# AN INVESTIGATION OF UNIVERSITY STUDENTS' ACCEPTANCE TOWARDS A LEARNING MANAGEMENT SYSTEM USING TECHNOLOGY ACCEPTANCE MODEL

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**ABSTRACT**

*The success of Learning Management System (LMS) in any educational institutions starts by students' acceptance, which in turns initiates and promotes students' utilisation of LMS in classes. Thus, it is necessary to assess the key barriers to the adoption of an e-learning system such as LMS among students because the user acceptance is often the pivotal factor determining the success or failure of an information system project. Understanding students' perception towards an LMS is a crucial issue for improving e-learning usage and effects. Therefore, this research aimed to frame a technology acceptance model (TAM) to investigate the usefulness and ease-of-use of an LMS from the perspective of university students. In this research, the LMS is referred to a web-based e-learning system called WBLE (Web-Based Learning Environment) in a Malaysian university. The proposed TAM integrated constructs from a well-established TAM which is developed by Davis in 1986. The research also aimed to: 1) study the effects of users' demographic data such as gender, level of study and course of study on their perceived usefulness (PU) and perceived ease of use of WBLE; and 2) examine the relationships between users' perceived usefulness, perceived ease of use (PEOU), and their behavioural intention to use WBLE. A sample of 445 students from a Malaysian university had taken part in the research. This research employed a self-administered questionnaire approach. Questionnaire was used to gather information about students' opinion on how strongly they agree or disagree with the statements for each research construct. Data collected was analysed using the SPSS (Statistical Package for the Social Sciences). The research findings indicate that PU and PEOU are significant determinants of students' behavioural intention to use WBLE. Nevertheless, student demographics have no impact on PEOU and PU.*

Key words: E-learning, Learning Management System, technology acceptance model, perceived usefulness, perceived ease of use.

## Introduction

Since digital technology becomes an integral component of our life, the way we consume content has fundamentally changed. The advancement in information and communication technology (ICT) has triggered significant changes in all levels of education, from kindergarten right up to tertiary level. Education has evolved from the use of traditional modes of instructions to the use of ICT for instruction. Due to the availability of ICT resources, funds, and personnel, e-learning was introduced in Malaysia in 1998, and the higher learning institutions were the first to embrace the concept of web-based teaching and learning (Mohamad et al., 2005). Many of the higher education institutions (HEIs) are evolving to meet the needs of learners in this new digital realm, during which educators have incorporated ICT tools in the instructional process as students become more IT savvy through what is called a Learning Management System (LMS) (Al-Busaidi and Al-Shihi, 2010). It is now common to find the LMS in use in all the public and private universities. E-learning has gradually becomes an important facilitator in teaching-learning process. According to Global Industry Analysts, the value of the global e-learning sector is estimated to hit $107 billion by the year of 2015 (Virtual College, 2012). Malaysia has the second highest growth rates for e-learning products in the world, at the record of 39.4%, which is more than four times the worldwide aggregate growth rate (Sawahel, 2013).

Through the review of extant literature, it was found that there are many advantages derived from e-learning. A well designed e-learning system could provide advantages like timely access to resources (Billings, 2002), up-to-date learning materials (Henderson, 2003), quickness access to wider range of resources (Sandars, 2006), cost effective (Hatakka et al., 2007), retainable (Kanniappan, 2007), interactive and collaborative (Pardesi, 2007), learner-centred (Den-Bossche et al., 2011) and more. However, these benefits would not be maximized if learners are not willing to adopt the system (Pituch & Lee, 2006).

Apparently, the success of LMS in any educational institutions starts by students' acceptance, which in turns initiates and promotes students' utilisation of LMS in classes. Thus, it is necessary to assess the key barriers to the adoption of an e-learning system such as LMS among students because the user acceptance is often the pivotal factor determining the success or failure of an information system project (Davis, 1993).

Understanding students' perception towards an e-learning system is a crucial issue for improving e-learning usage and effects. Therefore, this research aims to frame a technology acceptance model (TAM) to investigate the usefulness and ease-of-use of an LMS from the perspective of university students. In this research, the LMS is referred to a web-based e-learning system called WBLE (Web-Based Learning Environment). The proposed TAM integrated constructs from a well-established TAM which is developed by Davis in 1986. Knowing the outcomes of the WBLE utilisation is particularly important to evaluate the success of such system, plan for its future enhancement, and achieve better learning outcomes to enhance learning effectiveness it is also deemed useful as the sources of reference to the implementation of future LMS project. The remainder of this paper is structured as follows: Section 2 addresses the problem statement, Section 3 presents learning management system and user acceptance, section 4 describes the research framework and hypotheses, section 5 discusses the research methodology, while section 6 reports the research findings and discussion. Section 7 concludes the paper.

**Problem statement**

In recent years, the use of e-learning technology has become necessity within the HEIs (Wahab et al., 2011). Numerous HEIs embrace e-learning systems (such as LMS) as the medium of teaching and learning. Holley (2002 cited in Oye et al., 2012) claimed that students in HEIs who participate in online learning achieve better performance than students who engage in traditional face-to-face learning. In a survey conducted by EDUCAUSE Center for Analysis and Research in September 2013 (Dahlstrom et al., 2013), LMS is regarded as one of the most pervasive technology also most valued by 113,035 students from 251 universities across 13 countries. These students stated that LMS have the greatest impact on student success. Given the significant implication of LMS, ensuring LMS is delivering its pedagogical value to the students is therefore vital.

