Usb-Based Learning Management System And Its User Acceptance Among Filipino Students

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Abstract

A USB-based learning management system, called PLMS, was proposed and developed to achieve innovative teaching and learning. The objective of this paper was to measure the acceptance of PLMS in terms of performance expectancy, effort expectancy, attitudes, facilitating conditions, self-efficacy, anxiety, and behavioral intention as perceived by the respondents. Respondents of the study are 104 students from three selected higher education institutions in the Philippines. A survey questionnaire was used using the Unified Theory of Acceptance and Use of Technology model. The overall mean of the degree of acceptance of PLMS is 2.62, described as "agree." The study concludes that the newly developed USB-based learning management system is acceptable among higher education students. There is evidence that the students embrace the newly developed portable learning management system. The study recommends extensive utilization of the newly developed USB-based learning management system in higher education institutions.

Keywords: PLMS, portable learning management system, ICT in Teacher Education, technology acceptance.

INTRODUCTION

Learning management system "is a software that provides an integrated suite of online resources and communications capabilities in support of traditional courses and can also serve as a platform for fully only courses" (Lang & Pirani, 2014). There are three general types of LMSs; these are proprietary, open-source, and cloud-based (Dobre, 2015). Studies show that learning management system affects positively in terms of learner's autonomy (Dang & Robertson, 2010), student and faculty outcomes (Rubin, Fernandes, Avgerinou, & Moore, 2010), student's retention rate (Nair & Patil, 2012), among others. In theory, learning outcomes can be improved by investing and providing students and teachers with appropriate information

through a learning management system. However, these intended users may reject the technology, and thus, the investments would not benefit the users but instead put them to waste. Acceptance and use of information technology (IT) have been vital for information systems research and practice for decades (Lancelot Miltgen, Popovič, & Oliveira, 2013). Without acceptance, discretionary users seek alternatives. Even dedicated users likely manifest dissatisfaction and perform in an inefficient manner that merely negates the many, if not all, presumed benefits of new technology (Dillon & Morris, 1996). Also, acceptance in learning management systems is no exception.

Several studies have shown that there are remarkable factors that affect acceptance of a learning management system among teachers (Bousbahi & Alrazgan, 2015; Wichadee, 2015; Al-Adwan, Al-Adwan, & Smedley, 2013) which could be associated with barriers to online learning (Marcial, Caballero, Rendal, & Patrimonio, 2015). On the other hand, there are also systemic and organizational factors that affect LMS utilization (Nanayakkara, 2007). Most importantly, there are numerous barriers to LMS usage as perceived by students (Nasser, Cherif, & Romanowski, 2011). Thus, it is imperative for any LMS implementation to measure acceptance among the learners to predict efficiency and full utilization of the learning tool.

In 2013, a portable learning management system was proposed and customized using Poodle, which is part of the research entitled "ICT in Teacher Education in Region 7". The newly developed LMS is transferrable and can run even without Internet connectivity using a USB flash drive (Marcial, Onte, Forster, & Te, 2017). It has a positive acceptance among teachers who had a first-hand experience of using the said e-learning tool (Marcial & Arcelo, 2016). There was an absence of empirical data describing acceptance of the said portable LMS among students. Thus, this article presents the empirical result of the degree of acceptance of the newly developed USB-based learning management system called portable learning management system (PLMS). Using the constructs of the Unified Theory of Acceptance and Use of Technology model by (Venkatesh et al., 2003), this article describes the extent of performance expectancy, effort expectancy, attitudes, facilitating conditions, self-efficacy, anxiety, and behavioral intention of PLMS as perceived by the students. This paper does not only provide valuable inputs for the refinement of the tool but also adds to the limited literature about technology acceptance of a portable learning management system among Filipino students.

RELATED LITERATURE

User acceptance testing is the terminal phase in any software development lifecycle. "It ensures the system works, is reliable in the operational environment and has no major or show-stopping defects, deficiencies, or errors; the system or application is production or operational ready" (Williams, 2014). Positive acceptance is a determinant for product release. More so, it is beneficial in predicting efficiency and utilization rate among the intended users.

