Using Technology Acceptance Model in Understanding Academics' Behavioral Intention to Use Blackboard Learning Management System

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Abstract
This paper tried to examine the academics' acceptance for the use of Blackboard learning management system using Technology Acceptance Model (TAM) as an analysis approach. Four factors of TAM namely Perceived Ease of Use, Perceived Usefulness, Attitude, Behavior Intention, and Perceived convenience as an additional factor were used as the evaluation model factors to measure the academics' technology acceptance and a total of six hypotheses were proposed. An online questionnaire was conducted to extract the information from academics of Najran University (NU) and a total of 157 respondents were collected. Our findings illustrated that the five factors mentioned have inter correlated effect to explain the academics' behavior and Perceived convenience was determined as the key factor.
Keywords: Blackboard Learning Management System (BbLMS), Technology Acceptance Model (TAM), Saudi Arabi*a.*
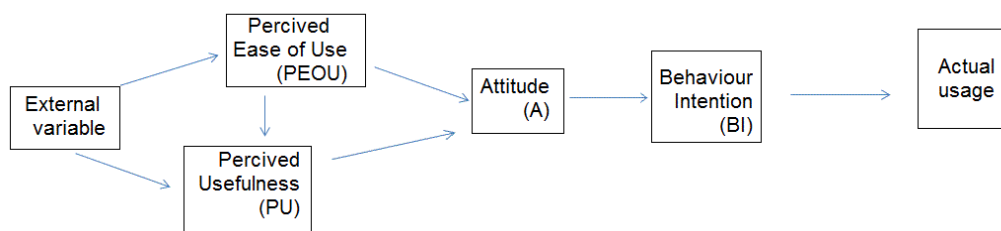
1. Introduction
Blackboard Learning System is an e-learning tool commonly known and used by many universities to manage their education process. Blackboard has built-in communication tools to facilitate interaction between faculty, teaching assistance, peer mentors, and classmates (Liaw, & Huang; 2011). According to Duffy, Duffy, andereasen, and Rimmer (1995) Blackboard Learn includes a bulletin board, chat rooms, email, messaging, course content management, quizzes, peer assessment, synchronous and asynchronous communication, etc. Blackboard systems constitute a comprehension of the fundamental philosophy of design co –ordination. Design co–ordination is defined as a high level concept of management function such as planning, scheduling, representation, decision making and control (Culley, Duffy, McMahon, & Wallace; 2001). In addition to that, they noted the Services provided by Blackboard system include access control and performance management. The popularity of blackboard performance was proven by looking at the number of its usage in U.S. colleges and universities which was more than 75 percent and had 17,000 schools and organization in 100 countries in 2014, it can be observed from that the popularity of Blackboard performance (Corcoran, 2014; Empson, 2014). An effective implementation of black board learning management system (BbLMS) should highly consider academics who will such system for teaching.

Therefore, the aim of this research is to develop a theoretical framework based on a well-known technology acceptance model (TAM). In our research, the five factors that will be studied and analysis consist of output quality, Perceived Ease of Use (PEOU), Perceived Usefulness (PU), Attitude (A), and Behavior Intention (BI) to use Blackboard Learning System. The expected result of our research is to describe the academics behavior in accepting the use of BblMS using TAM approach in order to find the key success factor of e-learning implementation.

The structure of this paper is arranged into six sections. The first section provides a brief introduction about the use Blackboard Learning System and the goal of this research. The second section explores the literature review related to previous studies about Technology Acceptance Model (TAM) implementation. Section three describes the research design including the model explanation and the proposed hypotheses. The fourth section presents the research methodology followed by section five that describes the data analysis. Section six ends this study by drawing some conclusions and research implications, which can be used as a reference and recommendation for conducting further research regarding this topic.

2. Literature Review
Technology Acceptance Model (TAM) was originally introduced by Davis on 1989. The research has explored the factors that have been identified the influences to the human behavior in accepting the Information Technology (IT). TAM model, which was adopted from the Theory of Reasoned Action (TRA) (Fishbein & Ajzen, 1975). TRA provides the crucial factors that can successfully capture the humans' belief, attitude and behavior intention in the use of IT. TAM model consist of any possible external variable that can affect Perceived Usefulness (PU) and Perceived Ease of Use (PEOU) to determine the Attitude (A) of human behavior intention (BI) to use IT application. The illustration model of Technology Acceptance Model (TAM) is shown on Fig.1.