Several issues pertaining to the use of LMS in HEIs which leads to the implementation of the research project are as follows:

- E-learning issues: Many HEIs today who have embarked in the development of e-learning system often encounter challenges in the implementation and process (Ehlers, 2004 cited in Wan-Ismail and Hosseini, 2014). Saadé (2003) stated that the delivery, effectiveness and the acceptance of the e-learning system becoming a hindrance to successful strategies of an educational institution. Ali (2004) asserted that low adoption rate has been one of the obstacles in implementing e-learning systems in Malaysia. High dropout rates have been reported for e-learning due to students' low degree of continuance intention to use e-learning systems (Drazdilova et al., 2010; Gaither, 2009). In 2011, Hamat et al. (2011) discovered that LMS usage among 6,301 Malaysian HEIs students achieved 63.4% only, which still leave much room for improvement. García-Peñalvo et al. (2011) claimed that although adoption of LMS is high within HEIs, these systems have yet to produce desired and expected educational improvements. Fathema and Sutton (2013) had pointed out that various issues are currently impeding the comprehensive utilisation of the LMS. Previous studies such as Garrote and Pettersson, and Vovides et al. (2007, cited in Fathema and Sutton, 2013) stated that many instructors use the LMS simply as delivery mechanism for the students (e.g. posting grades), and they do not use the integrated functionalities. Fathema and Sutton also noted that Garrote and Pettersson (2007) and Nelson (2003) had identified several LMS features that were underutilised by teachers and students, which included discussion forums, chat and email.
- Current state of WBLE usage: In the selected Malaysian university, WBLE usage continues to lag expectations in terms of quality and quantity. Students did not use WBLE as it designed to support. This can be traced from the results obtained from the survey where the primary reason login to WBLE reported by 99.3% of the respondents are to download course materials and 47.4% of them spent less than 15 minutes each time on WBLE. Apparently, students did not attain benefits of WBLE to the fullest extent and the pedagogical objectives are not being realized. Although studies discovered that e-learning can improve learning performance, yet the features and functionalities of the systems are often underutilised (Yusof et al., 2012). This is a waste of resources especially when those features may account for the cost of implementing LMS. Moreover, among 445 students who were asked to indicate their frequency of using the common WBLE features listed in the questionnaire, substantial amount of the students reported that they had never used some of the features integrated in WBLE. These underutilised features include Chat (80.2%), Forum (70%), Blog (64.4%), and Calendar (60.7%) in WBLE.
- Lack of knowledge about LMS acceptance: The major problem prompted in this research is the lack of knowledge about the LMS user acceptance. In fact, users' experiences of utilizing the system often neglected during the system implementation (Yusof et al., 2012), which is the perceptions and responses that result of the use or anticipated use of the system (Wigelius & Vaataja, 2009). Monzavi et al. (2013) asserted that users' perception of a new system is an introduction to its acceptance. Emelyanova and Voronina (2014) further strengthen that one of the keys to successful and efficient use of LMS is how the users adopt and perceive this learning platform. Hence, before investigate the factor that influence students' acceptance of LMS, it is important to first understand their current perception towards the system. Hence, this research will examine the perception of students in in a Malaysian university toward WBLE, to what extent they believe that WBLE is useful and easy to use, and to what extent they are intend to use WBLE in their study. Enjoying the advantages as a result of utilisation of LMS depends on efficient use of the system (Emelyanova & Voronina, 2014). Consequently, if user shows resistance against utilization of technology, the marked advantages are not achieved. Acceptance of LMS is imperative in deciding whether the system is usable and utilised by students in Malaysian universities (Almarashdeh et al., 2010 cited in Adzharuddin & Lee, 2013). Knowing students' intentions and understanding the factors that influence students' perception about e-learning can help institution to improve

students' adoption to this learning environment (Grandon et al., 2005). But what would be the factors that trigger a person to adopt a new information system? Whether the factors merely depend on the features of the system itself or the characteristics of the people impact the user acceptance as well? Thus, one of the research objectives is to examine the effect of student demographics such as gender, level of study and course of study on their perceptions toward the usefulness and ease of use of WBLE which led to their adoption of the system.

- Inadequate LMS acceptance research in Malaysian HEIs context: Citing Davis (1993), past studies (Boies & Lewis, 1991; McCarroll, 1991; Nickerson, 1981) proved that user acceptance is the core to the success of an IT system. Nonetheless, through the literature review thus far, it was found that scarcely research was conducted within the Malaysia higher education context to empirically determine the relationship of tertiary students' LMS usage with personal determinants such as perceived usefulness, ease of use, and social influence such as subjective norm. The scarcely research justifies the purpose of this research. The relationships between students' perceived usefulness, perceived ease of use, subjective norm, and their behavioural intention to use WBLE will be examined in this research.

