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Investigating Determinants of Faculty and Students' Acceptance of E-Learning Management Systems using UTAUT2

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Various factors can affect faculty and student acceptance of Leaning Management Systems (LMS). To fully understand these factors and the implications they may have on staff and students, an investigation of the UTAUT2 model was conducted as the object of this study. The analysis of this model comprised of 7 predictors: performance expectancy, effort expectancy, social influence, facilitating conditions, learning value, hedonic motivation and habit. An online questionnaire was used to collect responses from 113 faculty members and 184 students from the University of Kufa. Path analysis revealed that social influence, learning value, hedonic motivation and habit affects the faculty's intentions to use LMS, while performance expectancy, facilitating conditions, learning value, hedonic motivation and habit affect student's intentions. Findings of this study reveal a 51% variance in the faculty's intentions and a 52% variance in students' intentions.

Key words: *E-learning, Iraq, Learning Management System, Moodle, UTAUT2.*

Introduction

Information technology has created drastic changes in arguably all aspects of life, particularly within higher education, an industry in which the prevalence of technology to enhance learning processes is rapidly growing. One such element of e-learning is the Learning Management System (LMS), a "web-based technology used for planning, implementing, and assessing the learning process" (Alias and Zainuddin 2005, p. 28).

Technology acceptance is considered a mature research area in the field of information systems (Venkatesh et al. 2003, p. 426), which can be defined as an 'individual's willingness to use technology for the purpose it is designed to support' (Teo, 2011, p. 1). In order for universities to properly reap the benefits of their technological resources, financial investments and efforts in adopting LMS, it is crucial to investigate factors which lead to the acceptance of this technology. Should students or faculty members fail to accept new technologies, or display restrictions in their acceptance and use of elements like LMS, the return on this investment will be vastly reduced.

Matar et al. (2011) investigated LMS within Arab universities in the Middle East and found that low adoption levels of e-learning exist within these settings. As a country battling severe political and military conflicts over the last three decades, it is unsurprising that Iraq was the last country in the Arab region to adopt LMS in higher education (Al-Azawei et al. 2016). The University of Kufa was the first university in Iraq to implement Moodle (Modular Object-Oriented Dynamic Learning Environment) LMS in 2010, but it has since received a significantly low adoption rate from both faculty and students. This study therefore aims to investigate determinants of LMS acceptance by faculty and students within the University of Kufa in Iraq. The research will contribute to technology acceptance research through investigating and validating the UTAUT2 model in a new environment (higher education in Iraq) and will analyse perspectives of both staff and students to provide a comprehensive understanding of LMS acceptance. Previous LMS acceptance studies that used the UTAUT and UTAUT2 as research frameworks will also be reviewed and discussed as a basis for this research. Finally, the study will aim to validate learning value in favour of price value, as recommended by previous research.

Theoretical Background and Previous Studies

Venkatesh et al. (2003) developed the UTAUT (Unified Theory of Acceptance and Use of Technology) through reviewing eight previous theories: Innovation Diffusion Theory (IDT); Theory of Reasoned Action (TRA); Social Cognitive Theory (SCT); Technology Acceptance Model (TAM); Theory of Planned Behaviour (TPB); Model of PC Utilisation (MPCU); Motivational Model (MM), and Combined TAM and TPB (C-TAM-TPB). This comprehensive review resulted in a new unified model which provides a full overview of determinants of technology acceptance (Al Imarah et al. 2013). The model was able to predict 69% of variances in behavioural intention while previous models could only predict between 17% and 53% (Venkatesh et al, 2003).

UTAUT includes four determinants of technology acceptance: 1) performance expectancy, which is the degree of usefulness related to using the system; 2) ease of use; 3) social influence, or the degree of others' influences on an individual's usage behaviours, and 4)

facilitating conditions, which involves organisational and technical support available to facilitate behaviour (Venkatesh et al. 2003).

Venkatesh et al. (2012) developed UTAUT2 specifically to make it capable of predicting determinants of technology acceptance for customers, since the original model was designed purely for an employment context. Achieving an improved 73% variance in behavioural intention, the updated UTAUT2 model included three new determinants of technology acceptance: 1) hedonic motivation, defined as the degree of enjoyment experienced when using the system; 2) price value, or the product's positive or negative value for its cost, and 3) habit, which measures automatic behaviours performed during system use (Venkatesh et al., 2012). Figure 1 below illustrates both UTAUT and UTAUT2 models with three moderating variables of age, gender and experience.

