

The moderating effect of gender differences on Learning Management System acceptance: a multi-group analysis

L'effetto moderatore delle differenze di genere sull'accettazione dei Learning Management System: un'analisi multi-gruppo

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ABSTRACT Previous literature shows a concern in the education sector regarding the influence of gender differences on users' attitudes towards learning technologies. The present research aims to extend the Technology Acceptance Model (TAM) in the e-learning context and investigate the effect of gender on technology adoption in a Middle Eastern country. A total of 302 Computer Science undergraduate students at a public university in Iraq took part in the study. In addition to TAM's variables, perceived satisfaction and e-learning self-efficacy were integrated into the proposed model as direct predictors of behavioral intention towards acceptance of Learning Management Systems (LMSs). Gender divide, on the other hand, was included as a moderator of the relationship between the model constructs. The proposed framework explains substantial variance in behavioral intention (53.1%). Gender differences, however, had only a slight moderating effect on the relationship between e-learning self-efficacy and LMS acceptance. Self-efficacy had a stronger impact on the intention to use LMSs among men than among women. The potential implications of the present research are discussed further.

KEYWORDS Technology Acceptance Model (TAM); Gender Divide; Learning Management System (LMSs) Acceptance; Middle East.

SOMMARIO Nel settore educativo, l'influenza delle differenze di genere sull'atteggiamento degli utenti nei confronti delle tecnologie di apprendimento risulta essere motivo di preoccupazione nella letteratura esistente. La presente ricerca si propone di estendere il Technology Acceptance Model (TAM) nel contesto dell'e-learning e di indagare l'influenza del genere sull'adozione della tecnologia in un paese del Medio Oriente. Allo studio hanno preso parte 302 studenti universitari di informatica in una università pubblica in Iraq. Oltre alle variabili del TAM, nel modello proposto sono state integrate la soddisfazione percepita e l'autoefficacia dell'e-learning come fattori predittivi diretti dell'intenzione comportamentale

verso l'accettazione dei Learning Management System (LMS). Inoltre, il divario di genere è stato incluso come fattore equilibrante della relazione tra i costrutti del modello. Il framework proposto spiega una buona varianza dell'intenzione comportamentale (53,1%). Le differenze di genere, tuttavia, hanno avuto solo un lieve effetto moderatore sul rapporto tra autoefficacia dell'e-learning e accettazione degli LMS. L'autoefficacia ha avuto un impatto maggiore sull'intenzione di usare gli LMS tra gli uomini che tra le donne. Vengono inoltre discusse le potenziali implicazioni della ricerca.

PAROLE CHIAVE Technology Acceptance Model (TAM); Differenze di Genere; Accettazione dei Learning Management System (LMSs); Medio Oriente.

1. INTRODUCTION

The rapid growth of information and communication technologies (ICTs) has affected all life sectors. However, the influence of ICTs may be more strongly felt in the educational domain than in other aspects of life (Mikre, 2011). In contemporary education, ICTs play a key role in supporting content comprehension and enhancing learners' motivation. Accordingly, educational institutions invest heavily in implementing educational technologies successfully in their teaching and learning practice. The dominant technology in such institutions is Learning Management Systems (LMSs). This technology is defined as “*the infrastructure that delivers and manages instructional content, identifies and assesses individual and organizational learning or training goals, tracks the progress towards meeting those goals, and collects and presents data for supervising the learning process*” (Watson & Watson, 2007, p. 28). LMSs provide many advantages for both teachers and learners such as uploading learning contents, minimising the restrictions of time and place, reducing learning costs, monitoring learners' activities and interacting with instructors and other peers out of normal working hours (Al-Azawei, Parslow, & Lundqvist, 2016). However, the effective adoption and successful implementation of such technologies are still the subject of researchers' investigations (Emelyanova & Voronina, 2014).

Based on the above, many models have been proposed in information systems research to investigate technology adoption. These models include, but are not limited to, the Theory of Reasoned Action (Ajzen & Fishbein, 1980), the Theory of Planned Behaviour (Ajzen, 1985), the Technology Acceptance Model (Davis, Bagozzi, & Warshaw, 1989) and the Unified Theory of Acceptance and Use of Technology (Venkatesh, Morris, Davis, & Davis, 2003). The Technology Acceptance Model (TAM), however, still represents one of the most accepted and frequently cited theories due to its strong theoretical basis, parsimony and ease of evaluation (Al-Azawei, 2017; Bagozzi, 2007; Tarhini, Hassouna, & Abbasi, 2015). Nevertheless, TAM does not account for users' differences (Bagozzi, 2007). Hence, the previous literature has attempted to tackle this issue, considering several individual differences (Venkatesh et al., 2003; Tarhini, Hone, & Liu, 2014a; Al-Azawei, Parslow, & Lundqvist, 2017; Gefen & Straub, 1997; Tarhini et al., 2014a).