### Learning management system and user acceptance

A Learning management system (LMS) is a platform that support multiple facets of an educational process, from administrative functions to course delivery and assessment (Kats, 2013). Other terms used for this system are Course Management Systems (CMS) and Virtual Learning Environment (VLE) (Hamat et al., 2011). It is now common to find LMS within HEIs to supplement traditional classroom teaching (Hamat et al., 2011). Though each LMS has its own interface and features, there are common features that appear in most systems. These features include resources, discussion/forum, chat, news, grades, calendar, course home, Dropbox/ assignment, quizzes, and survey (Ahmad et al., 2010; Francis, 2013). Through LMS, instructors are able to create and manage educational courses quicker and easier, exchange information with students over the network, engage students in online discussion via forum and also assess student performance (Ahmad et al., 2010). LMS provide the students with ability to access lecture notes, and use communication and interactive features in their learning activities (Almarashdeh et al., 2011).

As cited in Fathema and Sutton (2013), past studies (e.g. Garrote & Pettersson, 2007; Vovides et al., 2007) stated that many instructors use the LMS simply as delivery mechanism for the students (e.g. posting grades), and they do not use the integrated functionalities. Fathema and Sutton also noted that Garrote and Pettersson (2007) and Nelson (2003) had identified several LMS features that were underutilised by teachers and students, which included discussion forums, chat and email. The findings are consistent with current study. Among 445 students who were asked to indicate their frequency of using the common WBLE features listed in the questionnaire, substantial amount of the students reported that they had never used some of the features integrated in WBLE. The results obtained from the survey indicated that the primary reason login to WBLE reported by 99.3% of the respondents are to download course materials and 47.4%. Apparently, students did not attain benefits of WBLE to the fullest extent and the pedagogical objectives are not being realized. Although studies discovered that e-learning system can improve learning performance, yet the features and functionalities of the systems are often underutilised (Yusof et al., 2012).

In fact, users' experiences of utilizing the system often neglected during the system implementation (Yusof et al., 2012), which is the perceptions and responses that result of the use or anticipated use of the system (Wigelius & Vaataja, 2009). Dillon and Morris (1996: 4) defined user acceptance as "the demonstrable willingness within a user group to employ IT for the tasks it is designed to support". Monzavi et al. (2013) asserted that users' perception of a new system is an introduction to its acceptance. Emelyanova and Voronina (2014) further strengthen that one of the keys to successful and efficient use of LMS is how the users adopt and perceive this learning platform. If user shows resistance against utilization of technology, the marked advantages are not achieved. Citing Davis (1993), past studies (Boies & Lewis, 1991; McCarroll, 1991; Nickerson, 1981) proved that user acceptance is the core to the success of an IT system. Acceptance of LMS is imperative in deciding whether the system is usable and utilised by students in Malaysian universities (Almarashdeh et al., 2010 cited in Adzharuddin & Lee, 2013).

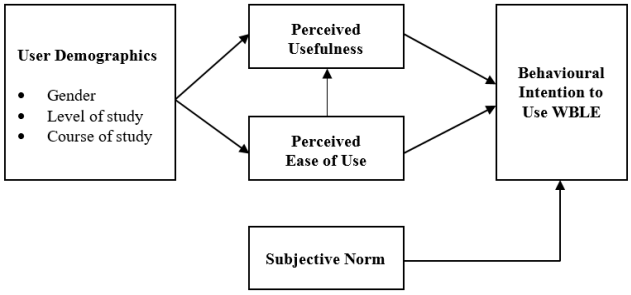
## Research framework and hypotheses

Theory of Reasoned Action (TRA), Theory of Planned Behaviour (TPB) and Technology Acceptance Model (TAM) are three widely used theoretical models in understanding various factors that influence the user acceptance of an information technology. These models involve the extension and decomposition from one theory (or model) to another. Since both TPB and the TAM are extended theories derived from TRA, it is expected that these two theories have more accurate predictive capability than the TRA. However, the concept of the TAM is slightly different from the TPB as TAM has a clearer focus on technology acceptance behaviour of computer users rather than being a generic model for individual behaviour in social environment. Bradley (2012), who explored the development, use and status of TAM had noted that TAM has been the most widely adopted theory to explore user acceptance of an information system. Gentry and Calantone (2002) and Yousafzai et al. (2010) had revealed that TAM has outperformed TPB and TRA in explaining behavioural intention to adopt a specific technology. The researchers from both studies believed that TAM outperform TRA and TPB due to TAM's use of two specific beliefs (i.e., PU and PEOU) which can be applied to any technology acceptance context. In contrast, TRA and TPB stipulate that factors influencing attitudes are unique for each situation which require researchers to "reinvent the wheel" with each situation. In short, Davis's TAM was developed to predict user's behavioural intention to use a specific information system.

TAM is an adaptation of the TRA to the field of information system which aims to accurately model how users respond to the presentation of a new technology, addressing factors such as their initial perception, level of acceptance and use of the technology. According to Davis, perceived usefulness (PU) and perceived ease of use (PEOU) were strong determinants of technology usage intention.Past studies had shown the power of TAM in exploring various factors that influence adoption of an

information system at the same time aid in predicting actual system use (Ameen, 2014; Wang et al., 2012). In addition, the findings in Park (2009) and Saadé et al., (2007) studies proved TAM to be a good theoretical model in understanding user acceptance of e-learning context. Hence, this research adopted the well-known TAM that was developed by Davis in 1986 as the foundation to develop the research framework to investigate students' perceptions toward WBLE and their intention to use it. The research framework can be perceived through Figure 1.