Figure 1. UTAUT and UTAUT2 Models (Venkatesh et al., 2012: 160)

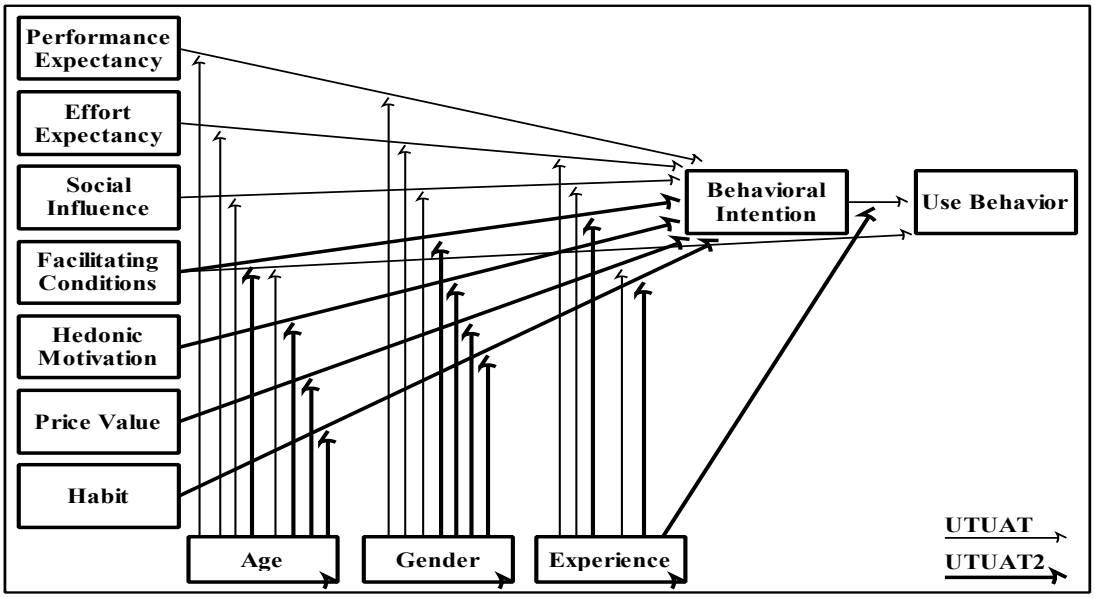


Table 1 below depicts ten previous studies which investigated the acceptance of LMS using UTAUT and UTAUT2. While these studies examined the same type of technology (LMS), each resulted in different determinants of technology acceptance, meaning that determinants may be different according to country, organisational settings and users (faculty or students).

Table 1: Previous Studies

Author and Year	Country	Sample and Number of Participants	UTAUT					UTAUT2							
			PE→BI	EE→BI	SI→BI	FC→UB	BI→UB	PE→BI	HM→BI	PV→BI	LV→BI	HT→BI	HT→UB	BI R^2	UB R^2
Evans, 2013	South Africa	Faculty: 144	◉	◎	◎	◉	◉							%40	%16
		Students: 421	◉	◉	◉	◉	◉							%43	%33
Raman and Don 2013	Malaysia	Preservice Teachers: 288	◉	◉	◉	◉	◉	◉	◉			◎	◎	%35	%29
Abdullateef and Allumi 2014	Malaysia	Students: 137	◎	◎	◉	◎	◉							%51	%29
Nirban and Chasul 2014	India	Students: 71	◉	◎	◉	◎	◉							%57	%33
Ain, et al. 2015	Malaysia	Students: 328	◉	◎	◉	◉	◉	◎	◎		◉	◎	◎		
Dečman 2015	Slovenia	Students:228	◉	◎	◉										
North-Samardzic and Jiang 2015	Australia	Faculty: 89	◎	◉	◉	◎	◉							%36	%10
		Students: 227	◎	◉	◎	◉	◉							%17	%7
Olatubosun et al. 2015	Nigeria	Students: 627	◉	◉	◉	◉	◉							%54	%63
Khan and Adam 2016	Saudi Arabia	Faculty: 310	◉	◉	◉	◎	◉	◎	◉			◎			
Loon et al. 2017	Malaysia	Students: 218	◉	◉	◉		◉	◉	◉						

***Note*:** ◉ Supported, ◎ Not Supported; PE: performance expectancy; EE: effort expectancy; SI: social influence; FC: facilitating conditions; PV: price value; LV: learning value; HM: hedonic motivation; HT: habit: BI: behavioural intention, and UB: usage behaviour.