Even though the previous literature has examined the impact of gender on the acceptance of educational technologies, the findings have been inconsistent, reporting either a significant difference (Gefen & Straub, 1997; Ong & Lai, 2006; Wong, Teo, & Russo, 2012) or the contrary (Compton, Burkett, & Burkett, 2003). Moreover, Ameen and Willis (2018, p.1) concluded that “the role of gender cannot be neglected when studying technology adoption and use”. This should encourage further research, particularly in under-represented contexts such as Iraq. Furthermore, Cai, Fan and Du (2017) point out that many variables such as time of the technology use, culture and region can all affect the possible influence of gender differences on users' beliefs and attitudes towards a technology. Accordingly, the key aim of the present research is to bridge this research gap in the Iraqi higher education context. The significance of this study is in provid-

ing outcomes that may help in addressing the gender gap in developing countries. Accordingly, this study sought to answer two questions:

- 1) Can the extended TAM effectively predict learners' perceptions towards LMS adoption?
- 2) Do gender differences have a moderating effect on the relationship between the proposed research model constructs?

2. THEORETICAL BACKGROUND

It is logical to assume that e-learning technology originally developed in the West would tend to reflect Western beliefs, attitudes and values. Therefore, the overwhelming majority of the literature on its acceptance has investigated users' beliefs and perceptions in developed countries (Abbad, Morris, & de Nahlik, 2009). The overall landscape of the developed world, however, does not resemble the Arab world in terms of culture and users' characteristics. This means that such differences should be considered when endeavouring to understand the factors affecting e-learning acceptance.

2.1. E-learning acceptance in the Arab world

In this section, some of the available literature on e-learning acceptance in Arab nations is reviewed. It is classified into two groups: (1) studies using an original theory without any extension, and (2) studies considering individual/cultural differences in the extension process.

Pertaining to the first group listed above, many studies have used a range of technology acceptance theories to test e-learning adoption in the Arab context (Al-Adwan, Adwan, & Smedley, 2013; Al-Gahtani, 2016; Al-Suqri, 2014; Tarhini et al., 2015).

Aside from the above, the effect of individual and cultural differences on e-learning adoption has been considered by many studies across the Arab world (Alshare, Mesak, Grandon, & Badri, 2011; Tarhini et al., 2014a; Tarhini, Hone, Xiaohui, & Tarhini, 2017). Table 1 summarises some of the literature that has integrated individual differences with the models of e-learning adoption.

Study	Country	Model	Extended		Learner differences
			Yes	No	
Al-Ammari & Ahmad (2008)	Bahrain	TAM	X		X
Alshare, Mesak, Grandon, & Badri (2011)	UAE, USA,	TAM	X		X
Al-Adwan, Adwan, & Smedley (2013)	Jordan	TAM		X	
Al-Suqri (2014)	Oman	UTAUT		X	
Tarhini, Hone, & Liu (2014a)	Lebanon	TAM	X		X
Al-Gahtani (2016)	Saudi Arabia	TAM3		X	
Tarhini, Hone, Xiaohui, & Tarhini (2017)	Lebanon	TAM	X		X

Table 1. Summary of the literature on e-learning acceptance in the Arab world.

2.2. Gender equality in Iraq

Although women in Iraq account for more than half of the overall population (57%), gender inequality is high and discriminatory practices may indicate that there is no sign of change in the near future (Kaya, 2017). Iraq faces many issues such as economic deficit, political conflicts and repression, which all led to deterioration in women's lives. Iraqi women still suffer from inequality, including a lack of access to education, health care and the labour market. According to a United Nations report, "*These conditions are often exacerbated by misconceptions of traditions, cultural and social values, false perceptions, and a lack of awareness of women's rights and potential, as well as institutional and legal barriers*" (UN Iraq, 2013). The importance of studying the gender gap in Iraq is that cultural and social barriers are still restricting

women's behaviour in comparison to the West (Ameen & Willis, 2018). For young women, there is a significant restriction on mobility and/or public interaction (Kaya, 2017; Yaseen, 2013). The ratio of female to male students is different for primary and secondary schools in Iraq, where it is 0.94 and 0.85 respectively (UN Iraq, 2013). Moreover, about 28.2% of females aged 12 years and over are illiterate, which is more than double the rate for men (13%). This percentage significantly increases for women aged between 15 and 24 years old, whose illiteracy rate is 33.6% (UN Iraq, 2013). These statistics clearly identify an inequality in the educational sector among men and women in Iraq.

Women in Iraq are failing to obtain equal educational opportunities due to unacceptance of their families as well as early marriage (UN Iraq, 2013). As such, it might be inferred that Iraqi women have stronger motivation to adopt e-learning technologies than men due to the above discussed restrictions. Furthermore, learning technologies provide specific types of users with further flexibility for presenting their knowledge since there is no direct (face-to-face) interaction.

3. THE PROPOSED RESEARCH MODEL

The proposed research framework is grounded on three studies: the Technology Acceptance Model (TAM) (Davis, 1986), Social Cognitive Theory (SCT) (Bandura, 1991), and Satisfaction Theory (Weng, Tsai, & Weng, 2015). Gender divide, on the other hand, is suggested to have a moderating influence on the relationship between the model's variables.