Figure 1: Research framework




However, this paper highlights the investigation on: 1) the effects of users' demographic data such as gender, level of study and course of study on their perceived usefulness and perceived ease of use of WBLE; and 2) the relationships between users' perceived usefulness, perceived ease of use, and their behavioural intention to use WBLE. Therefore, it is hypothesized that:

H1: Student demographics such as gender, level of study and course of study have significant effects on perceived usefulness (PU) and perceived ease of use (PEOU) of WBLE.
H2: There is a significant relationship between perceived usefulness (PU) and behavioural intention to use (BITU) WBLE.
H3: There is a significant relationship between perceived ease of use (PEOU) and behavioural intention to use (BITU) WBLE.

**Research methodology**

**Research samples**

The target population of this research are full-time foundation studies and undergraduate students from different faculties across three campuses in a Malaysian university. 445 students who have access to WBLE from different levels of study (i.e. Foundation studies or undergraduate), and courses (i.e. Foundation in Arts, Foundation in Science, Arts-based undergraduate courses, and Science-based undergraduate courses) participated in the empirical study. 239 of them were males and the rest were females. There were 200 Foundation Studies students and 245 undergraduate students from different courses.

**Research instrument**

The principle research method employed in this research was self-administrated questionnaire survey approach. A survey questionnaire was developed as the main instrument to investigate user acceptance of WBLE using the proposed TAM as shown in Figure 1. The questionnaire contained four sections as follows: Section A: Perceived usefulness and Perceived Ease of Use toward WBLE, Section B: Social Influence and Behavioural Intention to Use the WBLE, Section C: Actual Usage of WBLE, and Section D: Personal details to solicit demographic data of the students.

Sections A and B of the questionnaire measured the research constructs such as perceived usefulness (PU), perceived ease of use (PEOU), subject norm and behavioural intention to use (BITU) WBLE using a 5-point Likert-type scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). Each participant was required to complete the questionnaire indicating his/ her agreement or disagreement with each statement that built into those constructs. The statements in the questionnaire were adapted from relevant scales in the past studies (e.g. Cheung & Vogel, 2013; Joo & Sang, 2013; Lee & Lehto, 2013; Ortega Egea & Román González, 2011; Padilla-Meléndez et al., 2013; Park et al., 2014). However, this paper focuses on Sections A1, A2 and B2 in the questionnaire which examines the perceptions of students toward perceived usefulness (PU) and perceived ease of use (PEOU), as well as the relationships between PU or PEOU and behavioural intention to use WBLE that built into the research framework, which was developed based on the core ideas of TAM proposed by Davis.

In Section C, participants were asked to assess their actual usage of WBLE. They were asked to indicate their frequency of accessing WBLE and utilising its features, their purposes of accessing WBLE and length of time they spent each time logging into WBLE. Participants were also asked to rate the level of usefulness of each of the features in WBLE, and select other online technologies as the alternative tools to WBLE for learning purpose. The last section in the questionnaire contains items that solicited demographic data of the students.

Prior to the empirical study, a preliminary study was carried out among 30 undergraduate students to pilot-test the survey questionnaire for its reliability. These respondents were excluded from the empirical study to avoid contamination (van Teijlingen and Hundley, 2001). The data collected through the preliminary study were evaluated using the most popular test of inter-item consistency reliability that is the Cronbach's alpha coefficient. Curtis and Drennan (2013) reported that the

Cronbach's alpha values greater than 0.7 are considered acceptable, while values greater than 0.8 indicating good internal consistency. The results displayed in Table 1 shows that the Cronbach alpha coefficient of the four constructs ranging from 0.812 through 0.929. Moreover, the Cronbach's alpha coefficient for all the 23 statements is 0.922. Since all the Cronbach's alpha values are greater than 0.80, thus, the results of Cronbach's analysis revealed that the survey questionnaire for this research had demonstrated a high level of internal consistency and reliability among items. The questionnaire was well-constructed and reliable.

Table 1: Cronbach's alpha (α) coefficient for each attribute in the survey questionnaire

| Research Construct | Items | Cronbach's Alpha (α) |
|---|---|---|
| Perceived Usefulness of WBLE | 8 | 0.849 |
| Perceived Ease of Use of WBLE | 6 | 0.929 |
| Subjective Norm (social influence of using WBLE) | 4 | 0.812 |
| Behavioural Intention to use WBLE in the future | 5 | 0.854 |
| **Total** | **23** | **0.922** |

**Data collection procedure**

The empirical study was conducted in a Malaysian university. The survey instrument was administered to students from different courses with the assistance of several lecturers during the regular class time. The survey was completed in approximately 15-minute for each student. Since the number of students in all the classes that involved in the survey is different, so the total number of samples for different courses is different too. 131 questionnaires were administered to the undergraduate students of Arts-based courses from Faculty of Creative Industries, 114 questionnaires to the undergraduate students of Science-based courses from Faculty of Engineering and Sciences, 99 questionnaires to the students from Foundation in Arts, and 101 questionnaires to the students from Foundation in Science.

**Data analysis**

Data analysis involved the coding of data and interpreting the results using SPSS (Statistical Package for Social Science). Both descriptive and inferential analysis techniques were used to analyse the data collected from questionnaire, to empirically test the research framework via formulated hypotheses. Independent samples T-test, one-way ANOVA test and Pearson's Coefficient Correlation were used to test null hypotheses 1 ($H_0$1) through 3 ($H_0$3).