Figure 1 .Original theory Acceptance Model (Davis, Bagozzi, & Warshaw,1989)

According to Davis (1989) highlighted that , PU is a psychological level of the user to perceive a particular system as an enhancement to the work performance, while PEOU can be seen as defined as a degree of where a user feels that there is no high effort required to access a particular system. Both PU and PEOU have direct relation with Attitude factor (A) and have associations. With the intention to use IT application. Attitude (A) can be defined as degree of which people accept the likeable feeling to perform the behavior (Ajzen, 1980; park, BaekOhm, & Chang; 2014). Attitude has significant association with the Behavior Intention (BI), where Behavior Intention reflects human intention to use a specific IT application.
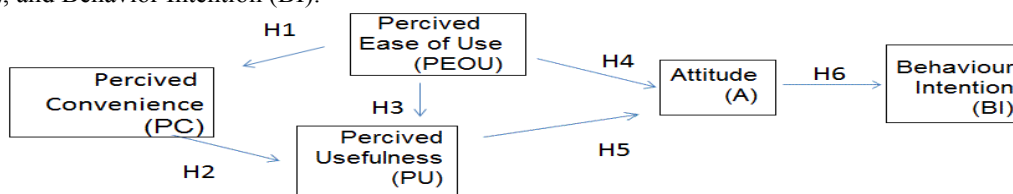
Perceived convenience is used as additional factors since , there are two kinds of convenience, which are product and service. A way to determine whether a product or service is convenient depends on time and effort (Berry, Seiders, & Grewal, 2002). Brown (1990) examined the convenience of a product or service by five dimensions including time, place, acquisition, use, and execution. Yoon and Kim (2007) also defined perceived convenience as a level of convenience toward time, place and execution that one perceives when using the system to complete a task. Based on the perspective provided by Yoon and Kim (2007), perceived convenience, in the present study, was defined as a level of convenience toward time, place and execution that one feels during the participation in blackboard learning management system. Time convenience refers to a level of convenience toward time that one feels when performing a task in BbLMS. Yoon and Kim (2007) found that perceived ease of use positively affected perceived convenience, and perceived convenience positively affected perceived usefulness. This finding was contradictory to Hossain and Prybutok (2008) who proposed that convenience included ease of use and usefulness. Therefore, relationships between perceived convenience and TAM variables require further examination.

Many studies attempted to implement TAM in IT case resulted that TAM has effectively described the human behavior to accept the existence of certain IT application. These studies can be referred to previous researches about the acceptance of hardware (Hossain, & Prybutok, 2008). IT software (Pai and Huang, 2001; Gallego, Luna, Bueno, 2008), web usage and online application (Qiu and Li ,2008; Lin and Lu, 2000).

For specific e-learning acceptance research itself, numerous researches have been successfully utilizing the TAM by adding some antecedent factors. Sánchez & Hueros (2010) as an example, have adapted TAM in their research by testing the two additional factors to measure a famous open source e-learning system namely Moodle. One of their proposed factors then was removed from their model and their research resulted that their proposed model could explain 41% of real situation, and Perceived Ease of Use was identified as a key element of their model. The convenience of implementing TAM has also been confirmed by other e-learning researchers (Escobar-Rodriguez and Monge-Lozano, 2012; Abdalla, 2007), thus, it will be implemented as well in our research to construct the measurement model for Blackboard Learning Management System.

3. Research Model and hypothesis

As mentioned in previous section, this research used TAM as the analysis model to understand the academics' acceptance for Blackboard Learning System as presented by Fig. 2. The illustration shows that TAM contains six factors namely Perceived Convenience (PC), Perceived Ease of Use (PEOU), Perceived Usefulness (PU), Attitude (A), and Behavior Intention (BI).

Figure 2. An extension of TAM for Blackboard Learning System Model

Perceived convenience is one of the features of BbLMS, so it was employed for extending TAM, proposed by Davis, in the present study. Attitude toward using and intention behavior were indicators of technology acceptance in the extended TAM. Relationships among perceived convenience, perceived ease of use,

perceived usefulness, attitude toward using BbLMS, and behaviour intention to use it were examined in the present study.

