Personal Innovativeness and Attitude as Predictors to Students' Engagement in a Learning Management System Environment

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Abstract

The aim of this study was to investigate on the issue of personal innovativeness and attitude as two important elements that contribute to high engagement in learning within the learning management system (LMS) environment. A survey related to the topic was conducted among university students in Universiti Sains Malaysia (USM) main campus in Penang. The findings show that attitude is a significant predictor on students' engagement in LMS environment while personal innovativeness is not a significant predictor. The results indicate that the success in learning in the LMS environment is determined by learners' attitude. If the learners have positive attitude to learn in the system, they will show high engagement and participation in learning.

Keywords: *Learning Management System (LMS), Personal Innovativeness (PI), Attitude (ATT), Engagement, e-Learning*

Inovasi Peribadi dan Sikap sebagai Peramal kepada Penglibatan Pelajar dalam Persekitaran Sistem Pengurusan Pembelajaran

Abstrak

Subjek kajian ini adalah mengenai isu inovasi peribadi dan sikap sebagai dua elemen penting yang mempengaruhi tahap penglibatan yang tinggi di dalam persekitaran sistem pengurusan pembelajaran (LMS). Tinjauan yang berkaitan dengan topik kajian telah dilaksanakan dalam kalangan pelajar universiti di kampus utama Universiti Sains Malaysia (USM) di Pulau Pinang. Hasil kajian menunjukkan bahawa sikap merupakan peramal yang signifikan terhadap penglibatan pelajar dalam persekitaran LMS sementara inovasi peribadi bukanlah peramal yang signifikan. Hasil kajian menunjukkan bahawa kejayaan dalam pembelajaran dalam persekitaran LMS ditentukan oleh sikap pelajar. Sekiranya pelajar mempunyai sikap positif dalam penggunaan LMS, mereka akan menunjukkan tahap penglibatan yang tinggi dalam pembelajaran.

Kata Kunci: *Sistem Pengurusan Pembelajaran (LMS), Inovasi Peribadi (PI), Sikap (ATT), Penglibatan, e-Pembelajaran*

Introduction

The education transformation in Malaysia is led by the development of ICT in the region. Many Malaysian higher learning institutions have emerged into digital transformation where they adopt digital technology to support teaching and learning activities. Thus, we can see universities nowadays have transformed from non-interactive learning to more interactive learning environment with the use of internet such as learning management system and other ICT related technology in the learning environment (Mostert & Quinn 2009). The advancement of the Internet and technology has also contributed to more effective teaching and

learning activities such as using web tools to assist the learning process. Furthermore, many Malaysian universities have adopted blended learning which refers to the combination of Internet-based learning and traditional face-to-face learning (Azizan, 2010) in their teaching and learning activities. One of the blended learning approaches is using the Learning Management System (LMS) which is a web-based system that allows lectures and students' to share instructional materials, submit assignments, communicate with one another, and also make class announcements (Lonn & Teasley, 2009).

There are many LMS providers currently available in the market, with *Blackboard* is the leading provider with 41% market share, *Moodle* (23%), *Desire2Learn* (11%), and *Instructure* being the next three largest providers (Green, 2013). One of the established public universities in Malaysia, Universiti Sains Malaysia (USM) is currently using *Moodle* as its LMS platform. In 2020 data shows that a total 250,000,000 are registered user of Moodle that consist of 251 countries worldwide ("Moodle Statistics," 2020).

Despite the utilisation of LMS in Malaysian higher learning institutions, there are not many significant studies that have been conducted to find the impact of LMS to student performance and whether it is a better method compared to traditional teaching. For instance, a study conducted in Monash University, Australia showed that students were dissatisfied with the quality of online learning due to the lack of design and poor quality of the LMS (Weaver, Spratt, 2008). In addition, Milne et al. (2012) argued that the instructor needs to understand how to improve student retention and success, and this can be done by understanding student engagement.

Therefore, this research intends to investigate students' characteristics which are the personal innovativeness (PI) and attitude (ATT) on student engagement towards the LMS environment.

