Factors Affecting Students' Usage of Learning Management System at the University of Jordan

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Abstract: Background: Jordan is a one of the developing countries with limited resources however it is trying to exploit Information and Communication Technology (ICT) to compensate the lacking of resources and advancement of the country. One of the ICT applications is E-learning and Open Source Learning Management System (Moodle). Although the Moodle in infancy stage in Jordan but the universities show a great interest in the adoption of learning and teaching tools. **Method**: The Technology Acceptance Model (TAM) with its core constructs: perceived ease of use, perceived usefulness, attitudes towards usage, and behavioral intention to use is used to examine how students receive and how they use Moodle platform. Additional external variables were also adopted: GPA, academic year, and faculty. **Result**: The results can firm the original TAM's findings and reveals that GPA, academic year have no significant influence on perceived ease of use while they have affect on perceived usefulness. The faculty has an influence on perceive ease of use and perceived usefulness.

1. Introduction

Using Information and Communications Technology (ICT) is inevitable in our lives due to its rapid development (Dutton & Loader, 2004). The ICT is playing an important role in educational field in schools and universities which directly contribute the improvement of teaching and learning that have been occurring in regards to E-learning (Radcliffe,2002) and (Jenkins & Hanson, 2003).

Nowadays, there is a substantial growth in the use of E-learning platforms in higher education from universities around the world (Paechter, Maier& Macher, 2010). One of the ICT tools that incorporated into the education sector and E-learning is called a learning management system (LMS). LMS is one of the rapidly emerging technologies that are widely used in higher education, whether in open source like Moodle or commercial LMS such as Blackboard (Al-Busaidi & Al-Shihi, 2010). The learning management systems (LMS) consists of human interactions, pedagogical devices, learning contents, assessment supporting, and advancing traditional learning in school or in higher education (Wahlstedt &Honkaranta,2007).

The University of Jordan is the first public university in Jordan. It was using Blackboard as learning management system to provide services for students and academics i.e. facilitate accessing the required material from anywhere, and the communication between them. Then the university turned to open source software and started using Moodle, as the main learning management system from the academic year 2012/2013. The provided services still in the beginning like: uploading the course description, assignments, course news for academics while the student can check the announcement, download the assignment, solve the assignment and upload it back to the teacher.

Any system can success or fail depending on technological factors and human factors (Ozkan & Koseler, 2009). LMS is one of these systems and this study focuses on the human factors which mean the students to examine their acceptance for learning management system (Moodle) at The University of Jordan. The TAM model was adopted as the theoretical framework to ascertain whether it could help in explaining behavioral intentions of students to accept and use this technology. This paper is organized as follows: section 2, theoretical framework, section 3, the method of this research with hypotheses, Discussion and Results in section 4. Finally, the conclusion section 5.

2. Theoretical Framework

There are many theories of technology acceptance used to assessment the perceptions of students. One of these models is the Technology Acceptance Model (TAM) which is developed by Davis (1989) shown in figure 1 as indicated in many researches (Pituch, K & Lee, Y-K., 2006), (Hayashi, Chen, Ryan, & Wu, 2008). TAM was built based on

Theory of Reasoned Action (TRA) upon Fishbein and Ajzen's (1975) which presumably that beliefs could influence attitudes (feelings of favorableness or un-favorableness towards using the technology), which lead to intention to use (indicates the strength on one's intentions to use the technology in the future), and finally actual usage behavior. The Technology Acceptance Model (TAM) has been widely used in explaining IT adoption and usage.
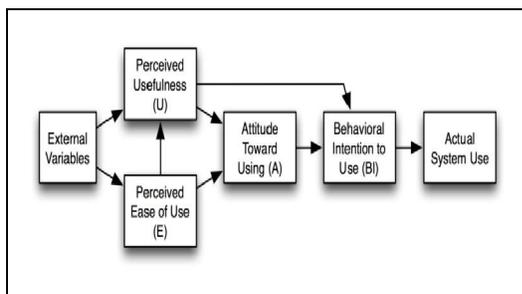

Figure 1: Original Technology Acceptance Model (TAM)

TAM model has been applied in various studies for testing user acceptance of information technology as you can see in table 1 (Sharp, 2007), (King & He, 2006), (Ma & Liu, 2004),(Lee, Kozar, & Larsen, 2003),(Almarabeh, 2014) and (Yousafzai, Foxall, & Pallister, 2007). In this study, the Moodle is considered LMS that makes use of Internet and web technology to deliver information to interact with the students through a computer interface.