Among the recent user acceptance model is the Unified Theory of Acceptance and Use of Technology (UTAUT). Venkatesh, Morris, Davis, and Davis (2003) proposed the UTAUT

based on a review of theoretical models and other literature about acceptance of technology and the predictors of this acceptance. It holds on four fundamental constructs: performance expectancy, effort expectancy, social influence, and facilitating conditions. The first three constructs mentioned determines usage intention and behavior, whereas the last condition refers to the user behavior.

UTAUT model is a consolidated technology acceptance model, which can be traced back to its origin models. First, the task-technology fit (TTF) which looks into the link between information systems and individual performance. The TTF model indicates that performance is affected when technology provides irrelevant system features and user support of the task (Goodhue & Thompson, 1995). It further looks into the fit among task requirements, individual abilities and the functionality and interface of the technology (Goodhue, 1997). Secondly, the utilization model which looks into user attitudes, beliefs, and behaviors and implies that increased use leads to positive perform TPB states that behavioral achievement depends on both motivation (intention) and ability (behavioral control). It distinguishes between three types of beliefs - behavioral, normative, and control. Third, the technology-to-performance chain model that came about due to the limitations of the Task-Technology Fit model and the utilization model. It recognizes that technologies must be utilized and must fit the task of the user it supports to have an impact on the performance. Another remarkable original acceptance model is the theory of reasoned action (TRA). TRA was developed by Fishbein and Ajzen (1975) as an improvement over Information Integration theory. This theory is explicitly concerned with behavior and recognizes that there are factors or situations that control the influence of attitude on behavior. It also uses attitudes and relevant norms to predict behavioral intent. Then, later on, the theory of planned behavior (TPB) which was developed by Icek Ajzen (1991) and is known to be one of the most accurate theories regarding human behavior; it is used to predict an individual's intention to engage in behavior at a given moment and place. This theory demonstrates why people's behavior can change; it explains the behaviors that people can control (deliberate behavior) because behavior can be deliberative and planned. TPB states that motivation (intention) and ability (behavioral control) affects behavioral achievement. Likewise, this model emphasizes three types of beliefs - behavioral, normative, and control. Moreover, TPB comprises six constructs that collectively represent a person's actual control over the behavior.

Further, many user acceptance studies do not fail to mention the most respected model - technology acceptance model (TAM). TAM was a model developed by Davis (1989) to explain computer usage behavior that creates acceptability for a specific purpose at the end user's perceived usefulness (PU) and perceived ease of use (PEOU). TAM is also commonly used to measure technology acceptance (King & He, 2006; Al-Gahtani, 2001). This model was applied to work settings and defined PU as the "degree to which a person believes that using a particular system would enhance his or her job performance" (Davis, 1989, p. 320). PEOU, on the other hand, refers to the "degree to which a person believes that a particular system would be free of effort" (Davis, 1989, p. 320). In non-work settings, the goal becomes personal objectives instead of enhancing job performance. The TAM model has been tested in various

studies with different sample sizes and situation and proven to be a valid and reliable model deliberating new technology implementation and its use (Davis & Venkatesh, 1996). Many extensions to original TAM have been proposed (Lu, Yu, Liu, & Yao, 2003; Venkatesh, Speier, & Morris, 2002; Venkatesh & Davis, 2000).

As described in the technology acceptance model, acceptance and intention to use a learning management system are affected by many variables. For example, Psycharis, Chalatzoglidis, and Kalogiannakis (2011) found out that students' concentration tends to be positively correlated with their intention to use a learning management system. Fathema, Shannon, and Ross (2015) also showed that system quality had a significant positive effect on PEOU and PU of LMS.

They found out, like previous studies, that faculty perceived self-efficacy also is a significant factor, but a weak positive effect on facilitating conditions on attitudes towards the use of technology and PEOU. Interestingly, Song (2010) emphasized that perceived usefulness and satisfaction are predictors of loyalty to the use of any technology. Likewise, Siang and Santoso (2015) conclude that there are significant differences in terms of perceived usefulness, behavioral intention to use, attitude toward using technology, and actual technology use according to academic disciplines. Just like many studies, they showed that younger students tend to use the system more than the older students. Teo, Lee, Chair, and Wong (2009) argued that perceived usefulness and perceived ease of use do not remain static, and may be subject to situational influences. This result means that those users, though teachers, who perceive technology to be useful and easy to use may soon experience limitations if they do not keep up with the advancements in the changing times.