Research Model and Hypothesis

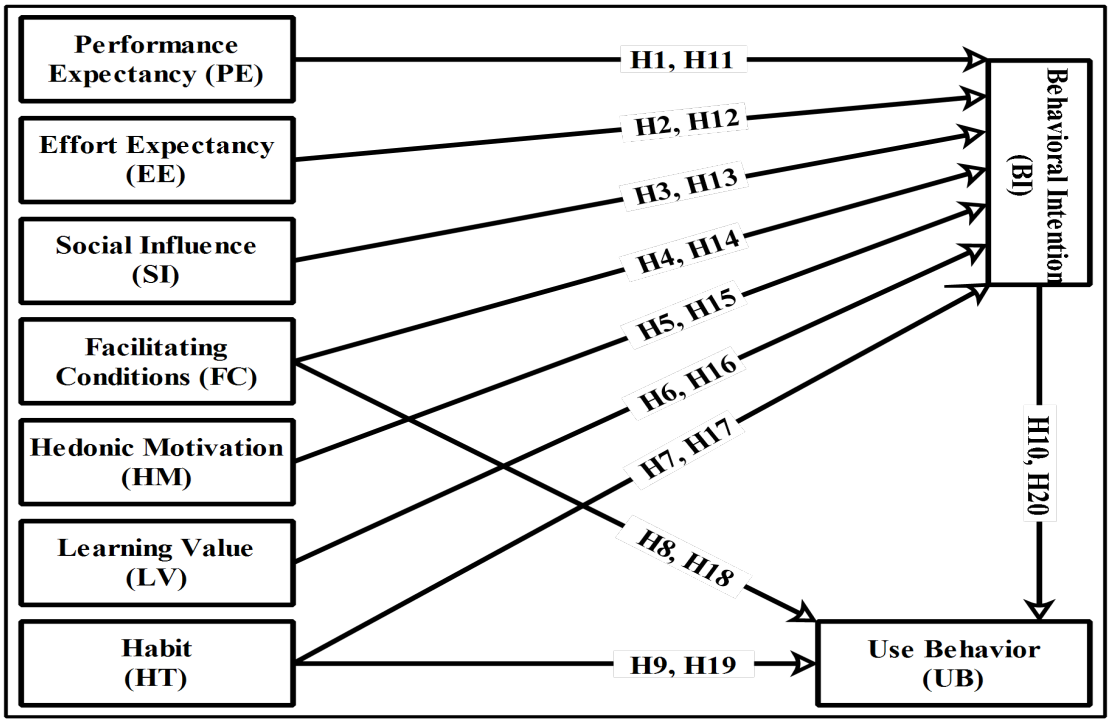
This study uses all original constructs and relationships found in UTAUT2 except for the price value element. As LMS is offered at no extra charge to users, none of the previous studies that adopted UTAUT2 used this price value construct (as evidenced in Table 1 above). Ain et al. (2015) proposed a solution to this issue in replacing price value with learning value, which is defined as the "perceived value of LMS for the spent time and effort". The current study follows this approach and examines the effects of learning value on

both faculty members and students. Table 2 presents hypotheses, which are further illustrated in Figure 2.

Table 2: Hypotheses of the Study

Faculty	Student	Hypotheses
H1 - H7	H11 – H17	Performance Expectancy (PE), Effort Expectancy (EE), Social Influence (SI), Facilitating Conditions (FC), Learning Value (LV), Hedonic Motivation (HM) and Habit (HT) have a significantly positive effect on Behavioural Intention (BI).
H8 – H10	H18 - H20	Facilitating Conditions (FC), Habit (HT) and Behavioural Intention (BI) have a significantly positive effect on Use Behaviour (UB).