Table 1: Applications, participant, country and settings used for applying TAM model

Variation in TAM application	Examples
Applications	Email, voicemail, e-commerce application, word processor, spreadsheet, presentation software, database program, case tools, hospital IS, Decision support system, Expert support system, telemedicine technology, and e-learning systems
Country	USA, UK, Taiwan, Hong Kong, Japan, Australia, Turkey Canada, Kuwait, France, Jordan
Type of study	Lab study, Field study and Web surveys
Participants	Students, knowledge workers, computer programmers, internet users, physicians, bank managers, brokers and sales assistants

The TAM model suggests that when users are presented with a new technology, a number of factors influence their decision about how and when they will use it (Wikipedia):
- ✓ Perceived usefulness (PU) - This was defined by Fred Davis as "the degree to which a person believes that using a particular system would enhance his or her job performance".
- ✓ Perceived ease-of-use (PEOU) - Davis defined this as "the degree to which a person believes that using a particular system would be free from effort".

3. Method

This study examined TAM model to examine student acceptance of new learning management system (Moodle) with the following hypotheses:
- H1: The degree of student GPA has a significant influence on LMS perceived usefulness.
- H2: The degree of GPA student has a significant influence on LMS perceived ease of use
- H3: The level of academic year has a significant influence on LMS perceived usefulness.
- H4: The level of academic year has a significant influence LMS perceived ease of use.
- H5: The type of faculty has a significant influence on LMS perceived usefulness.
- H6: The type faculty has a significant influence on LMS perceived ease of use.
- H7: Perceived ease of use positively affects perceived usefulness of LMS.
- H8: Perceived ease of use positively affects attitude towards using LMS.
- H9: Perceived usefulness positively affects attitude towards using LMS.
- H10: Perceived usefulness positively affects behavioral intention to use LMS.
- H11: Attitude towards using positively affects behavioral intention to use LMS.

Based on data collected from 240 students registered in Remedial computer Skills course in the spring semester 2013/2014 where this is compulsory course for the students who fails in computer proficiency exam. The questions divided in two groups, the first group contains the sample demographics which are shown in table 2. The second group contains 20 questions: 4 questions for Perceived ease of use, 7 questions for perceived usefulness, 5 questions for attitudes toward using, and 4 questions for intention to use. These group used 5-point Likert

scales (strongly agree, agree, neutral, disagree, and strongly disagree) with weight: 5, 4, 3, 2, and 1 to measure students' response. The questions for this study are adopted from previous information system research (Almarabeh, 2014), (Masrom,2007),(Malhotra & Galletta, 1999),(Kripanont &Napaporn,2007),(Sek, Lau, Teoh & Law, 2010)with modifications to adapt the research topic.
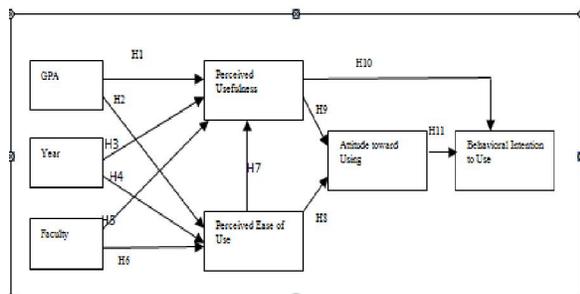

Figure 2: The Research Model

Table 2: Sample Demographics

Variables	Characteristics	Frequency	Percent
GPA	Excellent	20	8.3
	Very Good	82	34.2
	Good	107	44.6
	Fair	31	12.9
Academic Year	Forth Year	8	3.3
	Third Year	57	23.8
	Second Year	76	31.7
	First Year	99	41.3
Faculty	Medical	38	15.8
	Scientific	92	38.3
	Humanities	110	45.8

4. Discussion and Results

SPSS statistical software analyzed the research model shown in figure 2. Measurement validity in terms of reliability and construct validity was evaluated. The reliability analysis measured the internal validity and consistency of questions used for each construct by calculating Cronbach's alpha coefficient (Moolla & Bisschoff, 2012). The generally agreed lower limit for Cronbach's alpha may decrease to 0.60 in exploratory research (Hair, Black, Babin & Anderson, 2010). In this research, the Cronbach's alpha was higher than 0.6 as shown in table 3 which implies that the questionnaire is reliable. Kaiser-Meyer-Olkin (KMO) used to test the correlation of the variables to determine whether the variables were suitable for factor analysis. According to the results, the value of KMO was 0.877, indicating excellent correlations among these variables. The factor analysis used to examine construct validity of measures. Four factors were requested, based on the fact that the

questions were designed to index four constructs: perceived ease of use (PEOU), perceived usefulness (PU), and attitude toward using (ATU) and intention to use (ITU). All factor loadings were above 0.5, showing good convergent validity as shown in table 4.