METHODS

Design and Environment

The study implemented a descriptive-correlative design and utilized a survey method. It was conducted in higher education institutions (HEIs) offering any teacher education in Central Visayas, Philippines. Specifically, the study was undertaken in three selected HEIs: Batuan Colleges, Inc. (BCI), Negros Oriental State University (NORSU) – Bayawan-Sta. Catalina Campus (NORSU-BSC), and NORSU-Bais Campus (NORSU-B). BCI is a private school in Bohol Province while the other two are campuses of a state university in Negros Oriental province. These schools were selected because of their experience in using the newly developed USB-based learning management system.

Respondents

The respondents in this study were tertiary students in the three HEIs. A total enumeration of respondents in each class was employed. These students were selected because of their experience in using PLMS in the classroom. Regarding the duration of use, BCI students

integrated PLMS for four months, NORSU-BSC students for two weeks, and NORSU-B students for two months. Notably, the teachers-in-charge of these classes were part of the pilot users when the PLMS was tested. A total of 104 students participated during the administration of the survey. Thirty-three respondents were from BCI, 44 from NORSU-BSC, and 30 from NORSU-B.

More than a majority (80, 76.92%) of the respondents were female. Of these, 27 females were coming from BCI, 44 from NORSU-BSC, and 30 from NORSU-B. There were more male (13) respondents in NORSU-B compared to those in BCI (2) and NORSU-BSC (6) (see Table 1). Notably, all of the respondents were first-time users of the learning management system.

Table 1. Sex Profile of the Respondents

	Batuan Colleges, Inc.		NORSU-Bayawan-Sta. Catalina Campus		NORSU-Bais Campus		Total	
Sex	f	%	f	%	f	%	f	%
Male	2	6.67	6	13.64	13	43.33	21	20.19
Female	27	90.00	36	81.82	17	56.67	80	76.92
No answer	1	3.33	2	4.54	0	0.00	3	2.88
Total	30	100.00	44	100.00	30	100.00	104	100.00

Instrument

In accomplishing the specific objectives of the study, a survey questionnaire was used as the instrument in gathering data. Acceptance statements are based on the Unified Theory of Acceptance and Use of Technology model by Venkatesh et al. (2003). Respondents were asked to evaluate their agreement level of the statements according to the four-point Likert scale choices: 1 – disagree, 2 – somewhat agree, 3 – agree, 4 – strongly agree.

Administration and Statistical Treatment

The survey administration process was done at different distribution periods. The survey questionnaire was distributed in the classroom by the adviser. The questionnaires had been circulated and were collected in the class before the end of the second semester of the school year 2015-2016. The statistical tools employed in the data processing are the weighted mean for measuring the acceptance levels.

RESULTS

Table 2 shows the extent of performance expectancy as perceived by the respondents. As reflected in the table, all of the statements are rated "agree" resulting in an overall mean of 2.68.

Table 2. Performance Expectancy

Statements	Mean	Description
1. I find PLMS useful in the class.	2.74	Agree
2. Using PLMS enables me to accomplish tasks more quickly.	2.58	Agree
3. Using PLMS increases my classroom productivity.	2.74	Agree
Overall Mean	**2.68**	**Agree**

Table 3 reveals the extent of effort expectancy of the respondents. The overall mean is 2.64, described as "agree." Like performance expectancy, all statements in the magnitude of effort expectancy are rated agree. The highest mean ($\bar{x} = 2.64$) is on the respondent's clear and understandable interaction with the management system.

Table 3. Effort expectancy

Statements	Mean	Description
1. My interaction with PLMS is clear and understandable.	2.80	Agree
2. It is easy for me to become skillful at using PLMS.	2.60	Agree
3. I find PLMS easy to use.	2.56	Agree
4. Learning to operate PLMS is easy for me.	2.57	Agree
Overall Mean	**2.64**	**Agree**

Table 4 displays the extent of attitude towards using PLMS as perceived by the respondents. The table indicates an overall mean of the extent of attitude towards PLMS at 2.88, described as "agree." The data also reveals that the teachers strongly agreed ($\bar{x} = 3.42$) the PLMS is a good idea in teaching.