3.1. *The Technology Acceptance Model*

This model is grounded on the Theory of Reasoned Action (TRA) (Ajzen & Fishbein, 1980). However, TAM modifies TRA by assuming a direct link between perceived technology usefulness (PU) and behavioural intention. TAM also integrates a new construct, called perceived ease of use (PEOU). PU refers to the expectation that the use of technology can enhance task outcomes (learning, in the present research). PEOU refers to the expected mental effort required to use the technology. Moreover, attitudes towards use (ATU) takes into consideration users' feelings as to whether they should enact the behaviour 'in question' or not. Finally, intention towards use (ITU) evaluates whether users intend to enact a particular behaviour or not (Ajzen & Fishbein, 1980). According to Lim (2018, p. 8), «*TAM can be appropriately and relevantly applied in theoretical and practical behavioural modelling endeavours in contemporary technology-mediated environments characterized with evolving socioeconomic changes and continued technological proliferation*». Therefore, TAM has been frequently evaluated and supported in the e-learning context (Šumak, Heričko, & Pušnik, 2011; Tarhini et al., 2015). Based on TAM, the present research proposes that:

- H1:** Perceived ease of use (PEOU) has a significant influence on perceived usefulness (PU) of LMSs.
- H2:** Perceived usefulness (PU) has a significant influence on attitudes towards use (ATU) of LMSs.
- H3:** Perceived ease of use (PEOU) has a significant influence on attitudes towards use (ATU) of LMSs.
- H4:** Perceived usefulness (PU) has a significant influence on intention to use (ITU) LMSs.
- H5:** Perceived ease of use (PEOU) has a significant influence on intention to use (ITU) LMSs.
- H6:** Attitudes towards use (ATU) has a significant influence on intention to use (ITU) LMSs.

Figure 1 depicts the proposed model.

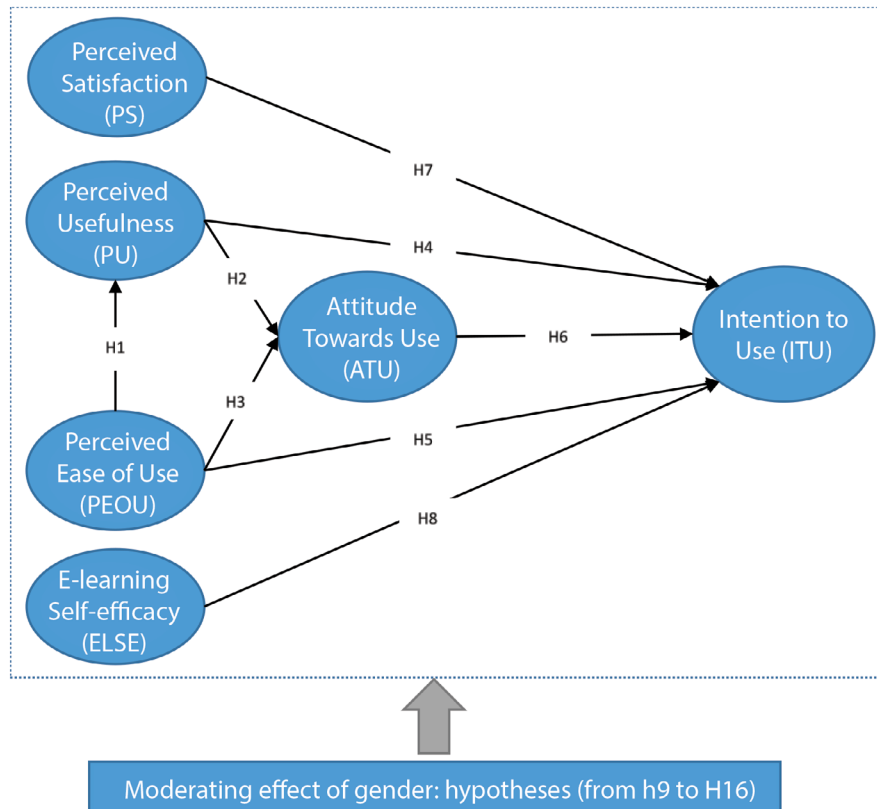


Figure 1. The research framework.

3.2. Perceived Satisfaction Theory

To investigate users' acceptance of e-learning, C. Weng, Tsai, and A. Weng (2015) built a research model based on social support and satisfaction theories. Perceived satisfaction (PS) refers to «*the feeling of contentment or disappointment driven from comparing the perceived outcome in relation to expectations*» (Weng et al., 2015, p. 182). Although satisfaction theory was first introduced to understand consumer behaviour and the willingness to continue purchasing products (Anderson & Sullivan, 1993), it also plays a significant role in education. Weng et al. (2015) point out that learner satisfaction in the e-learning context could positively influence willingness to continue using a learning technology. As such, this research hypothesises that:

H7: Perceived satisfaction (PS) has a significant influence on intention to use (ITU) LMSs.

3.3. Social Cognitive Theory

Social Cognitive Theory (SCT) proposed by Bandura (1986) represents one of the most frequently used and widely accepted models in the quest to understand how human behaviour and identity can be changed. Wood and Bandura (1989) point out that human behaviour can be influenced by cognitive and environmental variables. The former includes personal cognition and biological events, whereas the latter covers both social and physical contexts. This theory assumes that perceived usefulness and self-efficacy are factors that influence behaviour. Self-efficacy is defined as «*One's judgments and beliefs of his/her confidence and capability to perform a specific behavior [behaviour] - recognizing that our performance expectations of a behavior [behaviour] will be meaningless if we doubt our capability to successfully execute the behavior*

[behaviour] in the first place» (Wu, Tennyson, & Hsia, 2010, p. 156).

People's beliefs in their self-efficacy can also affect «*the choices they make, their aspirations, how much effort they mobilize in a given endeavour, how long they persevere in the face of difficulties and setbacks*» (Bandura, 1991, p. 257). Weng et al. (2015) assume that self-efficacy can be a direct predictor of behavioural intention. The present research also proposes that:

H8: e-learning self-efficacy (ELSE) has a significant influence on intention to use (ITU) LMSs.