**Research findings and discussion**

**Testing of hypothesis 1**

The following null hypothesis was tested:

**$H_0$1: Student demographics such as gender, level of study and course of study do not have any significant effects on perceived usefulness (PU) and perceived ease of use (PEOU) of WBLE.**

From the first main null hypothesis 1 ($H_0$1), the following six sub hypotheses were formed:

**$H_0$1a:** Students' gender does not have any significant effects on PU of WBLE.
**$H_0$1b:** Students' gender does not have any significant effects on PEOU of WBLE.
**$H_0$1c:** Students' level of study does not have any significant effects on PU of WBLE.
**$H_0$1d:** Students' level of study does not have any significant effects on PEOU of WBLE.
**$H_0$1e:** Students' course of study does not have any significant effects on PU of WBLE.
**$H_0$1f:** Students' course of study does not have any significant effects on PEOU of WBLE.

The independent samples T-test was used to test $H_0$1a through $H_0$1d to examine if there are significant differences between male and female students, so as the foundation studies and undergraduate students, in terms of perceiving the usefulness and ease of use of WBLE. On the other hand, the one-way ANOVA test was used to test $H_0$1e and $H_0$1f which examine if the course of study statistically affecting the students' perceptions of usefulness and ease of use of the WBLE.

Testing of $H_0$1a

As $H_0$1a stated, students' gender does not have any significant effect on PU of WBLE. The independent samples t-test was used to examine if there is a significant difference between male and female students' perceived usefulness of WBLE. The results are shown in Tables 2 and 3. As the p-value was very large ($p = 0.936$) which indicates that there was no significant difference in the two means, therefore, there was not enough evidence to reject $H_0$1a ($p > 0.05$) (see Tables 2 and 3). Hence, there was no significant difference between male and female students' perceived usefulness of WBLE.

Table 2: Descriptive statistics for Perceived Usefulness and students' gender

**Perceived Usefulness**

| Gender | N | M | SD |
|---|---|---|---|
| Male | 239 | 3.45 | 0.74 |

| | | | |
|---|---|---|---|
| Female | 206 | 3.45 | 0.71 |

Table 3: Independent samples T-test results for Perceived Usefulness and students' gender

| **Perceived Usefulness** | **Levene's Test for Equality of Variance** | | **T-test for Equality of Means** | | |
|---|---|---|---|---|---|
| | **F** | **Sig.** | **t** | **df** | **Sig. (2-tailed)** |
| Equal variances assumed | 0.165 | 0.685 | 0.081 | 443 | 0.936 |
| Equal variances not assumed | | | 0.081 | 437.811 | 0.936 |

**Note:**
According to Hanna and Dempster (2012), the value of equal variance assumed is applicable if the significance of the Levene's test is high (greater than 0.05). Since the p-value for Levene's test is large (p = 0.685), we can assume that the assumption of equal variances is not violated.

Testing of $H_0$1b

As $H_0$1b stated, students' gender does not have any significant effects on PEOU of WBLE. The independent samples T-test was used to examine if there is a significant difference between male and female students' perceived ease of use of WBLE. The results are reported in Tables 4 and 5. The p-value was rather large (p = 0.477) indicating that there was not enough evidence to reject $H_0$1b (p > 0.05) (see Tables 4 and 5). Thus male and female students were in agreement on the perceived ease-of-use of WBLE.

Table 4: Descriptive statistics for PEOU and students' gender

| **Perceived Ease of Use** | | | |
|---|---|---|---|
| **Gender** | **N** | **M** | **SD** |
| Male | 239 | 3.74 | 0.82 |
| Female | 206 | 3.79 | 0.68 |

Table 5: Independent samples T-test results for PEOU and students' gender

| **Perceived Ease of Use** | **Levene's Test for Equality of Variance** | | **T-test for Equality of Means** | | |
|---|---|---|---|---|---|
| | **F** | **Sig.** | **t** | **df** | **Sig. (2-tailed)** |
| Equal variances assumed | 5.347 | 0.021 | -0.702 | 443 | 0.483 |
| Equal variances not assumed | | | -0.711 | 442.346 | 0.477 |

**Note:**
According to Hanna and Dempster (2012), the value of equal variance assumed is applicable if the significance of the Levene's test is high (greater than 0.05). Since the p-value for Levene's test is is low (p = 0.021), we can assume that the assumption of equal variances is violated.

Testing of $H_0$1c

As $H_0$1c stated, students' level of study does not have any significant effects on PU of WBLE. The independent samples T-test was used to examine if there is a significant difference between foundation studies and undergraduate students in terms of perceiving the usefulness of WBLE. The results are depicted in Tables 6 and 7. The p-value was 0.655 indicating that there was not enough evidence to reject $H_0$1c (p > 0.05) (see Tables 6 and 7). Hence, the level of study did not have any significant effects on perceived usefulness of WBLE. Both Foundation studies and undergraduate students were in agreement on the usefulness of the WBLE.