Literature Review

The most significant progress in information technology (IT) in higher learning institutions in the last decade is the implementation of LMS (McGill & Klobas, 2009). LMS is a software application for the administration, documentation, tracking, reporting, and delivery of electronic educational technology (also called e-learning) courses or training programs (Jafari et al., 2015). The LMS allows instructors to share teaching materials, organise lessons and assessments, and virtually communicate with students to support the learning and teaching process.

Many studies have been conducted regarding LMS and the benefit of using it in teaching and learning. For instance, a study measuring the success factors of LMS usage in a Malaysian university, found that system quality, information quality, service quality, perceived usefulness, perceived ease of use, user satisfaction, system use, intention to use, and net benefit are the significant factors in LMS success in Malaysia (Almarashdeh, Sahari, Zin, & Alsmadi, 2010). Therefore, the implementation of LMS for teaching and learning in this era has become more important due to the advancement of technology, as for higher learning institution they need to utilize these learning technologies for the benefits of teaching and learning activities in their institution.

There are huge benefits from the adoption of LMS in higher learning institutions. As stated by Rais, Karim, and Hashim (2004), the implementation of LMS in Universiti Pendidikan Sultan Idris (UPSI) has brought benefits towards the university such as easy to track student progress, save time, and permissible of flexible learning. They also suggested for universities to form a national integrated e-learning network where all learners can receive high-quality advice and guidance and participate in lifelong learning" (Rais, Karim & Hashim, 2004, 58).

Despite all benefits and success of the adoption of LMS, there are still a concern towards the use of LMS. For instance, Almarashdeh et al., (2010) stated that LMS discourages students to use its tools such as discussion boards due to the lack of immediate feedback. Besides that, Bouhnik and Marcus (2006) highlighted other issues in the LMS environment such as students are expected to possess a high level of discipline when

using LMS, the lack of interpersonal direct interaction, instructors' ability to give feedback is limited, and students require more time to learn. Therefore, the use of LMS can also bring a negative impact towards students' learning.

Learning Management System (LMS)

LMS is an educational program that is based on web technology. The programs in this system provide support to instructors to achieve their pedagogical goals and organize course contents that in turn support students' learning processes (Jafari et al., 2015). In this study, LMS is referred to the *Moodle* platform that has been subscribed by USM for teaching and learning activities.

Blended learning

In the last decade, a great majority of the teaching and learning in higher learning institutions have been using the traditional method that engages face-to-face learning in a classroom environment. However, with the emergence of ICT around the globe, the blended learning approach has become popular and is being largely implemented across higher learning institutions. The combination of traditional face-to-face learning and online-based learning for synchronous and asynchronous modes are the form of blended learning (Roseli & Umar, 2015).

The students' characteristics are one of the important factors in the success of LMS usage (Bouhnik & Marcus, 2006). Therefore, one of the reasons that contribute to the successful implementation of LMS depends on learner engagement and interaction which increase learning outcomes (Asmuni et al., 2014). Moreover, besides the traditional classroom learning method, the adoption of technology in teaching and learning has a positive effect on students' attitudes towards information technology (Christensen, 2002). In addition, students' attitude plays an important role in measuring the effectiveness of learning in the online learning environment (Akkoyunlu & Soylu, 2008). The student's characteristics have many factors for example, self-regulated learning, Internet self-efficacy, computer anxiety, and technological experience. However, in this article, the researchers focused only on personal innovativeness and attitude.

Personal innovativeness

Personal innovativeness refers to the willingness of a person to try out any kind of new information technologies, and it also can be assumed as influential of usefulness perception (Agarwal & Prasad, 1998). Besides that, personal innovativeness can bring the usage of new technology to a new dimension and has a positive impact on user technology acceptance (Parveen & Sulaiman, 2008). In the context of the study, personal innovativeness is one of the characteristics of students that refer to their willingness to adopt or try out any new information technologies. Personal innovativeness is also a critical factor that influences the experiences and effect of perceptions on new information technology (Agarwal & Prasad, 1998). According to Raaij and Schepers (2008), there is a significant and important relationship between the learner's acceptance (perceived usefulness) of the virtual learning environment and the learner's innovativeness. Moreover, another study has found that personal innovativeness is an important factor in the LMS environment satisfaction (Al-Busaidi & Al-Shihi, 2012).