3.4. Gender and technology acceptance

According to a recent review conducted by Cai et al. (2017), even with the great technological revolution of the last two decades, attitudes towards technology still differ substantially in terms of gender. In agreement with this conclusion, Wong, Teo, and Russo (2012) point out that «*the debate over the gender gap that started in the 1980s still persists in the new millennium*» (p. 1194). Accordingly, the potential impact of gender on technology adoption has been considered in technology acceptance theories such as the Technology Acceptance Model 2 (Venkatesh & Davis, 2000) and the Unified Theory of Acceptance and Use of Technology (Venkatesh et al., 2003).

Gefen and Straub (1997) demonstrated that male and female users have different cognitive structures in their decision-making process, while Wong et al. (2012) found that gender was a moderator for the relationship between self-efficacy and, respectively, perceived ease of use, perceived usefulness and attitudes towards technology use. Gefen and Straub (1997) also mentioned that gender was a significant variable in technology acceptance. Another study conducted by Venkatesh, Morris, Davis, and Davis (2003) found that TAM's explanatory power can be significantly improved by incorporating gender as a moderator, given that perceived usefulness was more significant in men's acceptance of a technology, whereas women cared more about technology's ease of use.

In the e-learning context, Wang, Wu, and Wang (2009) indicated that «*there is evidence to support the notion that men are more likely to display autonomous personality traits than women*» (p. 101). Accordingly, they suggest that LMS self-efficacy will have a stronger effect on behavioural intention for men than for women. Although their analysis did support the notion that gender differences moderate the relationship between learning self-management and the use of mobile computing technology, this was stronger for female than for male users. Furthermore, their results failed to identify a significant impact of gender divide on the association between perceived ease of use and usefulness towards behavioural intention. Hilao and Wichadee (2017) found that differences between male and female learners' attitudes towards mobile learning are insignificant. Thus, the following hypotheses are suggested here:

H9: The effect of perceived satisfaction on behavioural intention towards LMS use does not differ significantly for men and women.

H10: The effect of perceived ease of use on perceived usefulness is stronger for women than for men.

H11: The effect of perceived ease of use on attitude towards LMS use is stronger for women than for men.

H12: The effect of perceived ease of use on behavioural intention towards LMS use is stronger for women than for men.

H13: The effect of perceived usefulness on attitude towards LMS use is stronger for men than for women.

H14: The effect of perceived usefulness on behavioural intention towards LMS use is stronger for men than for women.

H15: The effect of e-learning self-efficacy on behavioural intention towards LMS use is stronger for men than for women.

H16: The effect of attitude toward computer use on behavioural intention towards LMS is stronger for men than for women.

4. THE RESEARCH DESIGN

Due to the scarcity of research focusing on the effect of gender differences on e-learning adoption in the Iraqi higher education context, this study attempts to:

- 1) bridge this research gap in public-sector Iraqi universities;
- 2) identify the main predictors of LMS acceptance in the investigated context;
- 3) extend the available literature and compare findings.

The convenience sampling technique was adopted to recruit the research subjects. This approach was used because LMS uptake in Computer Science is an exception as the educator/researchers have an interest in implementing digital technologies. Thus, there would be a bias in the findings if the perspectives of students who had not effectively used the technology were considered. Overall, 302 undergraduate students from a public-sector university from two academic years (2015-2016 and 2016-2017) participated in this study on a voluntary basis. Of the 302 participants, the gender split was 136 (45.03%) male and 166 (54.96 %) female. The age range of most participants was between 18 and 23 years old (N=290, 96.02%).

All participants used a web-based learning system, Moodle, in different course modules as a learning tool supporting traditional classroom activities. The data were collected via a self-reported research questionnaire. This consisted of 17 questions to measure the constructs of the research model. The participants were asked to choose a response from 1 (strongly disagree) to 7 (strongly agree) that best described their perceptions and attitudes towards the use of LMSs. To ensure that the measurement is valid, all the items integrated were drawn from prior research related to information system acceptance and e-learning adoption (Chiu, Hsu, Sun, Lin, & Sun, 2005; Teo, 2009; Venkatesh & Davis, 2000; Wu et al., 2010). Appendix A shows the questionnaire items.

This research used Statistical Package for Social Science (SPSS) version 24 for Windows 10 to process the descriptive statistics and differences between groups. On the other hand, SmartPLS software version 3.3 for Windows 10 was used to evaluate the psychometric properties of the research questionnaire, investigate the proposed model, and conduct the multi-group analysis (MGA) to assess the effect of gender divide.

5. RESULTS

5.1. *Descriptive statistics and instrument validation*

Table 2 shows that the mean scores of all variables are higher than the midpoint of the scale (midpoint=3.5). Moreover, it is clear that the research data are normally distributed because values of skewness (Std. Error=0.140) and kurtosis (Std. Error=0.280) are all between +3 and -3, based on the threshold values proposed by Peat and Barton (2005). The values of variance inflation factor (VIF) are all less than 10, confirming that the multicollinearity assumption is not violated. This could happen if two variables are strongly associated (Pallant, 2013).