The research model and hypotheses in the present study, as shown in Figure 2, were proposed based on theories and related studies from literature review. Yoon and Kim (2007) found that perceived ease of use positively affected perceived convenience in a wireless LAN acceptance model. So, Hypothesis 1 was established in the present study.

H1: Perceived ease of use positively related to perceived convenience of academics to use BbLMS.

Yoon and Kim (2007) found that perceived convenience positively related to perceived usefulness. So, Hypothesis 2 was established in the present study.

H2: Perceived convenience positively related to perceived usefulness to use BbLMS.

Perceived ease of use (PEOU) in this study can be interpreted as a situation where a faculty member does not need to spend much effort and energies to operate BbLMS Perceived usefulness (PU) is a motivational perception of the academic to believe that BbLMS can enhance his or her work performance.

Attitude (A) is defined as the degree of which the a faculty member follows his or her positive or negative feeling to use Blackboard Learning System. Empirical studies from Sánchez & Hueros (2010) and Masrom (2007) have shown the positive correlation between PEOU, PU and A in their e-learning acceptance model research. Based on these previous empirical researches, these following hypotheses were made:

H3: Perceived Ease of Use (PEOU) is positively related to Perceived Usefulness (PU) to use BbLMS.

H4: Perceived Ease of Use (PEOU) is positively related to Attitude (A) to use BbLMS.

H5: Perceived Usefulness (PU) is positively related to Attitude (A) to use BbLMS.

As previously mentioned that Attitude (A) means how a faculty member follows his or her feeling to use Blackboard Learning System, it is important to know that Attitude is the strong source of academics intention (BI) to use BbLMS. Therefore, the association of these factors needs to be measured. Cheung and Vogel (2013) in their research regarding the use of TAM for web-based learning system application have stated the positive correlation between A and BI. Accordingly, the following hypothesis was made:

H6: Attitude (A) is positively related to Behavior Intention (BI) to use BbLMS.

Based on our six hypotheses, an analysis was performed to explain the academics' behavior and the result will be presented in the analysis and results section.

4. Study Method

The study is quantitative in nature and employs an online survey for data collection. Online surveys provide researchers with various benefits (Wright,2005), saving researchers time and expenses by overcoming geographic distance. Moreover, they assist in accessing unique subjects. Due to Saudi Arabia's gender-segregated higher education system, the online survey was the appropriate tool to use in order to access both male and female participants.

The questioner was also translated into Arabic because most of the academics at Najran University are native Arabic speakers. For the Arabic version, the back translation method suggested by Brislin (1986) is used. This method suggests that the questionnaire measurements should be translated by bilingual experts back and forth from the source language to the targeted language. Based on that concept, the English version was sent to two bilingual experts to translate it into Arabic, and the back translation method was followed until the English and Arabic version converged. Finally, the Arabic version was also revised by an expert in the Arabic language for clarity.

4.1 Instrumentation

The questionnaire survey contains two sections a appears in table 1.The first section asked about the personal and academic data, which are gender, age, teaching experience, academic rank and academic field. The second asked about twenty two observed variables to measure the 5 factors in the proposed model, which are Perceived Interactivity (PI), Perceived Ease of Use (PEOU), Perceived Usefulness (PU), Attitude (A), and Behaviour Intention (BI). These 14 observed variable were measured on a five-point Likert scale, ranging from 1 ("strongly disagree") to 5 ("strongly agree").Our study took the sample from NajranUniversity (NU) academics, which this university has been using Blackboard Learning System for about 3 years. Our questionnaire survey has been distributed from September to December 2015. During that period, 302 questionnaires were collected and used for our analysis. This section includes TAM constructs.