Table 6: Descriptive statistics for PU and students' level of study

| **Perceived Usefulness** | | | |
|---|---|---|---|
| **Level of Study** | **N** | **M** | **SD** |
| Foundation studies | 200 | 3.43 | 0.68 |
| Undergraduate | 245 | 3.47 | 0.76 |

Table 7: Independent samples T-test results for PU and students' level of study

| **Perceived Usefulness** | **Levene's Test for Equality of Variance** | | **T-test for Equality of Means** | | |
|---|---|---|---|---|---|
| | **F** | **Sig.** | **t** | **df** | **Sig. (2-tailed)** |
| Equal variances assumed | 2.942 | 0.087 | -0.448 | 443 | 0.655 |
| Equal variances not assumed | | | -0.453 | 439.635 | 0.651 |

**Note:**
According to Hanna and Dempster (2012), the value of equal variance assumed is applicable if the significance of the Levene's test is high (greater than 0.05). Since the p-value for Levene's test is test is rather large (p = 0.087), we can assume that the assumption of equal variances is not violated.

Testing of $H_0$1d

As $H_0$1d stated, students' level of study does not have any significant effects on PEOU of WBLE. The independent samples T-test was used to examine if there is a significant difference between foundation studies and undergraduate students in terms of perceiving the ease of use of WBLE. The results are revealed in Tables 8 and 9. The p-value was 0.157 indicating that there was not enough evidence to reject $H_0$1d ($p > 0.05$) (see Tables 8 and 9). Hence, the level of study had no significant effects on perceived ease of use of WBLE. Foundation studies and undergraduate students agreed on the ease of use of the WBLE.

Table 8: Descriptive statistics for PEOU and students' level of study

**Perceived Ease of Use**

| **Level of study** | **N** | **M** | **SD** |
|---|---|---|---|
| Foundation studies | 200 | 3.71 | 0.51 |
| Undergraduate | 245 | 3.81 | 0.50 |

Table 9: Independent samples T-test results for PEOU and students' level of study

| **Perceived Ease of Use** | **Levene's Test for Equality of Variance** | | **T-test for Equality of Means** | | |
|---|---|---|---|---|---|
| | **F** | **Sig.** | **t** | **df** | **Sig. (2-tailed)** |
| Equal variances assumed | 1.580 | 0.209 | -1.416 | 443 | 0.157 |
| Equal variances not assumed | | | -1.427 | 436,148 | 0.154 |

**Note:**
According to Hanna and Dempster (2012), the value of equal variance assumed is applicable if the significance of the Levene's test is high (greater than 0.05). Since the p-value for Levene's test is test is large (p = 0.209), we can assume that the assumption of equal variances is not violated.

Testing of $H_0$1e

$H_0$1e stated that students' course of study does not have any significant effects on PU of WBLE. The one-way ANOVA test was used to analyse whether or not the course of study (i.e. Foundation in Arts, Foundation Science, Arts-based undergraduate courses and Science-based undergraduate courses) has significant effects on students' perceived usefulness of WBLE. The results are reported in Tables 10 and 11. The p value was rather large (p = 0.398) indicating that $H_0$3e could not be rejected ($p > 0.05$) (see Tables 10 and 11). Hence, the course of study had no significant effects on students' perceived usefulness of the WBLE. Thus, whatever students' course of study, they were in agreement on the perceived usefulness of WBLE.

Table 10: Descriptive statistics for PU and students' course of study

**Perceived Usefulness**

| **Course of Study** | **N** | **M** | **SD** |
|---|---|---|---|
| Foundation in Arts | 99 | 3.39 | 0.70 |
| Foundation in Science | 101 | 3.48 | 0.65 |
| Arts-based undergraduate courses | 131 | 3.41 | 0.73 |
| Science-based undergraduate courses | 114 | 3.53 | 0.80 |

Table 11: ANOVA results for PU and students' course of study

| ANOVA Table | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| PU * Course | Between Groups | 1.555 | 3 | 0.518 | 0.987 | 0.398 |
| | Within Groups | 231.534 | 441 | 0.525 | 0.987 | |

Testing of $H_0$1f

$H_0$1f stated that students' course of study does not have any significant effects on PEOU of WBLE. The one-way ANOVA test was used to examine whether or not the different courses of study have significant effects on students perceived ease of use of WBLE. The results are shown in Tables 12 and 13). The p value was rather large ($p = 0.260$) indicating that there was not enough evidence to reject $H_0$1f ($p > 0.05$) (see Tables 12 and 13). Thus, the students from all courses of study agreed on the ease of use of WBLE.

Table 12: Descriptive statistics for PEOU and students' course of study

| **Perceived Ease of Use** | | | |
|---|---|---|---|
| **Course of Study** | **N** | **M** | **SD** |
| Foundation in Arts | 99 | 3.67 | 0.73 |
| Foundation in Science | 101 | 3.74 | 0.71 |
| Arts-based undergraduate courses | 131 | 3.75 | 0.67 |
| Science-based undergraduate courses | 114 | 3.87 | 0.75 |

Table 13: ANOVA results for PEOU and students' course of study

| ANOVA Table | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| PEOU * Course | Between Groups | 2.283 | 3 | 0.761 | 1.341 | 0.260 |
| | Within Groups | 250.246 | 441 | 0.567 | | |

Summary of $H_0$1 testing

The results of the testing of $H_0$1a and $H_0$1b reported that there was no significant difference between male and female students in their perceptions toward the usefulness and ease of use of WBLE. The results are in accordance with the findings of Wong et al. (2012). Wong et al. claimed that this may be due to the fact that "computers-in-education have permeated the everyday lives of pre-service teachers and differences in the use between male and female have been narrowed till it was no longer be significant" (p. 1203).