Attitude

Attitude is a positive or negative behaviour that a person reflects toward a certain situation, or target behaviour (Mehra & Omidian, 2011). In the context of the study, attitude is also one of the characteristics of students that refer to the students' positive or negative behavior towards learning in the LMS environment. Also, based on previous research, attitude is one of the significant factors in any learning activity or environment (Mehra & Omidian, 2011). The findings indicated that attitude could impact the students' learning behavior directly or indirectly (Rahimi & Yadollahi, 2011). This finding is supported by Link and Marz, (2006), Rahimi and Yadollahi, (2011), and Liaw, Huang, and Chen (2007). For instance, Link and Marz (2006) indicated that the attitude of students can be influenced by using e-learning. These findings show that attitude is one of the significant factors toward students' learning engagement.

Students' engagement

In education, engagement refers to the degree of attention, curiosity, interest, optimism, and passion that students show when they are

learning or being taught, which extends to their level of motivation in a learning process (Atkinson, 2011). Engagement in this study is defined as student participation and interest in using the LMS environment. Hawryszkiewycz (2007) indicated that student engagement can support learning by providing flexibility to the learning process, while Angelino and Natvig (2009) said that engagement can reinforce the connection between students and the course material. In this study, student engagement is another critical determinant of the utilization of LMS in the teaching and learning environment. In addition, past research also mentioned the significant relationship between a student's characteristics and their engagement related to internet-based learning (Adena & Connell, 2004; Arbaugh, 2000; Robinson & Hullinger, 2008)

Model and Theory Use

Connectivism Learning Theory

Connectivism learning is the approach of learning where students use the ICT related technology and e-learning platform to learn and gain knowledge (Banihashem & Aliabadi, 2017). Connectivism learning also considered learners are independent and become the center of learning experience rather than the lecturer (Banihashem & Aliabadi, 2017). In the context of this study, learning is blended and complemented by the usage of instructional tools whereby the instructors can mend or add on to knowledge given using other means besides what is already given in the traditional classroom. Hence, student's learning takes on a different level which is virtual and online.

SOLE Engagement Model

The SOLE model (Atkinson, 2010) is used to relate the student's engagement towards the LMS environment. The SOLE model is a visual representation of a variety of learning engagement styles that could assume to promote a complete learning experience (Atkinson, 2010) This model has nine elements of learning engagement (feedback, assessment, reflection, personal context, social context, peer moderation, tutor facilitation, tutor contact time, and learning material) (Atkinson,

2010).

This model emphasizes the importance of personal context that contributes to student learning engagement (Atkinson, 2010). Personal context is the individual characteristics, in this study, the researchers choose personal innovativeness and attitude to measure their engagement toward LMS (Atkinson, 2010).

Therefore, the researchers have developed a conceptual framework to examine whether students' characteristics (personal innovativeness and attitude) predict students' engagement in the LMS.

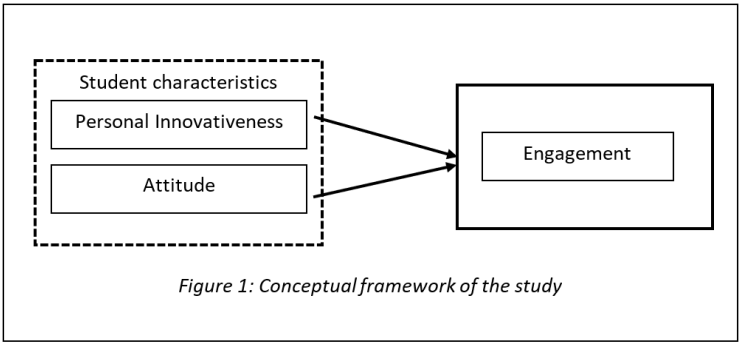

Figure 1: Conceptual framework of the study

Research Objectives

The main objectives of this study are:

1. To identify students' level of personal innovativeness (PI) in the LMS environment.
2. To identify students' level of Attitude (ATT) in the LMS environment.
3. To identify whether students' PI and ATT are good predictors of student' engagement in the LMS environment.