Table 3: Cronbach's Alpha

Item	Number of Items	Cronbach's Alpha
Perceived Ease of Use	4	0.803
Perceived Usefulness	7	0.831
Attitudes Toward Usage	5	0.792
Intension To Use	4	0.74
Total	20	0.888

Table 4: Factor Analysis

Item	Factor 1	Factor 2	Factor 3	Factor 4
PEOU1	0.796			
PEOU2	0.833			
PEOU3	0.764			
PEOU4	0.777			
PU1		0.682		
PU2		0.753		
PU3		0.738		
PU4		0.765		
PU5		0.615		
PU6		0.766		
PU7		0.645		
ATU1			0.721	
ATU2			0.787	
ATU3			0.855	
ATU4			0.674	
ATU5			0.663	
ITU1				0.740
ITU2				0.843
ITU3				0.785
ITU4				0.648

*Factor 1: Perceived Ease of Use (PEOU), Factor 2: Perceived Usefulness (PU), Factor 3: Attitude towards Using (ATU), and Factor 4: Behavior Intention to Use (ITU)

In testing the hypotheses, for the external variables the researchers used one way ANOVA with pre-set level of significance is 0.05 followed by Post Hoc tests to examine the differences between the students in their perceived usefulness and perceived ease of use for LMS based on their demographics. As shown in table 5, the hypothesis H1 is supported (sig < 0.05) which means the degree of GPA has a

significant influence on perceived usefulness but the GPA has no statistically influence on perceived ease of use (H2 is rejected) which is normal because the students can get excellent GPA in their faculties and specialization courses without having a good skills in using computer and internet especially in humanities faculties.

Table 5: One way ANOVA: GPA

		Sum of Squares	df	Mean Square	F	Sig.
Perceived usefulness	Between Groups	1031.511	3	343.837	19.035	.000
	Within Groups	4262.885	236	18.063		
	Total	5294.396	239			
Ease of use	Between Groups	57.411	3	19.137	2.188	.090
	Within Groups	2063.772	236	8.745		
	Total	2121.183	239			

By conducting Post Hoc test in table 6 to find out which of the 4 categories of GPA has the most influence on perceived usefulness, the results indicated that excellent GPA has the most impact, followed by very good, good and finally fair which shows positive relationship between GPA and the students' awareness of the benefits.

Table 6: Post Hoc Test: GPA

Dependent Variable	(I) average	(J) average	Mean Difference (I-J)	Std. Error	Sig.
Perceived usefulness	Fair	good	-2.48628*	.86689	.005
		very good	-4.80370*	.89608	.000
		excellent	-7.99516*	1.21895	.000
	Good	fair	2.48628*	.86689	.005
		very good	-2.31742*	.62377	.000
		excellent	-5.50888*	1.03536	.000
	very good	fair	4.80370*	.89608	.000
		good	2.31742*	.62377	.000
		excellent	-3.19146*	1.05992	.003
	excellent	fair	7.99516*	1.21895	.000
		good	5.50888*	1.03536	.000
		very good	3.19146*	1.05992	.003

Regarding the academic year, the level of academic year is influenced on perceived usefulness (H3 is supported) while no statistically influence on perceived ease of use (H4 rejected) as shown in table 7. The Post Hoc test in table8 shows that the students of academic year: first, second, and third better than the students in the forth level and this is normal situation because the Jordanian schools become more interested to use computer and internet in the education in the last few years so using LMS becomes easy for them.

Table 7: One way ANOVA: Academic Year.

		Sum of Squares	df	Mean Square	F	Sig.
Perceived usefulness	Between Groups	206.870	3	68.957	3.199	.024
	Within Groups	5087.526	236	21.557		
	Total	5294.396	239			
Ease of use	Between Groups	24.214	3	8.071	.908	.438
	Within Groups	2096.970	236	8.885		
	Total	2121.183	239			

Table 8: Post Hoc Test: Academic Year.

Dependent Variable	(I) year	(J) year	Mean Difference (I-J)	Std. Error	Sig.
Perceived usefulness	First	second	.53270	.70810	.453
		third	-.95853	.77198	.216
		forth	4.09848*	1.70658	.017
	second	first	-.53270	.70810	.453
		third	-1.49123	.81354	.068
		forth	3.56579*	1.72578	.040
	Third	first	.95853	.77198	.216
		second	1.49123	.81354	.068
		forth	5.05702*	1.75296	.004
	Forth	first	-4.09848*	1.70658	.017
		second	-3.56579*	1.72578	.040
		third	-5.05702*	1.75296	.004

Table 9: One way ANOVA: Faculty.