In regard to the level of study, the findings from the testing of $H_0$1c and $H_0$1d testing have proven that there was no significant difference between Foundation studies students' and undergraduate students' perceived usefulness and ease of use of WBLE. They were in agreement on the usefulness and ease of use of WBLE. These findings are consistent with the study of Afari-Kumah and Achampong (2010). Afari-Kumah and Achampong stated that level of student do not affect a student's perception of how easy it is to use the computer. This could be a "reflection of the determination of students to learn to use the computer regardless of their level" (Afari-Kumah and Achampong, 2010: 113). Afari-Kumah and Achampong further added that it is necessary to note the weakness of the insignificant relationship between PU and level of student, suggesting that other external variables such as cost of a personal computer and income levels of families have to be looked at. Besides, Agarwal and Prasad (1999) believed that level of study did not have effect on PU might be that for a large number of the users, the added functionality of the interface had simply not been "discovered" yet, and hence, they did not perceived its value differently. Although Agarwal and Prasad had found a relationship between level of study and PEOU, however, they had used corporate user as the samples in their study; corporate user and student may have different points of views, and the findings may be affected by other unknown variables.

Apart from that, the findings of $H_0$1e and $H_0$1f testing reported that the course of study had no significant effects on students' perceived usefulness and ease of use of WBLE. The result is contrary to prior research, which investigated the impact of course/programme on users' perceptions toward technology. One plausible cause is that almost all the students from different courses used WBLE to download course materials or check announcement.

In conclusion, all students regardless of their gender, level of study and course of study agreed on the usefulness and ease of use of WBLE. According to Shiratuddin (2002: 238), "A software should be easy to use and easy to learn by different groups of user, for instance, experienced and novice users, male and female users, and so on. This is in line with Molich and Nielsen's (1990: 338) statement that "Any system designed for people to use should be easy to learn and remember, effective, and pleasant to use.

Thereby, WBLE may be considered as a successful LMS that was perceived by different students of different gender, level of study and course of study as useful and easy to use.

**Testing of hypothesis 2**

The following null hypothesis was tested:

**$H_0$2: There is no significant relationship between perceived usefulness (PU) and behavioural intention to use (BITU) WBLE.**

Pearson's Correlation Coefficient (r) was used to test $H_0$2, which studied the relationship between perceived usefulness (PU) and behavioural intention to use (BITU) WBLE. The results are shown in Tables 14 and 15. The p-value was found to be highly significant ($r = 0.626$, $p < 0.01$) (see Tables 14 and 15). Therefore there was strong evidence to reject $H_0$2. PU was positively correlated with BITU ($r = 0.626$). Students who perceived the WBLE as being useful will increase their behavioural intention to use WBLE in studies.

Table 14: Descriptive statistics for PU and Behavioural Intention to Use WBLE

| | N | M | SD |
|---|---|---|---|
| PU | 445 | 3.45 | 0.73 |
| BITU | 445 | 3.49 | 0.70 |

Table 15: Correlation results between PU and Behavioural Intention to Use WBLE

| | | PU | BITU |
|---|---|---|---|
| **PU** | Pearson Correlation | 1.00 | 0.626** |
| | Sig. (2-tailed) | | 0.000 |
| | N | 445 | 445 |
| **BITU** | Pearson Correlation | 0.626** | 1.00 |
| | Sig. (2-tailed) | 0.000 | |
| | N | 445 | 445 |

** Correlation is significant at the 0.01 level (2-tailed)

The findings are consistent with the empirical studies of past studies (e.g. Alatawi et al., 2014; Almarashdeh et al., 2010, 2011; Baleghi-Zadeh et al., 2014; Premchaiswadi & Porouhan, 2012). Premchaiswadi and Porouhan (2012) discovered that intention to use an online learning system to learn is positively affected by "Perceived Usefulness". While Almarashdeh et al. (2010, 2011) and Baleghi-Zadeh et al. (2014) indicated that PU has a significant impact on behavioural intention to use LMS.

**Testing of hypothesis 3**

The following null hypothesis was tested:

**$H_0$3: There is no significant relationship between perceived ease of use (PEOU) and behavioural intention to use (BITU) WBLE.**

The Pearson correlation analysis was used to analyse $H_0$3. Pearson's Correlation Coefficient (r) was utilised to study the relationships between perceived ease of use (PEOU) and behavioural intention to use (BITU) WBLE. The results are shown in Tables 16 and 17. The p-value was found to be highly significant ($r = 0.597$, $p < 0.01$) (see Tables 16 and 17). Therefore there was a strong evidence to reject $H_0$3. PEOU was positively correlated with BITU. The findings imply that students who perceived the WBLE as easy to use will increase their behavioural intention to use WBLE in studies. The findings concur with several studies including Almarashdeh et al. (2010, 2011), Alatawi et al. (2014), Baleghi-Zadeh et al. (2014), and Premchaiswadi and Porouhan (2012).