Methodology

A survey was conducted to examine the effect of the student's characteristics (PI and ATT) on engagement in an LMS environment. Firstly, descriptive statistics were used to identify the level of students' characteristics (PI and ATT) in the LMS environment. Secondly, an inferential analysis was used to measure the factors affecting a student's engagement in the LMS environment.

Population and Sampling

The population of this study includes all first-year students at the School of Educational Studies (SOE), Universiti Sains Malaysia. The SOE comprises of four different majors, Bachelor of Art with Education, Bachelor of Science with Education, Bachelor of Education (TESOL), and Bachelor of Education (Special Education). The researchers chose first-year students because they are new to educational technology and the majority of them are Malaysian Higher School Certificate (STPM) leavers. The STPM is a pre-requisite for university admission which is equivalent to the British Advanced Level (A-Level) qualifications and the South Australia Matriculation (SAM). The group of students are also first-time users when it comes to education technology in a higher learning institution.

Green (1991) stated that sample size can be estimated using a rule of thumb formula $n > 50 + 8m$ where m represents the number of predictors. In this study, there are two predictors for student characteristics (personal innovativeness and attitude). Based on the formula $n > 50 + 8(2) = 66$, the researcher has calculated the required number of respondents needed for this study which is at least, 66 respondents.

After an expert review and validity test was conducted, the new instrument was amended to be accurate and meet the measured factors. After that, the new version of the instrument is finalized and ready for data collection. Approval from a respected school was granted before conducting the data collection. The overall population size is 228 students that consist of all first-year students in the School of Educational Studies, USM. Using Green's (1991) rule of thumb formula, the minimum sample size

required is 66 respondents, however, the researcher managed to get 100 respondents.

In this study, the questionnaires were printed and distributed to the respondents. During the data collection activities, each student was briefly explained on the scope of the research. The questionnaire was administered during the data collection to ease the process.

Research Variables

Independent variable (IV)

Table 1: Summaries of the independent variable

Independent variable	Meaning of each factor
Personal innovativeness	The willingness of a person to try out any kind of new information technologies
Attitude	Students' positive or negative behavior toward learning in an LMS environment.

Dependent variable (DV)

Table 2: Summaries of the dependent variable

Dependent Variable	Meaning of each factor
Engagement	Degree of attention, curiosity, interest, and passion in the LMS environment

Research Instrument

The variables' measurements were adopted from past research and articles. The questionnaire consists of two different sections. The first section was the students' characteristics variable (personal innovativeness and attitude) that consisted of 8 items. The second section is the student engagement variable contains 10 items and the items were measured by using a five-point Likert scale: 5 = SA (Strongly Agree), 4 = A (Agree), 3 = N (Not Sure), 2 = DA (Disagree), 1 = SD (Strongly disagree).

Section 1: Personal innovativeness and attitude

In this section, the researcher collected the data and analyze the variables that influence student characteristics (personal innovativeness and attitude), in an LMS environment. Student characteristics in this section are the independent variables. Personal innovativeness variable consisted of three items and questioned about willingness to try new technology, and these items are adopted from Van Raaij and Schepers (2008). The attitude variable was tested using five items adapted from Liaw, Huang, and Chen (2007), these items were the students' attitude in using LMS and computer technology.

Table 3: Independent Factors

Factor	Sub Factors Measure	No. of Items	Adopted/ Modified from
Student characteristics	Personal Innovativeness	3	Van Raaij and Schepers (2008).
	Attitude	5	Liaw, Huang, and Chen (2007)

Section 2: Student engagement in an LMS environment

In this study, engagement is considered as the dependent variable. Students' engagement variable was measured by 10 items adopted from Dixson (2015). These items are used to measure the level of student attention, curiosity, and interest in the LMS environment.