Factor	Mean	Std. Deviation	Skewness	Kurtosis	VIF
ITU	5.5232	1.17961	-1.644	3.070	-
PU	5.1843	1.28147	-1.002	0.835	2.094
PEOU	5.3005	1.14507	-1.145	1.430	1.907
ELSE	5.1115	1.26445	-0.973	0.549	1.420
PS	5.3278	1.22255	-1.433	2.156	2.325
ATU	5.5430	1.16488	-1.336	1.933	1.752

Table 2. Descriptive statistics.

The research survey was evaluated with respect to item loadings (≥ 0.7), consistent reliability (≥ 0.7 or 0.6), average variance extracted (AVE) (≥ 0.5) and composite reliability (CR) (≥ 0.7) (Hair, Black, Babin, Anderson, & Tatham, 2006; Pallant, 2013).

Tables 3 and 4 clearly reveal that all values in the research measurement meet the minimum acceptable standard levels, confirming its overall psychometric properties. It is worth mentioning that we assessed the research measurement for the whole model (Table 3) and then for the two sub-models based on gender (Table 4).

Latent factor	AVE (>0.5)	CR (>0.7)	Cronbach's α	Discriminant validity						
				ATU	ELSE	ITU	PEOU	PS	PU	
ATU	0.796	0.886	0.744	0.892						
ELSE	0.707	0.879	0.795	0.331	0.841					
ITU	0.848	0.918	0.820	0.454	0.411	0.921				
PEOU	0.606	0.859	0.784	0.415	0.528	0.576	0.778			
PS	0.799	0.923	0.874	0.554	0.384	0.625	0.592	0.894		
PU	0.725	0.888	0.811	0.536	0.354	0.655	0.536	0.683	0.851	

Table 3. Convergent and discriminant validity of the whole sample.

Latent factor	AVE (>0.5)	CR (>0.7)	Cronbach's α	Discriminant validity						
				ATU	ELSE	ITU	PEOU	PS	PU	
Male group (N=136)										
ATU	0.803	0.891	0.755	0.896						
ELSE	0.721	0.886	0.807	0.375	0.849					
ITU	0.853	0.921	0.828	0.451	0.567	0.924				
PEOU	0.609	0.861	0.788	0.420	0.632	0.574	0.780			
PS	0.837	0.939	0.903	0.522	0.437	0.595	0.535	0.915		
PU	0.714	0.882	0.803	0.610	0.349	0.606	0.500	0.657	0.845	
Female group (N=166)										
ATU	0.787	0.881	0.732	0.887						
ELSE	0.689	0.869	0.781	0.323	0.830					
ITU	0.843	0.915	0.814	0.467	0.285	0.918				
PEOU	0.604	0.857	0.779	0.423	0.446	0.576	0.777			
PS	0.761	0.905	0.843	0.592	0.343	0.657	0.647	0.872		
PU	0.732	0.732	0.817	0.491	0.351	0.699	0.563	0.709	0.855	

Table 4. Convergent and discriminant validity of the two groups (male and female).

5.2. Testing the proposed research model

Table 5 and Figure 2 show the findings of the PLS-SEM technique. H1 was confirmed since PEOU was a significant predictor of PU ($\beta_{PEOU \rightarrow PU} = 0.536$, $P < 0.001$). Additionally, both PU ($\beta_{PU \rightarrow ATU} = 0.440$, $P < 0.001$) and PEOU ($\beta_{PEOU \rightarrow ATU} = 0.180$, $P = 0.012$) had a direct and significant influence on ATU to support H2 and H3. Finally, the model showed that PU ($\beta_{PU \rightarrow ITU} = 0.352$, $P < 0.001$), PEOU ($\beta_{PEOU \rightarrow ITU} = 0.201$, $P = 0.005$) and PS ($\beta_{PS \rightarrow ITU} = 0.212$, $P = 0.025$) were significant determinants of ITU, explaining 53.1% of its variance, supporting H4, H5 and H7. On the other hand, ATU and ELSE were insignificant predictors of ITU, rejecting H6 and H8.

Hypothesis	Standardised Estimate					Finding
	Direct effect	t-value	P-value	Indirect effect	Total effect	
H1: PEOU → PU	0.536	9.601	<0.001		0.536	Supported
H2: PU → ATU	0.440	7.632	<0.001		0.440	Supported
H3: PEOU → ATU	0.180	2.531	0.012	0.236	0.415	Supported
H4: PU → ITU	0.352	4.616	<0.001	0.016	0.368	Supported
H5: PEOU → ITU	0.201	2.799	0.005	0.204	0.404	Supported
H6: ATU → ITU	0.036	0.544	0.587		0.544	Rejected
H7: PS → ITU	0.212	2.254	0.025		0.212	Supported
H8: ELSE → ITU	0.088	1.809	0.071		1.809	Rejected

Table 5. Findings of the research hypothesis.