		Sum of Squares	df	Mean Square	F	Sig.
Perceived usefulness	Between Groups	263.510	2	131.755	6.207	.002
	Within Groups	5030.885	237	21.227		
	Total	5294.396	239			
Ease of use	Between Groups	308.559	2	154.280	20.172	.000
	Within Groups	1812.624	237	7.648		
	Total	2121.183	239			

Table 10: Post Hoc Test: Faculty.

Dependent Variable	(I) faculty	(J) faculty	Mean Difference (I-J)	Std. Error	Sig.
Perceived usefulness	humanities	scientific	-1.43202*	.65093	.029
		medical	-2.89426*	.86694	.001
	scientific	humanities	1.43202*	.65093	.029
		medical	-1.46224	.88845	.101
	medical	humanities	2.89426*	.86694	.001
		scientific	1.46224	.88845	.101
Ease of use	humanities	scientific	-2.26482*	.39072	.000
		medical	-2.30144*	.52038	.000
	scientific	humanities	2.26482*	.39072	.000
		medical	-.03661	.53329	.945
	medical	humanities	2.30144*	.52038	.000
		scientific	.03661	.53329	.945

The faculty has significant influence on both perceived usefulness and perceived ease of use as shown in table

9 (H5 and H6 are supported). Post Hoc Tests are shown in table 10 to specify that medical and scientific faculties has more impact than humanities faculties where the medical and scientific courses, materials and the way of teaching and learning depending on working more on the computer and internet with search engines than humanities faculties which affect positively on both perceived usefulness and perceived ease of use.

For testing the original TAM model, the researchers used a regression analyses and found all the hypotheses are supported as shown in table 11 and table 12.

Table 11: Regression Results for Original TAM model Hypotheses.

Independent Variable	β	SE	T	P	R^2	Dependent Variable
perceived ease of use	0.356	0.096	5.870	0.000	0.126	perceived usefulness
perceived ease of use	0.599	0.065	9.164	0.000	0.261	attitude towards using
perceived usefulness	0.404	0.044	6.811	0.000	0.163	attitude towards using
perceived usefulness	0.331	0.039	5.410	0.000	0.109	behavioral intention to use
attitude towards using	0.654	0.042	13.335	0.000	0.428	behavioral intention to use

Table 12: Summary of Original TAM model Hypotheses Testing

Hypothesis	Relationship Tested	Results
H7	Perceived ease of use positively affects perceived usefulness of an LMS.	Supported
H8	Perceived ease of use positively affects attitude towards using LMS	Supported
H9	Perceived usefulness positively affects attitude towards using LMS.	Supported
H10	Perceived usefulness positively affects behavioral intention to use LMS	Supported
H11	Attitude towards using positively affects behavioral intention to use LMS.	Supported

In linear regression matrix there are five parameters, R2 (the coefficient of the correlation or the relation) which shows the strength and direction of the relationship. P- Value indicates the significant of the relationship, P must always equal or less than 0.05 for the relationship to be significant. Beta, β which is another parameter in linear regression shows the slope and the direction of the relationship, standard error of β indicates the percentage of error that can happen. The smaller the standard error of β the less likely error can happen while t statistics is the coefficient divided by its error.

The results showed that the perceived usefulness has a significant influence (R2 = 0.163, β= 0.404) on the attitudes towards using better than its influence on behavioral intention to use. This may be due to the fact that students are willing to adopt Moodle as learning management system while focusing on its benefits. This research also agrees with other researches to indicate that an attitude towards using is a direct determinant of behavioral intention to use (Liu, Liao & Pratt,2009),(Lee, Cheung & Chen,2005).

5. Conclusion

This study indicated that TAM model can be employed as a useful theoretical base to understand students' intentions to use the learning management system (Moodle) in the University of Jordan. The findings of this study demonstrate some important issues. First, the students of the University of Jordan are highly qualified to use Moodle and have sufficient awareness of benefits of this system. Second, the results revealed that the perceived usefulness and perceived ease of use are factors that directly affect students' acceptance toward using Moodle, noting that the attitudes of students for using Moodle because of the perceived ease of use and not because of the perceived usefulness which invites the decision makers in the university to increase the awareness of the importance and usefulness of Moodle and other ICT tools. Third: type of the faculty is an important factor that affect on perceived ease of use and perceived usefulness which means the decision makers in the University of Jordan must give more attention to the students in humanities faculties to increase their skills in using computer and internet in their courses and increase their awareness about the benefits of the Learning Management Systems.

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