Table 4: Engagement Factor

Factor	No. of Items	Adopted/Modified from
Engagement	10	Dixson (2015)

Data Analysis

The participants were asked to rate their characteristics level in the questionnaire using a five-point Likert scale of 5 = SA (Strongly Agree), 4 = A (Agree), 3 = N (Not Sure), 2 = DA (Disagree), 1 = SD (Strongly disagree). Descriptive statistics were utilized to analyze the result and the data are calculated to mean and standard deviations to find the response level.

The level of student characteristics (PI and ATT) was concluded using the following measure which was adapted from Landell, (1997).

Interval width = maximum point - minimum point\ number of levels. Interval width = 5-1\3 = 1.33

Low level of characteristics = between 1 to 2.33
Moderate level of characteristics = between 2.34 to 3.67
High level of characteristics = between 3.68 to 5

Figure 2: Level of student's characteristics measurement

Based on this measurement in Figure 2, a mean score between 1 to 2.33 will indicate a low level, 2.34-3.67 will indicate a moderate level and 3.68-5 will indicate a high level.

Level of personal innovativeness

Table 5: The findings for the PI factor

	Personal Innovativeness	Mean	Level
1	I like to experiment with new ICT-related technologies (apps, software, gadgets, etc)	4.06	High
2	Among my peers, I am usually the first to try out new ICT-related technologies (apps, software, gadgets, etc)	3.30	Moderate
3	If I heard about new information technology, I would look for ways to experiment with it	3.53	Moderate

The highest level of PI is shown in their claim that they like to experiment with the new ICT related technologies (*M*= 4.06). However, they reported a moderate level in looking for new ways to experiment with new ICT technologies (*M*= 3.53) and being the first to try out new ICT technologies (*M*= 3.30).

Level of attitude

Table 6: The findings for the ATT factor are shown in Table 6

	Attitude	Mean	Level
1	I enjoy using computers as a learning assisted tool	4.22	High
2	I have a positive attitude towards e-learning	4.19	High
3	I support the use of e-learning	4.31	High
4	I enjoy learning in an electronic environment	4.16	High

Overall, the students have high a high positive attitude in the LMS. The highest score is shown in their support of the use of e-learning (*M*= 4.31), they enjoy using computers as learning tools (*M*= 4.22), have a positive attitude toward e-learning (*M*= 4.19) and enjoy learning in an electronic environment (*M*= 4.16).

The total level of personal innovativeness and attitude

Table 7: Means and standard deviation for student's characteristics in an LMS environment

Students characteristics	Mean	Standard Deviation	Level
PI in LMS environment	3.63	0.643	Moderate
ATT in LMS environment	4.23	0.493	High

Based on Table 7, the respondents have indicated that the attitude factor is the most important factor with (*M*= 4.23). However, personal innovativeness (*M*= 3.63) was the least important factor in the LMS environment.

Multiple regressions between student's characteristics (PI and ATT) on LMS engagement

Based on the literature the hypothesis was constructed as the following:

H_A: Personal innovativeness and attitude are significant predictors for student's engagement in the learning management system environment

Table 8: Summary of regression analysis between the student's attitude and engagement

variable	B	SE(B)	B	t	Sig, (p)
Attitude Engagement	.532	.421	0.531	6.237	.000

Note: $R^2 = 0.282$

Regression analysis was performed to test whether a student's attitude predicted their engagement in the learning management system environment. The result shows that there is a significant relationship between attitude and engagement ($r=0.531$, $p<0.05$). It also indicated that a student's attitude explained 28.2% of the student's engagement variance ($R^2=0.282$, $F(1,99)=38.90$, $p<0.05$). Based on this result, it was found that the student's attitude is a significant predictor of engagement in an LMS environment ($\beta=0.531$, $p<0.05$). However, the student's personal innovativeness appeared as a non-significant predictor and did not significantly affect the dependent variable (engagement).

Finding and Discussion

Level of students' personal innovativeness

The findings suggest a moderate level of personal innovativeness (*M* = 3.63), which was the least important factor in students' characteristics. The findings indicated that the respondents only have a moderate level of willingness to try out the LMS environment. This result may be due to their lack of experience in using the LMS, where most of the students are not familiar with education technology. Also, this may be due to many of the students are from a government school which implements the traditional learning approach or face-to-face. Thus, the use of LMS is still new to them, and this is one of the reasons why the result shows a moderate level of personal innovativeness.

