable results.

Third, use context differences between educators and students might have a role regarding the observed differences in perceptions. Especially, use of LMS in the university was voluntary for educators during data collection period. However, if an educator decides to use LMS for his course, use of LMS becomes somewhat mandatory for the students. Due to this kind of use context difference, we call for more studies in different contexts in order to verify the findings of this study.

References

Ajzen, I. (1991), "The theory of planned behavior", *Organizational Behavior and Human Decision Processes*, Vol. 50 No. 2, pp. 179-211.

Al-Busaidi, K.A. (2013), "An empirical investigation linking learners' adoption of blended learning to their intention of full e-learning", *Behavior & Information Technology*, Vol. 32 No. 11, pp. 1168-1176.

Bhattacherjee, A. (2001), "Understanding information systems continuance: an expectation-confirmation model", *MIS Quarterly*, Vol. 25 No. 3, pp. 251-370.

Chiu, C.M. and Wang, E.T.G. (2008), "Understanding web-based learning continuance intention: the role of subjective task value", *Information & Management*, Vol. 45 No. 3, pp. 194-201.

Cho, V., Cheng, T.C.E. and Lai, W.M. (2009), "The role of perceived user-interface design in continued usage intention of self-placed e-learning tools", *Computers & Education*, Vol. 53 No. 2, pp. 216-227.

Davis, F.D. (1989), "Perceived usefulness, perceived ease of use, and user acceptance of information technology", *MIS Quarterly*, Vol. 13 No. 3, pp. 319-340.

Deci, E.L. and Ryan, R.M. (1995), "Human autonomy: the basis for true self-esteem", in Kemis, M. (Ed.), *Efficacy, Agency and Self-Esteem*, Plenum, New York, NY, pp. 31-49.

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*, Vol. 19 No. 4, pp. 9-30.

Fornell, C. and Larcker, D.F. (1981), "Evaluating structural equation models with unobservable variables and measurement error", *Journal of Marketing Research*, Vol. 18 No. 1, pp. 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*, Vol. 16 No. 5, pp. 91-109.

Goodhue, D.L. and Thompson, R.L. (1995), "Task-technology fit and individual performance", *MIS Quarterly*, Vol. 19 No. 2, pp. 213-236.

Graf, S., Kinshuk and Liu, T.-C. (2009), "Supporting teachers in identifying students' learning styles in learning management systems: an automatic student modeling approach", *Educational Technology & Society*, Vol. 12 No. 4, pp. 3-14.

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*, Vol. 42 No. 3, pp. 1819-1834.

Hung, M.-C., Chang, I.-C. and Hwang, H.-G. (2011), "Exploring academic teachers' continuance toward the web-based learning system: the role of causal attributions", *Computers & Education*, Vol. 57 No. 2, pp. 1530-1543.

Islam, A.K.M.N. (2011), "The determinants of the post-adoption satisfaction of educators with an e-learning system", *Journal of Information Systems Education*, Vol. 22 No. 4, pp. 319-332.

Islam, A.K.M.N. (2012), "Understanding e-learning system users' post-adoption usage behavior and its outcomes: a study of a learning management system", PhD Dissertation, Turku School of Economics, Turku.

Islam, A.K.M.N. (2013), "Investigating e-learning system usage outcomes in the university context", *Computers & Education*, Vol. 69, pp. 387-399, available at: www.sciencedirect.com/science/article/pii/S0360131513002145

Karahanna, E., Straub, D.W. and Chervany, N.L. (1999), "Information technology adoption across time", *MIS Quarterly*, Vol. 23 No. 2, pp. 183-213.

Kelly, D., Baxter, J.S. and Anderson, A. (2010), "Engaging first-year students through online collaborative assessments", *Journal of Computer Assisted Learning*, Vol. 26 No. 6, pp. 535-548.

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*, Vol. 25 No. 3, pp. 778-784.

Lee, J.K. and Lee, W.K. (2008), "The relationship of e-learner's self-regulatory efficacy and perception of e-learning environment quality", *Computers in Human Behavior*, Vol. 24 No. 1, pp. 32-47.

Lee, M.C. (2010), "Explaining and predicting users' continuance intention toward e-learning: an extension of the expectation-confirmation model", *Computers & Education*, Vol. 54 No. 2, pp. 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*, Vol. 10 No. 12, pp. 860-888.

Lee, Y.-H., Hsieh, Y.-C. and Chen, Y.H. (2013), "An investigation of employees' use of e- learning systems: applying the technology acceptance model", *Behavior & Information Technology*, Vol. 32 No. 2, pp. 173-189.

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*, Vol. 23 No. 6, pp. 2804-2822.

Liao, C., Palvia, P. and Chen, J.L. (2009), "Information technology adoption behavior lifecycle: toward a technology continuance theory (TCT)", *International Journal of Information Management*, Vol. 29 No. 4, pp. 309-320.

Liao, H.L. and Lu, H.P. (2008), "The role of experience and innovation characteristics in the adoption and continued use of e-learning web-sites", *Computers & Education*, Vol. 51 No. 4, pp. 1405-1416.