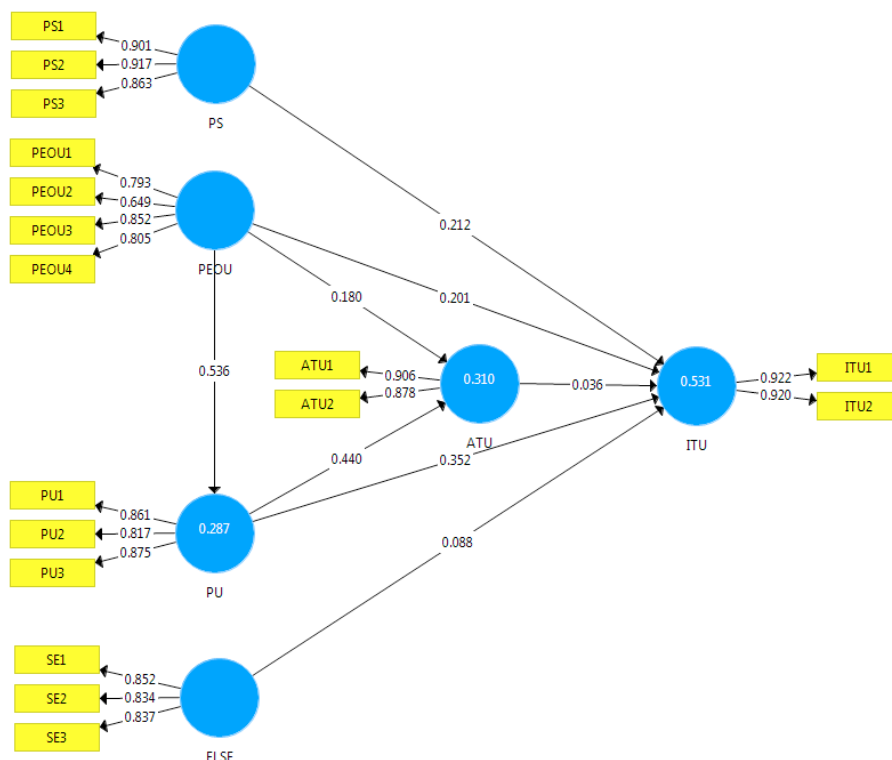


Figure 2. The research model findings.

5.3. Testing the moderating effect of gender

Table 6 illustrates the path strength between the model factors based on MGA. It shows that gender is an insignificant moderator for the relationship between the research model variables, except for the association between LMS self-efficacy and behavioural intention, rejecting the proposed hypotheses.

Table 7 depicts the main findings regarding the influence of gender on the path strength between the research variables. The effect of ELSE on behavioural intention towards LMS use is stronger for men than for women (the difference between groups=0.336, $P < 0.001$). Figure 3 and Figure 4 illustrate the models for males and females respectively.

Path	Male (N=136)	R2	Female (N=166)	R2	Path coefficient difference	P value
	β		β			
PEOU→PU	0.500***	0.250	0.563***	0.317	0.063	0.714
PU→ITU	0.316**		0.427***		0.111	0.769
PEOU→ITU	0.131 ^{NS}		0.195*		0.063	0.680
ATU→ITU	-0.007 ^{NS}		0.069 ^{NS}		0.076	0.719
PS→ITU	0.193 ^{NS}		0.203 ^{NS}		0.010	0.525
ELSE→ITU	0.292***	0.545	-0.044^{NS}	0.564	0.336	<0.001
PU→ATU	0.533***		0.370***		0.164	0.064
PEOU→ATU	0.154 ^{NS}	0.390	0.215*	0.273	0.061	0.665

*Significant at 0.05, **Significant at 0.01. ***Significant at 0.001, NS: Not Significant.

Table 6. The moderating effect of gender differences.

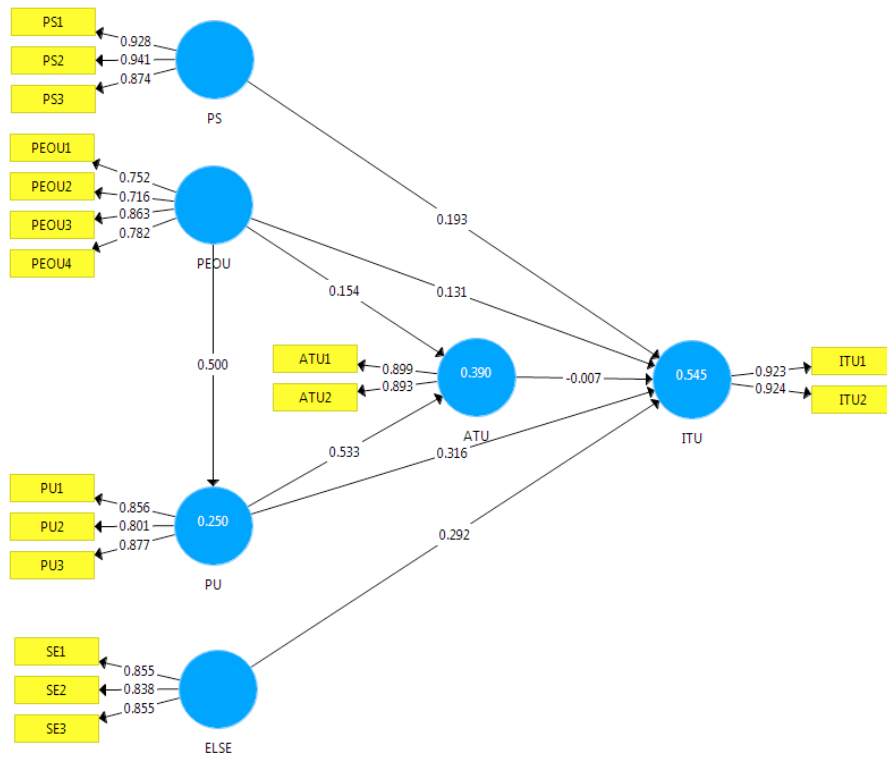


Figure 3. The male model.