Table 4. Attitude toward using technology

Statements	Mean	Description
1. Using PLMS in the class is a (bad) good idea.	3.42	Strongly Agree
2. PLMS makes the class more interesting.	2.77	Agree
3. Learning with PLMS is fun.	2.69	Agree
4. I like learning our lessons with PLMS.	2.60	Agree
Overall Mean	**2.88**	**Agree**

Table 5 shows the extent of facilitating conditions towards using PLMS as perceived by the respondents. The table shows 2.63 as the overall mean of the degree of facilitating conditions towards using PLMS and is described as "agree." The data reveals that the respondents perceive that their teacher is available for assistance with PLMS difficulties with the mean of 2.87, with the description "agree." However, they only "somewhat agree" with having the resources necessary to use PLMS with the average 2.45.

Table 5. Facilitating conditions

Statements	Mean	Description

1. I have the resources necessary to use PLMS.	2.45	Somewhat agree
2. I have the knowledge necessary to use PLMS.	2.61	Agree
3. Our teacher/s is/are available for assistance with PLMS difficulties.	2.87	Agree
Overall Mean	**2.63**	**Agree**

Table 6 shows the extent of self-efficacy towards using PLMS as perceived by the respondents. The table shows 2.32 as the overall mean of the extent of self-efficacy towards using PLMS and is described as "somewhat agree." The data specifically reveals that the respondents agreed ($\bar{x} = 2.69$) that they could complete a job or task using PLMS if there was no one around to tell them what to do as they go. Students described only "somewhat agree" ($\bar{x} = 2.19$) on their ability in completing a job or task using PLMS if they had just the built-in help facility for assistance.

Table 6. Self-efficacy

Statements I could complete a job or task using PLMS…	Mean	Description
1. …if there was no one around to tell me what to do as I go.	2.69	Agree
2. …if I could call someone for help if I got stuck.	2.56	Agree
3. …if I had a lot of time to complete the job for which the software was provided.	2.22	Somewhat agree
4. …if I had just the built-in help facility for assistance.	2.19	Somewhat Agree
Overall Mean	**2.32**	**Somewhat Agree**

Reflected in Table 7 is the anxiety level felt by the respondents as they used the PLMS. In this table, the overall mean is 2.69, described as "Agree." The data specifically reveals that the respondents agree ($\bar{x} = 2.67$) that they feel apprehensive about using PLMS.

Table 7. Anxiety

Statements	Mean	Description
1. I feel apprehensive about using PLMS.	2.67	Agree
2. It scares me to think that I could lose a lot of information using PLMS by hitting the wrong key.	2.57	Agree
3. I hesitate to use PLMS for fear of making mistakes I cannot correct.	2.71	Agree
4. PLMS is somewhat intimidating to me.	2.80	Agree
Overall Mean	**2.69**	**Agree**

The behavioral intention to use the system as perceived by the respondents is shown in Table 8. As indicated, the overall mean is 2.51, described as "agree." In the table, respondents also indicate their intention to use the PLMS in the next semester with a mean of 2.54. On the other

hand, the respondents have a little agreement to the plan of using the system in the incoming semester ($\bar{x}$ = 2.49).

Table 8. Behavioral intention to use the system

Statements	Mean	Description
1. I intend to use the system in the next semester.	2.54	Agree
2. I predict I would use the system in the next semester.	2.53	Agree
3. I plan to use the system in the next semester.	2.49	Somewhat agree
Overall Mean	**2.51**	**Agree**

DISCUSSION

The extent of performance expectancy as perceived by the respondents indicates that the respondents perceive the PLMS as a contributing factor to their class productivity in accomplishing tasks. Positively, they viewed PLMS to be useful to them in their class and can increase their classroom productivity. Integrating PLMS in class helps them since the resources, supplementary materials, and activities are already provided for their learning experiences. Coates, James, and Baldwin (2005) posit that the desirability of a learning management system is associated with enhanced student learning by allowing them access to the materials and resources. Similarly, Dahlstrom, Brooks, and Bichsel (2014) and Garrote, Pettersson, and Christie (2011) also affirmed that learning management system is a useful tool in the enhancement and acceleration of teaching and learning experiences for teachers and students. Learning management systems manage and administer learning progress since students can monitor and keep track of their learning and performance in class (Sejzi & Aris, 2013).