Limayem, M. and Cheung, C.M.K. (2011), "Predicting the continued use of internet-based learning technologies: the role of habit", *Behaviour & Information Technology*, Vol. 30 No. 1, pp. 91-99.

Limayem, M., Hirt, S.G. and Cheung, C.M.K. (2007), "How habit limits the predictive power of intention: the case of information systems continuance", *MIS Quarterly*, Vol. 31 No. 4, pp. 705-737.

Lin, K.M. (2011), "E-learning continuance intention: moderating effects of user e-learning experience", *Computers & Education*, Vol. 56 No. 2, pp. 516-526.

Lin, W.S. and Wang, C.H. (2012), "Antecedents to continued intentions of adopting e-learning system in blended learning instruction: a contingency framework based models of information system success and technology fit", *Computers & Education*, Vol. 58 No. 1, pp. 88-99.

Liu, I.F., Chen, M.C., Sun, Y.S., Wible, D. and Kuo, C.H. (2010), "Extending the TAM model to explore the factors that affect intention to use an online learning community", *Computers & Education*, Vol. 54 No. 2, pp. 600-610.

Macfadyen, L.P. and Dawson, S. (2012), "Numbers are not enough. Why e-learning analytics failed to inform an institutional strategic plan", *Educational Technology & Society*, Vol. 15 No. 3, pp. 149-163.

Mäntymäki, M. and Islam, A.K.M.N. (2014), "Social virtual world use among teens: uncovering the moderating role of perceived network exposure", *Behaviour & Information Technology*, Vol. 33 No. 5, pp. 536-547.

Moore, G.C. and Benbasat, I. (1991), "Development of an instrument to measure the perception of adopting an information technology innovation", *Information Systems Research*, Vol. 2 No. 3, pp. 192-222.

Nunnally, J.C. (1978), *Psychometric Theory*, 1st ed., McGraw Hill, New York, NY.

Pituch, K.A. and Lee, Y.K. (2006), "The influence of system characteristics on e-learning use", *Computers & Education*, Vol. 47 No. 2, pp. 222-244.

Ringle, C.M., Wende, S. and Will, A. (2005), Smart PLS 2.0 M3, University of Hamburg, Hamburg, available at: www.smartpls.de

Roca, J.C. and Gagne, M. (2008), "Understanding e-learning continuance intention in the workplace: a self-determination theory perspective", *Computers in Human Behavior*, Vol. 24 No. 4, pp. 1585-1604.

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*, Vol. 64 No. 8, pp. 683-696.

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*, Vol. 53 No. 4, pp. 1177-1187.

Venkatesh, V., Morris, M.G., Davis, G.B. and Davis, F.D. (2003), "User acceptance of information technology: toward a unified view", *MIS Quarterly*, Vol. 27 No. 3, pp. 425-473.

Wixom, B.H. and Todd, P.A. (2005), "A theoretical integration of user satisfaction and technology acceptance", *Information Systems Research*, Vol. 16 No. 1, pp. 85-102.

Appendix

Construct	Item	Source
Ease of use	PEOU-1: My interaction with Moodle is clear and understandable PEOU-2: Interacting with Moodle does not require a lot of mental effort PEOU-3: I find Moodle to be easy to use PEOU-4: I find it easy to get Moodle to do what I want to do	Hong *et al.* (2006)
Satisfaction	SAT-1: My overall experience of using Moodle is very satisfied SAT-2: My overall experience of using Moodle is very pleased SAT-3: My overall experience of using Moodle is very contented SAT-4: My overall experience of using Moodle is absolutely delighted	Limayem *et al.* (2007)
Usefulness	PU-1: Using Moodle is of benefit to me PU-2: The advantages of Moodle outweigh the disadvantages PU-3: Overall, using Moodle is advantageous	Limayem *et al.* (2007)
Result demonstrability	RD-1: I have no difficulty telling others about the results of using Moodle RD-2: The result of using Moodle is apparent to me RD-3: I have no difficulty explaining why using Moodle may or may not be beneficial	Moore and Benbasat (1991)
Compatibility	COMP-1: Using Moodle fits with the way I like to teach/study COMP-2: Using Moodle fits with my teaching/study style COMP-3: Moodle is compatible with most aspects of my teaching/study	Moore and Benbasat (1991)
Accessibility	ACCESS-1: Moodle quickly loads all the text and graphics ACCESS-2: Moodle provides good access	Lee *et al.* (2009)
Reliability	REL-1: Moodle is stable REL-2: Moodle operates reliably	Wixom and Todd (2005)
Continuance intention	INT-1:I intend to continue using Moodle rather than discontinue its use INT-2:My intentions are to continue using Moodle than use any alternative means	Limayem *et al.* (2007)

Table AI.
Survey questionnaire

Try to remember a particular satisfying or unsatisfying incident during your use of Moodle. Describe the incidents in your own word focussing on the following issues.

a. What caused the incident? b. What happened? c. How did you react? d. What did you do?

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