Table 1.   Questionnaire

Section I : Demographic Characteristics Information		
-Gender:	1. Male	2. Female
-Age : 1. Less than 25 4. 40-50	2. 25-30 5. Above 50 years old	3. 30-40
- Academic Rank 1. Professor 4. Lecturer	2. Associate Professor 5. Instructor	**3. Assistance Professor**
- Your academic field		
1. Humanities & Social Sciences		2. Natural Sciences
3. Applied Sciences(e.g. engineering, computing& IT)		4. Medical & Health Sciences

Section II : Questionnaire		
A: **Perception of convenience (PC)**		
1	PC1	I will perform my job anyplace with the use of a BbLMS
2	PC2.	Using a BbLMS gives me convenience in performing my work.
3	PC3.	I find a BbLMS convenient for my work.
4	PC4.	Using a BbLMS enables me to accomplish my job at a time that is convenient for me.
B : Perceived Ease of Use (PEOU)		
5	PEU1	I feel that using an BbLMS would be easy for me
6	PEU2	I feel that my interaction with BbLMS would be clear and understandable
7	PEU3	I feel that it would be easy to become skillful at using BbLMS
8	PEU4	I would find BbLMS to be flexible to interact with
9	PEU5	Learning to operate BbLMS would be easy for me
10	PEU6	it would be easy for me to get BbLMS to do what I want to do
11	PEU7	I feel that my ability to determine BbLMS ease of use is limited by my lack of experience.
C: Perceived Usefulness (PU)		
12	PU1	Using BbLMS in my job would enable me to accomplish tasks more quickly
13	PU2	Using BbLMS would improve my job performance.
14	PU3	using BbLMS in my job would increase my productivity
15	PU4	Using BbLMS would enhance my effectiveness on the job.
16	PU5	Using BbLMS would make it easier to do my job
17	PU6	I would find BbLMS useful in my job
D: Attitude Toward Usage (A)		
18	ATU1	I believe it is a good idea to use a BbLMS
19	ATU2	I like the idea of using a BbLMS
20	ATU3	Using a BbLMS is a positive idea
Section V: Behavioral (BI)		
21	**BIU1**	**I plan to use a BbLMS in the future**
22	**BIU2**	**Assuming that I have access to an BbLMS, I intend to use it**

4.2   Participants

The participants in this study were 157 faculty members from different colleges and different departments who voluntarily participated in the online survey. All participants in this study were academics working for Najran University, who fit well with the aim and context of this study.

4.3   Sampling technique

While it is difficult to get responses from a whole population, sampling is an attempt to draw a conclusion based on a small representation in a given population (Jemain, Al-Omari, and Ibrahim, 2007). The sample in this survey is considered a subset of academics at Najran University, comprised of some faculty members selected from the institution. The sampling technique used in the present study is non-probability convenience sampling. Convenience sampling is found used in many studies investigating technology acceptance. Further, the technique is used to ensure a better response rate in a short amount of time. Finally, it is against Najran University privacy

policies to obtain academics' contacts and email addresses from the faculty or its departments. Additionally, using the university's mailing list may have led to the inclusion of other participants who are out of this study scope and therefore distort the findings. Hence, convenience sampling was the optimal technique for the purpose of this study.

4.4   Data collection

The questionnaire was made available at the beginning of academic year 2013/2014. The survey was distributed online by emailing a convenient sampling of 250 academics with the URL to the survey. Participants had the option to switch between English and Arabic at any time during the survey. At this time, of the 250 questionnaires distributed, 63 responses were recorded (62.80%) which consists from 157 respondents.

5.   Data analysis

5.1   Demographics

It is clear from table.2 down that our respondents consist of 99 male and 53 female. The majority of respondents were between 40 and 50 years, with 35.7 % from 31 to 40, 10.2% above 50 years, 7.6% from 25 to 30, with a low minority (5.1%) below 25. Our respondents had experiences in using Blackboard Learning Management System during their academic work.

Table No. 2   Respondents' demographic information

Gender		
Respondents	**Frequency**	**Percent**
Male	99	63.1
female	53	33.8
3.00	5	3.2
Age		
less than 25	8	5.1
25-30	12	7.6
31-40	56	35.7
41-50	65	41.4
more than 50	16	10.2
Academic Rank		
Professor	17	10.8
Associate Professor	30	19.1
Assistant Professor	83	52.9
Lecturer	27	17.2
Academic File		
Social Science	94	59.9
Applied Science	25	15.9
Natural Science	18	11.5
Medical Science	20	12.7

5.2   Validity and reliability

In addition to the steps mentioned earlier to assess instruments' validity and reliability, a further test was performed. Reliability assessment was done using Cornbach Alpha (Cronbach, 1951). Reliability concerns internal consistency between multiple measurements of variables, and Cornbach Alpha is commonly used to measure it (Hair, Black, Babin, Anderson, & Tatham; 2006).