The extent of effort expectancy of the respondents manifests positive perceptions that the PLMS is easy to use since it is clear and understandable. The usability of learning management system enables the students to exert less effort in the interaction with PLMS. Hence, greater acceptance of the LMS is generated. According to Thong et al. (2006), as cited in the study of Mafuna and Wadesango (2012), the level of acceptance in using LMS increases when students notice it as easy and enjoyable to use. The students also perceive that learning to operate the PLMS is easy, and it is also easy for them to become skillful in using PLMS. Ease of use (Karahanna, Straub, & Chervany, 1999) and flexibility (Garrote & Pettersson, 2011) are to be considered for the adoption of technology. This result agrees with the Theory of Diffusion of Innovations by Rogers (1997) which states that the degree of complexity of the innovation or new idea introduced can determine its adoption. Innovations that are easy to understand are more adopted rapidly than those that are believed to be difficult. In this study, the PLMS is perceived to be easy to use and operate; hence, its acceptance for adoption is evident.

Mac Callum, Jeffrey, and Kinshuk (2014) assert that attitudes played an influential role in the acceptance of mobile learning. The result of the attitude shows that the respondents have positive feeling and experience when performing PLMS. The result is similar to the study of Enayati, Modanloo, and Fatemeh Sadat Mir Kazemi (2012) who concluded that teachers

positively viewed technology application in education. The result also implies that teachers have a positive assessment towards the integration and application of PLMS in the classroom. The result of facilitating conditions shows that the students believed that the necessary factors in the successful implementation of PLMS are present. During the implementation, it was noticed by the class advisers that acquiring a USB flash drive is a challenge among the students. Likewise, according to the class advisers, the respondents have limited access to computers. This observation corresponds to the result of ITL Research (2011) that reveals that the lack of computers for students is the highest technology barrier to ICT integration.

Notably, the extent of self-efficacy towards using PLMS as perceived by the respondents yielded the lowest of all the overall means. The result shows that the students have a moderate ability to complete some tasks using PLMS. The result implies that the students need more orientation and training before the utilization of PLMS.

The result shows the presence of anxiety in performing the PLMS in which students show resistance when they first used the PLMS. This result is congruent with García-Peñalvo, Conde, Alier, and Casany (2011) that the stability and maturity of the learning management system may become yet another resistance factor working against the introduction of innovations. However, this feeling was eliminated later (in Table 8) when the teacher gives regular follow-up to whatever problems encountered by students. This result is similar to the article of Mumtaz (2000) which examines the role of the teacher in the successful implementation of ICT and its effect on pedagogy.

The result of behavioral intention to use the system reveals that the respondents are now ready for another implementation of the PLMS in the next semesters as shown in their positive attitude towards their experience in using the system. The result is similar to the study of Díaz, Ramos and & Sánchez (2014) which indicates that after students productively used a learning management system, they expressed comfort and interest in using them.

With the positive acceptance among the students, extensive utilization of the newly developed USB-based learning management system in higher education institutions is suggested. However, it must be the responsibility of the stakeholders to initiate the actual implementation. To increase behavioral usage among students, teachers must spend time in orienting the students about the learning management system. Teachers should not start the integration until the necessary skills have been provided for the students. School administration must develop a plan for USB flash drive ownership among students as part of the classroom resources. Likewise, school administration should see to it that there is reasonable access to all students especially those who are in teacher education. Students should help each other regarding the technical operations of the system.

Notably, this study was aimed to measure empirically the acceptance level of the newly developed LMS among the students who experienced a semester utilization. It was limited only to the variables found in the Unified Theory of Acceptance and Use of Technology model by

Venkatesh et al. (2003). Likewise, this study describes only the levels of the acceptance and does not measure in relationships or differences of the said variables. Moreso, this study does not test correlations with other variables and moderators that were mentioned in the study of Venkatesh et al. (2003). It is also advisable to correlate results of acceptance between students and teachers.

CONCLUSION

The study concludes that the USB-based learning management system is acceptable among higher education students. Thus, there is evidence that the students will embrace the newly developed portable learning management system. Based on the Unified Theory of Acceptance and Use of Technology of Venkatesh et al. (2003), the study concludes that there is an adequate level to which students believe that using PLMS helps them to attain gains in learning. There is also a satisfactory extent of ease associated with the utilization of the USB-based learning system. Likewise, there is also a positive amount to which students believe that there must be a well-planned infrastructure specifying both technical and organizational requirements in the implementation of the learning tool. The students need more skills and knowledge to use the portable system. In the same manner, the students hold some concerns and apprehensions in using the system.

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