Figure 2. Research Model



Methodology

Sampling Design

Study participants comprised of University of Kufa faculty members and undergraduate students who use the Moodle Learning Management System. Due to the limited number of

Moodle users present, a Homogeneous Purposive Sample was implemented. Sample size was determined based on the Partial Least Squares (PLS-SEM) analysis, which requires ten times the largest number of structural paths directed towards a construct (Barclay et al. 1995). As there are seven paths directed to Behavioural Intention (BI), then the required minimum sample size was 70 respondents.

Measurement

Measurement instruments were adapted from those used in previous studies, including performance expectancy; effort expectancy; social influence; facilitating conditions; learning value; hedonic motivation; habit; behavioural intention and usage behaviour (Venkatesh et al. 2012; Ain et al. 2015). The scale used in this study consisted of 27 items (3 items for every construct) measured on 5-point Likert scale.

Data Analysis

Data Collection and Descriptive Analysis

An online questionnaire was conducted using *Limesurvey*, an open source questionnaire tool with advanced features. The questionnaire was sent via email to faculty members and students, and a direct survey link was inserted into the Moodle interface. As depicted in Table 3 below, 113 valid responses were collected from faculty members and 184 valid responses were collected from students.

Table 3: Descriptive Analysis

Faulty Demographics			**Students Demographics**		
Demographics	Frequency	Percentage	Demographics	Frequency	Percentage
Gender			**Gender**		
Female	54	47.8	Female	90	48.9
Male	59	52.2	Male	94	51.1
Age			**Age**		
26-18	1	0.9	26-18	184	100.0
35-27	42	37.2	35-27	0	0
43-36	48	42.5	43-36	0	0
51-44	13	11.5	51-44	0	0
61-52	9	8.0	61-52	0	0
70-62	0	0	70-62	0	0
Title			**Stage**		
Assistant Lecturer	29	25.7	First Stage	21	11.4
Lecturer	53	46.9	Second Stage	64	34.8

Asst. Professor	25	22.1	Third Stage	48	26.1
Professor	6	5.3	Fourth Stage	51	27.7
Experience			**Experience**		
1-6 months	32	28.3	1-6 months	35	19.0
6-12 months	18	15.9	6-12 months	39	21.2
More than a year	63	55.8	More than a year	110	59.8
Total	113	100.0		184	100.0
Constructs					

		PE	EE	SI	FC	LV	HM	HT	TI	IQ	BI	UB
Faculty	Average	4.15	4.23	3.78	3.56	3.94	3.86	3.85	3.5	4.07	3.86	3.66
	Standard Deviation	0.79	0.84	0.96	1.16	0.92	0.92	1.01	1.14	0.92	0.95	1.06
		PES	EES	SIS	FCS	LVS	HMS	HTS	TIS	IQS	BIS	UBS
Students	Average	4.05	3.96	3.68	4.1	3.91	4	3.77	4.07	4.22	4.08	3.75
	Standard Deviation	1.01	0.89	0.94	1.02`	1.05	0.88	1.01	0.93	0.85	0.82	1.04

Partial Least Squares Structural Equation Modelling (PLS-SEM)

A two-step approach is used to conduct PLS-SEM using the SmartPLS version 3.2.7 (Ringle 2015), starting with assessment of the measurement model followed by the structural model. Table 4 shows criterions for these measurement and structural assessments according to Hair et al. 2017.

Table 4: PLS-SEM Criterions (Hair et al. 2017)

Criterion	**Threshold**
Measurement Model Assessment	
Internal Consistency Reliability	Composite reliability ≥ 0.70
Indicator Reliability	Standardized indicator loadings ≥ 0.70
Convergent Validity	Average Variance Extracted (AVE) ≥ 0.50
Discriminant Validity	Heterotrait-Monotrait Ratio (HTMT) < 0.90
Structural Model Assessment	
Collinearity Assessment	Variance Inflation Factor VIF < 5
Significance of Path Coefficients	t Value < 1.96 ; p Value < 0.05
Coefficient of Determination R^2	0.25, 0.50, 0.75 for weak, moderate, strong
Effect Size f^2	0.02, 0.15, 0.35 for weak, moderate, strong
Predictive Relevance	Stone–Geisser's $Q^2 > 0$

Measurement Model Assessment

The measurement model is concerned with assessing the reliability and validity of variables. Table 5 below shows results of Composite Reliability and the average variance extracted (AVE), while Table 6 depicts results of the Heterotrait-Monotrait Ratio (HTMT), which is used to assess discriminant validity.