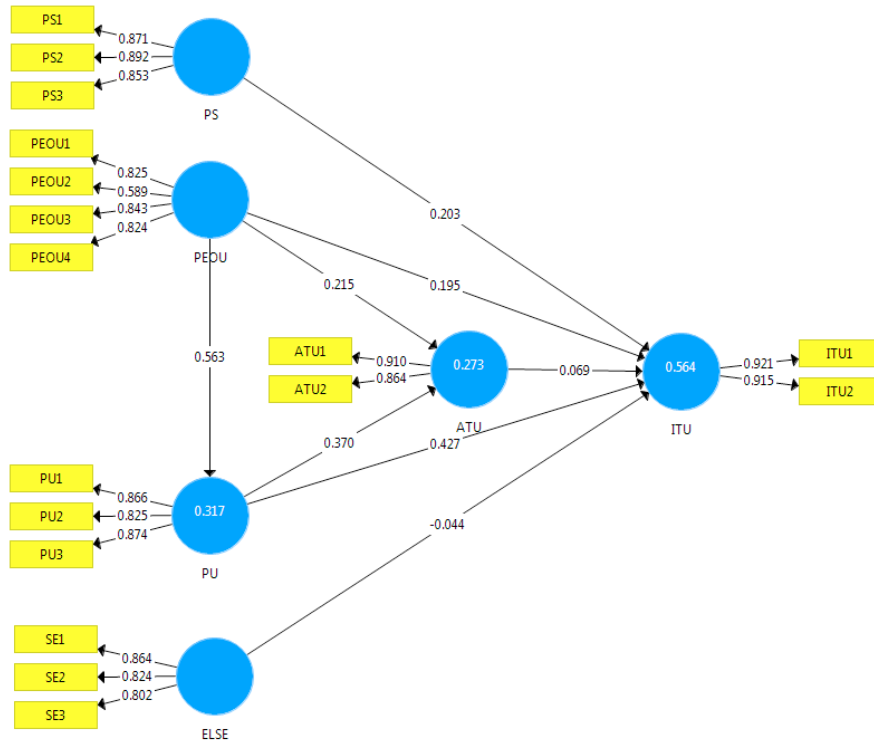


Figure 4. The female model.

Code	Relationship	Hypothesis	Finding
H9	PS-ITU	Men=women	Supported
H10	PEOU-PU	Women>men	Rejected
H11	PEOU-ATU	Women>men	Rejected
H12	PEOU-ITU	Women>men	Rejected
H13	PU-ATU	Men>women	Rejected
H14	PU-ITU	Men>women	Rejected
H15	ELSE-ITU	Men>women	Supported
H15	ATU-ITU	Men>women	Rejected

Table 7. Summary of the moderating effect of gender divide.

6. DISCUSSION

6.1. Predictors of LMS acceptance

The first research question presented in this study was answered in that the proposed model achieved a good fit and explained 53.1% of the variance of behavioural intention towards LMSs. TAM's hypotheses were confirmed, except for the direct influence of attitudes towards LMS use on technology acceptance. The findings reveal that this variable was a weak predictor of intention to use, supporting the conclusion of Szajna (1996) that attitudes towards a behaviour is a weak mediator between perceived technology usefulness, perceived ease of use and intention to use.

Perceived usefulness was the strongest predictor of LMS acceptance, as in other e-learning studies (Wang et al., 2009; Wu et al., 2010). The result of the present study suggests that learners' belief that learning outcomes can be enhanced by adopting the technology is an essential variable for continued use in the future. In other words, if learners felt that the technology would not help in enhancing their learning outcomes, they will search for an alternative learning method. Accordingly, educational institutions and universities, particularly those in developing countries, should implement LMS in a manner that optimises their interactivity and actual usefulness. Similarly, perceived usefulness was also a significant determinant of learners' attitudes towards LMSs use, supporting the assumption of TRA (Ajzen & Fishbein, 1980) and TAM (Davis, 1986). This suggests that learners' attitudes and intention to enact a specific behaviour are strongly associated with perceived technology usefulness.

In agreement with TAM, perceived technology ease of use was also found to have a direct and significant

impact on behavioural intention. In light of such findings, LMS managers and e-learning instructors need to provide different LMS training courses. Such courses can make individuals aware of how LMSs can be used effectively. Perceived ease of use was also a strong predictor of perceived usefulness, as proposed in TAM (Davis et al., 1989). This means that learners will not perceive LMS usefulness if they feel that this technology requires high effort to be used. Moreover, in line with TAM, perceived ease of use was predictive of attitudes towards LMS use. Thus, perceptions regarding the usefulness of technology, the intention to accept it and learners' attitudes to using the technology all are significantly associated with ease of use, highlighting the indisputable need to improve learners' skills so as to avoid failure.

As expected, perceived satisfaction was found to be a strong and significant determinant of behavioural intention. This finding is consistent with user satisfaction theory. It suggests that user satisfaction about a particular product (LMSs in the present study) is a significant determinant of his/her continuous intention to buy/use it in the future. This outcome is also in line with the findings of Weng et al. (2015), which suggested that strategies to improve learner satisfaction in blended or web-based learning modes should also be taken into account as significant in enhancing LMSs acceptance.