Premchaiswadi and Porouhan (2012) concluded that perceived ease of use is a significant determinant of intention to use an e-learning system. In particular Alatawi et al. (2014), Almarashdeh et al. (2010, 2011), and Baleghi-Zadeh et al. (2014) stated that PEOU has a significant impact on the intention to use LMS. Premchaiswadi and Porouhan added that the degree to which a student believed that using an e-learning system will require little effort is important in acceptance of e-learning. They relate it to numerous psychological, cultural or lifestyle factors. Alatawi et al. further explained that easier system is more likely to be adopted by the users than the complex and cumbersome systems. Alatawi et al. stated that a system need to be user friendly and its exploration has to be effortless, otherwise users of such system would not adopt or use it even though it is useful as this is a human nature to use easier system.

Table 16: Descriptive statistics for PEOU and Behavioural Intention to Use WBLE

| | N | M | SD |
|---|---|---|---|
| PU | 445 | 3.76 | 0.75 |

| | | | |
|---|---|---|---|
| BITU | 445 | 3.49 | 0.70 |

Table 17: Correlation results between PEOU and Behavioural Intention to Use WBLE

| | | PU | BITU |
|---|---|---|---|
| **PU** | Pearson Correlation | 1.00 | 0.597** |
| | Sig. (2-tailed) | | 0.000 |
| | N | 445 | 445 |
| **BITU** | Pearson Correlation | 0.597** | 1.00 |
| | Sig. (2-tailed) | 0.000 | |
| | N | 445 | 445 |

** Correlation is significant at the 0.01 level (2-tailed)

**Conclusions**

Davis (1993) claimed that "Lack of user acceptance has long been an impediment to the success of new information systems" (p. 475). While LMS is adopted to facilitate learning, user acceptance must be considered during the development in order to enhance its successful adoption. This research represents research in examining the applicability of TAM to explain students' acceptance of LMS within the academic setting. Overall, findings from this research suggested that:

- The proposed TAM (depicted in Figure 1) is an appropriate model to explain and predict students' acceptance of LMS in the university context. The model provides a conceptual depiction of what motivates student to use LMS with reasonably strong empirical support.
- Student demographics such as gender, level of study and course of study are not the factors that will affect their perception either towards the usefulness or ease of use of WBLE.
- Data analysis yielded results supporting the idea that perceived usefulness was a main determinant of one's intention to adopt a technology, while perceived ease of use was also found to have a significant effect on influencing one's intention to use the technology.

The research findings reported that it is imperative for the institution to emphasize on the usability of LMS by offering a greater variety of e-learning courses. Also, LMS designer have to take user experience into account during development. Not only must the system be able to improve students' performance and advantageous to their study, it must be user-friendly which required minimal mental to be skilful at using the system. The ease of use and usefulness of a LMS can add value to the existing system through improving and enhancing students' acceptance toward LMS as an e-learning system. Besides, instructors must be provided with sufficient training to be familiar with the technology, and exhibit a strong acceptance behaviour towards the technology. Instructors should promote the use of LMS by complementing LMS with traditional teaching and learning process. Meanwhile, the university management should advertise the benefit of LMS to enhance students' perception towards e-learning. In conclusion, HEIs should develop strategic plans and provide guidelines considering students' acceptance in order to include all critical success factors for the sustainable deployment of e-learning. The results of this study could provide insight into what factors need to be considered for designing an e-learning system and the guideline to enhance existing LMS or future IT implementation.

This research has some limitations that need to be enhanced in future research. First, this research did not include another group of LMS users, which are lecturers. Since social pressure from lecturer's perspective also directly influence students' intention to use LMS, thus additional research is needed to examine lecturers' perception of LMS and also factor that influence their adoption of the technology. Second, the findings of this research have limitations in terms of generalizability to the whole Malaysia because the data were only collected from a single private higher education provider. Students from different universities may behave differently thus may have different outcomes. Future research might be conducted to investigate the acceptance of LMS from students of different universities within Malaysia, which include both public and private institutions. This study could also be extended to cover public and private universities students in other countries to find out the favourable LMS tools among university students. Last but not least, there are numerous factors that may affect acceptance of LMS, however, this research focused only on three factors as seen in the proposed research framework. Further research could adopt a more complex research model by including different potential determinants such as perceived enjoyment, perceived information quality, perceived website quality, perceived playfulness and so forth.

This research would be a significant endeavour in promoting effective asynchronous learning environment within the HEIs and motivation of students to utilise LMS in their study. Particularly, this research added value to the attempts by Ministry of Education and the management of HEIs working on improving e-learning usage and effects among the students. Moreover, this research would be helpful to the management of the selected Malaysian university in informing them the students' LMS usage behaviour. Meanwhile, this research also served as a stimulus to evaluate the performance of their existing LMS system whether it is realising its objectives. Besides, it also provided guideline to LMS designer on what criteria need to be considered during the development of LMS in order to cater to the needs of LMS users, which in turns initiated and promoted students' utilisation of LMS. Additionally, this research had made valuable academic contributions to the technology acceptance literature for e-learning system in Malaysia. This research also serves as a future reference for researches on the subject of technology acceptance. Understanding the effect of students' perceptions on their intention to adopt a technology and the factors that influence their perception leads to higher user acceptance of the technology. Since user acceptance determines the success of

the system, it is therefore a critical issue for the education sector. Nonetheless, the contributions of this research are not exclusive to the educational context, and should be of value to organisation in any sectors aiming to achieve better user acceptance of new and existing information technology.

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