Table 5: Assessment of Measurement Model

Faulty				**Students**			
Item	**Composite Reliability**	**Loading**	**AVE**	**Item**	**Composite Reliability**	**Loading**	**AVE**
PE1	0.921	0.905	0.765	**PES1**	0.835	0.846	0.647
PE2		0.921		**PES2**		0.892	
PE3		0.847		**PES3**		0.747	
EE1	0.821	0.847	0.543	**EES1**	0.885	0.884	0.737
EE2		0.764		**EES2**		0.932	
EE3		0.743		**EES3**		0.757	
SI1	0.786	0.757	0.578	**SIS1**	0.843	0.857	0.656
SI2		0.843		**SIS2**		0.841	
SI3		0.721		**SIS3**		0.736	
FC1	0.734	0.775	0.554	**FCS1**	0.725	0.747	0.579
FC2		0.785		**FCS2**		0.767	
FC3		0.774		**FCS3**		0.755	
LV1	0.908	0.925	0.764	**LVS1**	0.889	0.778	0.658
LV2		0.865		**LVS2**		0.732	
LV3		0.832		**LVS3**		0.812	
HM1	0.912	0.743	0.735	**HMS1**	0.853	0.757	0.757
HM2		0.912		**HMS2**		0.825	
HM3		0.902		**HMS3**		0.816	
HT1	0.869	0.836	0.624	**HTS1**	0.821	0.814	0.689
HT2		0.741		**HTS2**		0.837	
HT3		0.834		**HTS3**		0.879	
BI1	0.911	0.854	0.743	**BIS1**	0.832	0.737	0.668
BI2		0.905		**BIS2**		0.857	
BI3		0.915		**BIS3**		0.858	
UB1	0.841	0.736	0.594	**UBS1**	0.747	0.748	0.531
UB2		0.748		**UBS2**		0.768	
UB3		0.758		**UBS3**		0.737	

Table 6: Assessment of Discriminant Validity

Faulty									
	BI	EE	FC	HM	HT	LV	PE	SI	UB
BI									
EE	0.424								
FC	0.423	0.723							
HM	0.651	0.421	0.251						
HT	0.702	0.443	0.372	0.751					
LV	0.419	0.541	0.647	0.348	0.481				
PE	0.623	0.320	0.261	0.841	0.773	0.341			
SI	0.761	0.325	0.246	0.847	0.852	0.372	0.786		
UB	0.732	0.431	0.481	0.663	0.727	0.253	0.679	0.668	
Students									
	BIS	EES	FCS	HMS	HTS	LVS	PES	SIS	UBS
BIS									
EES	0.337								
FCS	0.545	0.537							
HMS	0.821	0.431	0.536						
HTS	0.815	0.438	0.337	0.731					
LVS	0.552	0.627	0.448	0.524	0.625				
PES	0.816	0.458	0.531	0.837	0.768	0.536			
SIS	0.826	0.459	0.437	0.825	0.823	0.654	0.864		
UBS	0.727	0.536	0.647	0.789	0.613	0.436	0.642	0.743	

The results in Table 5 show that both faculty and student models have achieved acceptable levels of composite reliability with average variance extracted (AVE). Table 6 reveals that all constructs have achieved acceptable levels of HTMT.

Structural Model Assessment

The structural model assessment involves a number of important practical elements: a) collinearity assessment; b) path coefficients; c) coefficient of determination R^2; d) effect size f^2, and e) predictive relevance Q^2. Table 7 depicts results of this structural model assessment, which is graphically presented in Figure 3.