Table No.3   Instruments reliability Cornbach's Alpha

Cronbach's Alpha	Number of Items	Scale
0.846	4	Perceived Convenience (PC)
0.784	7	Perceived ease of use (PEU)
0.927	6	Perceived usefulness (PU)
0.971	3	Attitude (A)
0.764	2	Behavioral intention (BI)

As per many studies (i.e., Nunnally, 1967; Sekaran, 2006), constructs are considered to have internal consistency reliability when the Cronbach's Alpha value exceeds 0.07. In this study, the reliability assessment was done using Statistical Package for Social Sciences (SPSS) version 21. All measures in this study show a high level of reliability, ranging from 0.971 to 0.764. All scales exceeded 0.70, and therefore the survey is considered reliable.

5.3   Factor loading

A parametric statistical technique were used to test the proposal research hypotheses. Factor analysis is used to

identify the underlying predictors of academic's behavioral intention (BI). Correlation technique was used to show the strength of relationship among various constructs. Factors analysis yielded six factors based on the minimum Engine value one. The sum squared loading based on extracted six factors including "perceived ease of use (PEU)", " perceived usefulness (PU)", " perception of convenience (PC)", "Attitude (AT)", " behavioral intention (BI)" produced a cumulative vale of 76 % in explaining the total variance of data.

The appropriates of factor analysis was tested by two important factors i.e.Kaiser-Meyer-Olkin (KMO) and Bartlett's test of sphericity. The KMO overall measure of sampling adequacy was .54, which is within the recommended level and statistically significant at p < 0.05. The Bartlett's test of sphericity was 2632.762 (degree of freedom 171) and statistically significant at p < 0.05 which is the indicate of good correlation among question in the questionnaire.

Table No.4   Factor Loading

Construct	Item	Factor loading	% variance explained	Eiegn value
Perception Of Convenience	PC1	.812	27.616	5.247
	PC2	.908		
	PC3	.780		
Perceived Ease of Use	PEU1	.727	18.580	3.530
	PEU2	.680		
	PEU3	.659		
	PEU4	.727		
	PEU5	.790		
	PEU6	.761		
Perceived Usefulness	PU1	.824	13.057	2.481
	PU2	.906		
	PU3	.758		
	PU4	.824		
	PU5	.806		
	PU6	.651		
Attitude	AT1	.769	9.078	1.725
	AT2	.728		
Behavioral Intention	BI1	.823	7.298	1.387
	BI2	.840		

5.4 correlation

The table 5 shows Pearson correlation coefficients among dependent and independent variables. The Perceived ease of use has a positive relationship with Perceived Convenience (r = 0.99, P < 0.05) which proves hypothesis 1. The hypothesis 2 is proven by positive correlation between Perceived convenience and perceived usefulness (r = .069, P < 0.05), but rejected our hypothesis 3 by the correlation coefficients between perceived ease of use and perceived usefulness is (r = -.006, P < 0.05). In addition to that, hypothesis 4 is rejected by correlation coefficients between perceived usefulness and attitude (r = - 0.046, P < 0.05). A positive and significant association is existed between perceived usefulness and attitude (r = 0.617, P < 0.05) which proves our hypothesis 5. There is a strong positive association between attitude and Behavioral Intension (r = .069, P < 0.05) which proves our hypothesis 6.

TableNo.5.   Pearson correlation coefficients

No.	Variable	1	2	3	4	5
1	Perceived Ease of use	1	0.099	-0.006	-.046	-.174*
2	Perceived convenience		1	.069	.053	.477**
3	Perceived usefulness			1	.617**	.199*
4	Attitude				1	.085*
5	Behavioral Intension					1

*Correlation is significant at the 0.05 level (2-tailed).

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

5.5. Regression

Table 7 show that, the perceived ease of use (B= -.006 p = .942), and (B=- 0.046, p = .569) have insignificant and negative impact on both perceived usefulness and attitude, while it has (B= 0.099, p = .220) significant and positive impact in perceived convenience.