In this study, the students claimed that they like to experiment with ICT technologies (*M* = 4.06), which indicates a high level. Students

who have a high level of personal innovativeness tend to try out latest technologies and they also have a positive reaction towards technology acceptance (Parveen & Sulaiman, 2008). Moreover, a majority of the first-year students like to experiment with the ICT-related technology for learning purposes due to their curiosity and eagerness to get used to the higher learning environment. However, they reported a moderate level in looking for new ways to experiment with the new ICT (M = 3.53) and being the first to try out the new ICT (M = 3.30). From the findings, we can assume that they like to experiment with new technologies but at the same time, they will wait for other people to try it first. They also have a sense of doubt to try out the latest ICT related technologies due to lack of experience and uncertainties. In addition, this is the first time, they are using LMS for learning purposes. This is maybe due to their learning preference, where they still believe in traditional learning compared to LMS.

Level of students' attitude

Interestingly, in this study, attitude (M = 4.23) is at a high level and ranked highest. The findings indicated that the students have a strong and positive attitude in the LMS environment. The result is possibly due to the students are positive and support the implementation of e-learning and they feel e-learning can improve their learning activities. In the statement, the highest score is their claim in supporting the use of e-learning (M = 4.31). They have a positive attitude toward the LMS environment, and this is probably due to their feeling that using LMS is a better learning approach in a higher learning institution. In addition, blended learning is proven to be an effective learning approach (Azizan, 2010).

From the statement, the second highest was the students' claim that they enjoy using a computer as a learning assisted tool (M = 4.22). This finding indicates that students like to use computer technology to help them in learning activities. Again, this is due to computers are considered important tools in education. In addition, blended learning required computer technology as their learning support. Attitude is one of the important factors in any learning activities or environment. This is because attitude can impact the student's learning behavior directly or indirectly (Rahimi & Yadollahi, 2011). This finding is supported by the

work of Link and Marz, (2006), Rahimi and Yadollahi, (2011), and Liaw, Huang, and Chen (2007).

Personal innovativeness and attitude as a good predictor for engagement

The findings indicated that only the attitude factor is appeared to be a significant and better predictor of student engagement ($r=0.531$, $p<0.05$) which explained 28.2% of the student engagement variance ($R^2=0.282$, $F(1,99)=38.90$, $p<0.05$). The personal innovativeness factor was measured as a non-significant predictor for students' engagement. The findings show that a student's attitude has a positive impact and an important factor in students' engagement toward the LMS environment. The result shows that students' attitudes play an important role in their engagement in the LMS environment. In other words, the higher the positive attitude they have, the more engaged they become. This finding is consistent with the research conducted by Adena and Connell (2004) as well as Liaw et al., (2007). Since most of the students are in the same program, which is Bachelor of Education, they are the most likely to work in a group and possess the same attitude.

Conclusion and Recommendation

In the 21st century of teaching and learning activities, technology and learning tools have become more and more important to the students and instructors. Embracing technology is a must to ensure that we can move forward towards the industrial revolution 4.0 and becoming a developed nation especially when the students show a high level of attitude toward the use of a learning management system. In addition, student attitude is also a significant predictor of their engagement in the learning management system environment. Therefore, to ensure the implementation of LMS to be successful, universities should consider the student's attitude and engagement before they fully implement the utilization of LMS as teaching and learning tools. In other words, if students have a negative attitude towards LMS, it will affect their engagement toward the use of LMS as a learning tool, then the idea of blended learning in universities cannot be implemented successfully. Besides that, only a moderate level of personal innovativeness was found. This may be due to the students who are not fully ready to use

LMS, but it is still an important factor that needs to be rectified by LMS developers and universities. Based on this study, we believe that we now understand a piece of issue between humans and computers and how educators can make full use of the technology to help them to improve education quality. In addition, connectivism learning approach where the students are the center of learning will only become productive if we provide a better LMS for them. Finally, more studies are needed to identify other factors that lead to the success of LMS implementation to enrich the literature in this field.

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