Table 7: Structural Model Results (Table)

Hypothesis		Path	VIF	Path Coefficient	t Value	Result	Effect size f^2	R^2	R^2_{adj}	Q^2
Faulty	H1	PE→BI	2.24	0.121	1.431	Not Sup.	0.012	0.528	0.514	0.361
	H2	EE→BI	1.37	-0.042	0.648	Not Sup.	0.001			
	H3	SI→BI	1.58	0.154**	2.912	Sup.	0.052			
	H4	FC→BI	1.49	-0.019	0.408	Not Sup.	0.001			
	H5	LV→BI	2.45	0.131	2.082	Sup.	0.021			
	H6	HM→BI	2.31	0.192*	2.084	Sup.	0.038			
	H7	HT→BI	2.17	0.248***	3.749	Sup.	0.081			
	H8	FC→UB	1.87	0.098*	1.982	Sup.	0.014	0.394	0.382	0.241
	H9	HT→UB	1.48	0.257**	3.341	Sup.	0.071			
	H10	BI→UB	1.51	0.324***	4.68	Sup.	0.174			
Students	H11	PES→BIS	2.12	0.174*	2.316	Sup.	0.033	0.586	0.562	0.353
	H12	EES→BIS	1.59	-0.096	1.217	Not Sup.	0.012			
	H13	SIS→BIS	1.22	0.118	1.837	Not Sup.	0.023			
	H14	FCS→BIS	1.59	0.068	1.118	Not Sup.	0.014			
	H15	LVS→BIS	2.77	0.128*	1.995	Sup.	0.022			
	H16	HMS→BIS	2.25	0.165*	2.237	Sup.	0.031			
	H17	HTS→BIS	2.38	0.226**	2.813	Sup.	0.071			
	H18	FCS→UBS	1.28	0.212*	2.412	Sup.	0.051	0.402	0.396	0.205
	H19	HTS→UBS	1.41	0.388***	4.368	Sup.	0.132			
	H20	BIS→UBS	2.11	0.318***	3.426	Sup.	0.164			

Note: Sup: Supported; Not Sup: Not Supported; ***p < 0.001; **p < 0.01; *p < 0.05

Figure 3. Structural Model Results (Graph)