The results prove our hypothesis H1 but rejects H3 and H4.The results, indicate that perceived convenience (B= 0.069, p = .391) has positive impact on perceived usefulness, and in the same time attitude has (B= 0.133, p = .097) has positive impact on behavioral intension. Therefore, the results prove our hypothesis H2 and H6.

We can see that perceived usefulness (B= 0.617, p = .000) have significant and positive impact on Attitude. Which lead to prove our hypothesis H4.

Table No. 6   Liner Regression Coeffcients

Dependent variable	Model	Unstandardized Coefficient		Standardized Cofficient	t	Sig
		B	Std. Error	Beta		
Perceived convenience	(Constant)	1.810	.223		8.116	.000
	ease of use	.145	.118	.099	1.233	.220
Perceived Usefulness	(Constant)	1.816	.187		9.715	.000
	Perceived convenience	.074	.o87	.069	.860	.391
Perceived Usefulness	(Constant)	1.988	.242		8.208	.000
	ease of use	-.009	.128	-.006	-.072	.942
Attitude	(Constant)	1.697	.188		9.019	.000
	ease of use	-.057	.099	-.046	-571	.569
Attitude	(Constant)	.646	.102		6.355	.000
	Perceived Usefulness	.480	.049	.617	9.766	.000
Behavioral Intension	(Constant)	1.329	.158		8.536	.000
	Attitude	.153	.091	.133	1.672	.097

6.Discussion and Implications

The goal of this research, which is based on the TAM model, was to add perceived convenience to the model and explore the willingness of users to adopt the use of Moodle. The results revealed the positive direct effect of perceived ease of use on perceived convenience, which is aligned with outcomes from previous studies (Chang et al., 2012; Yoon & Kim, 2007). In line with their studies, the model confirms that perceived convenience has a direct effect on perceived usefulness, meaning that the more convenient the academic user feels the BbLMS is the more useful one perceives it to be

H3 postulated that the direct effect of perceived ease of use on perceived usefulness is negative and insignificant, which is opposed to several studies (Chang et al., 2012; Liu et al., 2010; Liu, Liao, & Pratt, 2009; Tselios et al., 2011; Šumak et al., 2011; Van Raaij & Schepers, 2008). A plausible reason for the lack of support for H3 is that the academics in the present study may not see ease of use as a critical factor that will help them improve their working in the process of using BbLMS.

Inconsistent with previous studies (Chang et al., 2012; Masrom, 2007; Ong et al., 2004; Saadé, Nebebe, & Tan, 2007; Šumak et al., 2011; Tselios et al., 2011), H4 referring to the relationship between perceived ease of use and attitude showed significantly negative results. One of the possible reasons of this inconsistency can probably be attributed to the low frequency of use of Moodle by the academics. The other possible reason would be due to the fact that users are mandatorily required to use BbLMS by their instructors.

H5 referred perceived ease of use had positive and significant effects on attitude to use. This result is consistent with the hypothesis of TAM, and the findings of Liao, Tsou, & Huang (2007) and Kuo and Yen (2009). Attitude had positive effects on behavior intention to use BbLMS. This result is consistent with the hypothesis of TAM, and it echoes the findings of Liao, Tsou, & Huang (2007) and Kuo and Yen (2009).

The current study contributes to the validation of the extended TAM model by introducing and confirming the influence of perceived convenience as an external variable on the users' attitude and behavior intention to use Moodle. The results of the study reveal that perceived convenience, perceived ease of use, and perceived usefulness are three important determinants of attitude toward using BbLMS, whereas perceived usefulness is the most significant determinant that directly affects attitude. The findings also illustrate users' behavior intentions for using BbLMS are neither a result of users' perceptions about how easy it is to use the BbLMS, nor perceptions about how useful the system will help users in their academic working process. The current study is not without limitations. First, the use of Moodle is mandatory during the course, which may influence users' perceptions of how useful the system is in helping them in their working. Follow-up studies should examine users' BbLMS using frequency and behavior outside the classroom, users' self-efficacy, users' BbLMS pre-using experiences and the motivational factors that influence academics' participation in online teaching; and second, participants in this study are college and high school lectures, but we did not analyze their demographic data. Future studies including categories of gender, age, and the length of using online teaching system should be conducted to obtain a deeper understanding of the factors that influence attitude and behavior intention toward using BbLMS.

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