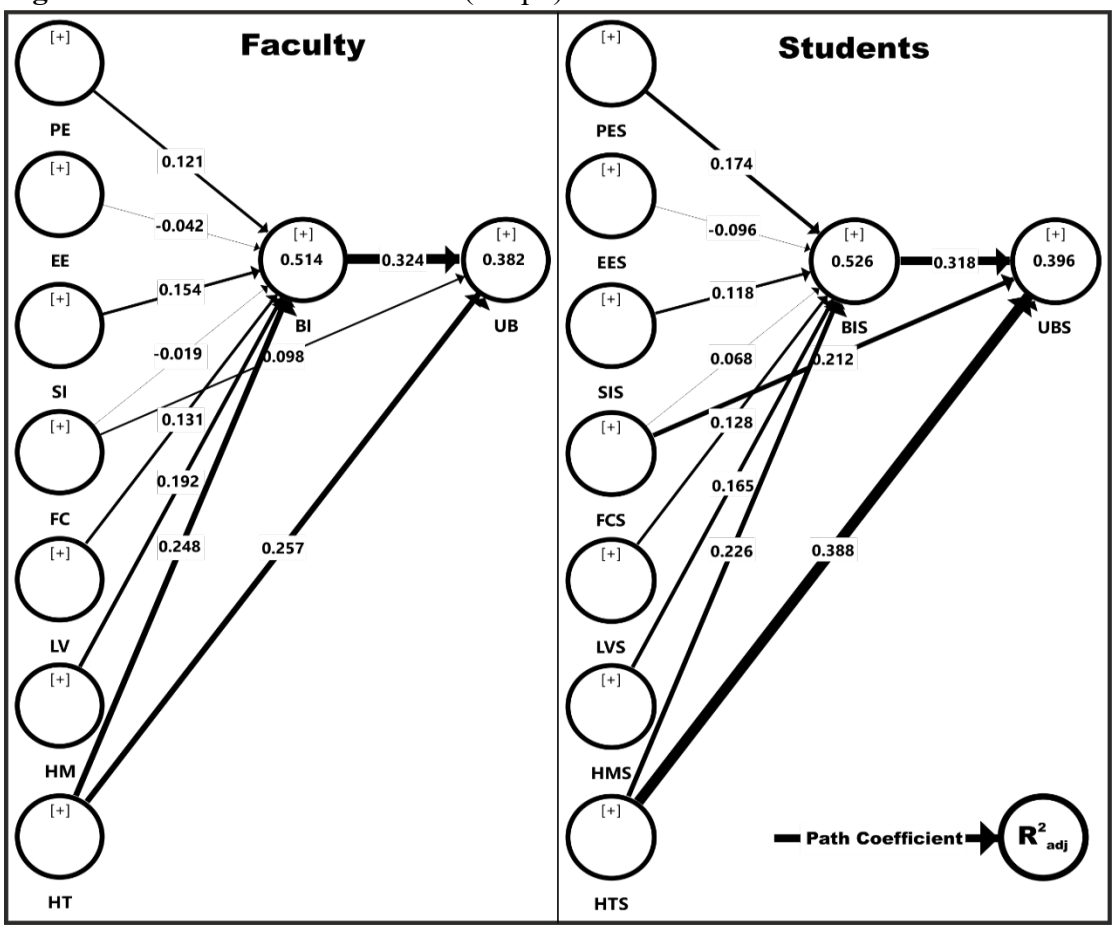


Table 7 shows results of hypothesised relationships for both faculty and students' structural models. The faculty model's four relationships between social influence, hedonic motivation, learning value, habit and behavioural intention were supported, in addition to three relationships between facilitating conditions, habit, behavioural intention and use behaviour. The faculty's model achieved 51% of Adjusted R^2 in behavioural intention and 38% in use behaviour.

The student model's four relationships between performance expectancy, learning value, hedonic motivation, habit, and behavioural intention were also supported, in addition to three relationships between facilitating conditions, habit, behavioural intention and use behaviour. This model was also able to achieve 52% of Adjusted R^2 in behavioural intention and 39% in use behaviour. Stone–Geisser's Q^2 was obtained using the SmartPLS blindfolding technique (see Table 7), in which all values were larger than zero. This finding confirms out-of-sample predictive relevance for both models.

Discussion and Conclusions

Structural assessment results found some similarities and differences between faculty and students. Faculty members' behavioural intention was affected by social influence, meaning that faculty members were more inclined to use Moodle when their peers did. Students were influenced by performance expectancy and were reportedly more likely to use Moodle if and when they found it useful and valid. Both faculty and students' acceptance of Moodle was influenced by facilitating conditions, hedonic motivation and habit, pointing to the important role of technical support and attractive user experience in the adoption of Moodle. Further, habit was found to predict prolonged usage of Moodle; the more a user engaged with the tool, the more he or she would accept it as part of a daily routine.

Learning value was added to the model as a replacement of price value. A significant relationship between learning value and behavioural intention was found among both faculty and students, which is consistent with Ain, et al.'s findings (2015).

Both faculty and students' models achieved 52% of adjusted R^2 in behavioural intention, which elicits a number of important observations. Firstly, the UTAUT2 predictive capability is identical across different types of users (faculty and students). Secondly, the current study is still behind the potential capability of UTAUT2 R^2 73% (Venkatesh et al. 2012). Finally, R^2 values of this study are consistent with the highest R^2 values from previous studies (see Table 1).

Limitations and Further Research

This study aimed to comprehensively understand user acceptance of LMS from both faculty and student perspectives. While results do show interesting and valuable information, this data cannot yet be generalised to apply to other organisations due to its limited sampling. Moderating variables of age, gender and experience in the UTAUT2 model were not considered in this study due to this limited sample size, although further studies could explore potential effects of these variables using advanced techniques such as multi-group analysis.

Hedonic motivation and habit also require further investigation, in which researchers could study gamification as an option for creating more enjoyable and habitual experiences in the Moodle app and the effects these may have on LMS acceptance. Finally, future research should investigate post-acceptance behaviours to adequately measure and moderate long-term behaviours surrounding LMS practices.

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REFERENCES

1. Abdullateef, A. O., Allumi, N. (2014) A. Determinants of Moodle 1.9 Online Learning-Zone Services Adoption.
2. Ain, N., Kaur, K., Waheed, M. (2015). The influence of learning value on learning management system use An extension of UTAUT2. Information Development, 0266666915597546.
3. Al Imarah, A., Zwain, A., Al-Hakim, L. (2013). The Adoption of e-government services in the Iraqi higher education context: An application of the UTAUT model in the University of Kufa. Journal of Information Engineering and Applications, 3(10), 77-84.
4. Al-Azawei, A., Parslow, P., Lundqvist, K. (2016). Barriers and Opportunities of E-Learning Implementation in Iraq: A Case of Public Universities. The International Review of Research in Open and Distributed Learning, 17(5).
5. Al-Busaidi, K. A., Al-Shihi, H. (2012). Critical factors influencing instructors' acceptance and use of learning management systems. In *Higher education institutions and learning management systems: Adoption and standardization*(pp. 116-140). IGI Global.
6. Alias, N. A., Zainuddin, A. M. (2005). Innovation for better teaching and learning: Adopting the learning management system. *Malaysian online journal of instructional technology*, *2*(2), 27-40.
7. Barclay, D. W.,H iggins, C. A., Thompson, R. (1995). The partial least squares approach to causal modeling: P ersonal computer adoption and use as illustration. Technology Studies, 2, 285-309.
8. Dečman, M. (2015). Modeling the acceptance of e-learning in mandatory environments of higher education: The influence of previous education and gender. *Computers in human behavior*, *49*, 272-281.
9. DeLone, W. H., McLean, E. R. (1992). Information systems success: The quest for the dependent variable. Information systems research, 3(1), 60-95.
10. Evans, N. D. (2013). Predicting user acceptance of electronic learning at the University of Zululand (Doctoral dissertation, University of Zululand).
11. Hair, J., Hair, J., Hollingsworth, C. L., Hollingsworth, C. L., Randolph, A. B., Randolph, A. B., Chong, A. Y. L. (2017). An updated and expanded assessment of PLS-SEM in information systems research. *Industrial Management & Data Systems*, *117*(3), 442-458.
12. Khan, R., Adams, C. (2016). Adoption of Learning Management Systems in Saudi Higher Education Context: Study at King Fahd University of Petroleum and Minerals &

Dammam Community College. In Society for Information Technology & Teacher Education International Conference (Vol. 2016, No. 1, pp. 2909-2916).
13. Loon, L. K., Mun, C. C., Kang, T. Y., Rui, S. C. S., Ping, L. W., Tung, M. C. V. (2017). Factors Affecting Students' Acceptance of SMART2 Learning Management System. Handbook of Research on Leveraging Consumer Psychology for Effective Customer Engagement, 154.
14. Matar, N., Hunaiti, Z., Halling, S., Matar, Š. (2011). E-learning acceptance and challenges in the Arab region.
15. Ngafeeson, M. N., Sun, J. (2015). The Effects of Technology Innovativeness and System Exposure on Student Acceptance of E-textbooks. Journal of Information Technology Education: Research, 14.
16. Nirban, V. S. (2014, December). Learning management system acceptance behaviour of students in higher education. In MOOC, Innovation and Technology in Education (MITE), 2014 IEEE International Conference on (pp. 108-111). IEEE.
17. North-Samardzic, A., Jiang, B. (2015, January). Acceptance and Use of Moodle by Students and Academics. In AMCIS 2015: Blue Ocean IS Research: Proceedings of the Americas Conference on Information Systems 2015 (pp. 1-13). Association for Information Systems.
18. Olatubosun, O., Olusoga, F. A., Samuel, O. A. (2015) Adoption of eLearning Technology in Nigerian Tertiary Institution of Learning.
19. Raman, A., Don, Y. (2013). Preservice teachers' acceptance of learning management software: An Application of the UTAUT2 Model. International Education Studies, 6(7), 157.
20. Ringle, C. M., Wende, S., Becker, J.-M. 2015. "SmartPLS 3." Boenningstedt: SmartPLS GmbH, http://www.smartpls.com.
21. Roca, J. C., Chiu, C. M., Martínez, F. J. (2006). Understanding e-learning continuance intention: An extension of the Technology Acceptance Model. *International Journal of human-computer studies*, *64*(8), 683-696.
22. Sharma, S. K., Gaur, A., Saddikuti, V., Rastogi, A. (2017). Structural equation model (SEM)-neural network (NN) model for predicting quality determinants of e-learning management systems. *Behaviour & Information Technology*, *36*(10), 1053-1066.
23. Teo, T. (2011). Technology acceptance in education: research and issues. Rotterdam: SensePublishers.
24. Venkatesh, V., Morris, M. G., Davis, G. B., Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. MIS quarterly, 425-478.
25. Venkatesh, V., Thong, J. Y., Xu, X. (2012). Consumer acceptance and use of information technology: extending the unified theory of acceptance and use of technology. MIS quarterly, 36(1), 157-178.