Finally, in contrast with our assumption, LMS self-efficacy was not a predictor of the continuous usage intention. This may be because all the participants were from a Computer Science major. Therefore, their overall self-confidence was relatively strong. Weng et al. (2015) also revealed that self-efficacy was not a predictor of e-learning use. On the other hand, Wang et al. (2009) demonstrated that self-efficacy had a significant impact on LMS adoption. Generally, the overall characteristics of the research participants may have a significant influence on the relationship between self-efficacy and behavioural intention. Accordingly, our overall conclusion is that self-efficacy should be considered in e-learning acceptance theories, although it may relate to users' field of study and individuals' experience in using the technology.

6.2. The moderating effect of gender

As for the second research question, overall, our analysis supports the proposed predictors of LMS adoption and attitudes to determine and explain LMS acceptance. Perceived usefulness was the most consistently significant variable for both male and female models, while there is a clear variation regarding the influence of other factors on behavioural intention. The multi-group analysis was conducted to investigate the moderating effect of gender differences in which the significant difference in the standardised path coefficients between the variables was computed.

The study indicates that perceived ease of use was a predictive factor of perceived technology usefulness for both male and female models. Furthermore, perceived LMS usefulness had a direct significant impact on behavioural intention and attitudes towards LMS use, but no gender divide was found. This means that learners will not perceive the usefulness of web-based learning systems if their use required high effort. Moreover, perceiving LMS usefulness is an essential factor in improving learners' attitudes and intention to perform a particular action given that gender does not seem to affect either. Accordingly, educational institutions should not only provide effective training programs to enhance learners' abilities to use LMSs, they should also implement a universal strategy to foster learners' positive perceptions about the usefulness of adopting the technology in their learning. Perceived ease of use was a significant predictor of attitude toward LMS usage and behavioural intention in the female model, but not in the male model. This suggests that women are more concerned than men about ease of use in adopting LMSs. However, the difference in the standardised path coefficient was insignificant. These findings are inconsistent with the research performed by Venkatesh et al. (2003), which found that gender was a significant moderator between perceived ease of use and perceived usefulness towards technology acceptance. On the other hand, other studies are consistent with our outcomes. For instance, Tarhini et al. (2014a), Wang et al. (2009) and Wong et al.

(2012) also pointed out that gender divide does not significantly moderate the path strength between these variables. This may suggest that, regardless of the gender group, learners with a positive perception of technology ease of use and usefulness were more willing to adopt it in the future.

The findings further support our assumption regarding the effect of self-efficacy on behavioural intention towards LMSs being stronger in men. Women's self-confidence in using web-based learning systems does not seem to affect their decision to continue adopting them in their learning. On the contrary, Wang et al. (2009) and Wong et al. (2012) found that in Taiwan the effect of women's self-efficacy on behavioural intention was stronger than that for men, whereas Tarhini et al. (2014a) failed to find a significant moderating effect of gender on the relationship between this construct and behavioural intention towards e-learning in Lebanon. The difference in user characteristics attributable to cultural background has been attributed as one reason for such inconsistent findings (Wang et al., 2009).

To sum up, the above reported research outcomes may suggest an improvement in the educational opportunities and freedom granted to women in Iraq. This can be inferred from the small difference between their personal attitudes and perspectives towards educational technologies compared with those of men. However, the overall results may also indicate that Computer Science undergraduate students have roughly similar perspectives, irrespective of gender. Although previous research showed some moderating influence of gender on the relationship between different latent variables (Venkatesh et al., 2003), the environment in which the study was conducted may have strongly affected the moderation of gender. Another research study revealed similar findings in a learning context, suggesting that business students had to some extent the same features in terms of learning goals and individual experience in e-learning (Khechine, Pascot, & Bytha, 2014). Thus, replicating this research in another environment and with students from different disciplinary areas may provide stronger evidence about the role of gender differences in the uptake of educational technologies. Table 8 compares the findings of this research with previous studies on the moderating effect of gender on technology adoption.

	Previous research			This study
Relationship	Study	Country	Findings	Findings
PEOU-PU	Venkatesh et al. (2003)	USA	Supported	Rejected
	Tarhini et al. (2014a)	Lebanon	Rejected	
	Wang et al. (2009)	Taiwan	Rejected	
	Wong et al. (2012)	Taiwan	Rejected	
PEOU-ITU	Venkatesh et al. (2003)	USA	Supported	Rejected
	Wang et al. (2009)	Taiwan	Rejected	
	Tarhini et al. (2014b)	England	Supported	
PU-ITU	Venkatesh et al. (2003)	USA	Supported	Rejected
	Wang et al. (2009)	Taiwan	Rejected	
	Tarhini et al. (2014b)	England	Rejected	
SE-ITU	Venkatesh et al. (2003)	USA	Supported	Supported
	Wang et al. (2009)	Taiwan	Supported	
	Wong et al. (2012)	Taiwan	Supported	
	Tarhini et al. (2014b)	England	Rejected	

Table 8. Comparing the findings of this research with other studies.

6.3. Research implications, limitations and future directions

This study provides a number of theoretical and practical insights. Cultural, social and religious factors in the Arab world potentially affect gender-based behaviour of students engaging in e-learning. This study aims to bridge the current research gap into this issue by extending the previous literature. Another contribution is that this study provides further support to the findings of the previous literature on the strong influence that perceived ease of use exerts on the decision of learners to adopt a technology in future. This may indicate that there is still a need for further training programs to familiarise users of LMS technology with its main features. This could reduce users' negative perceptions regarding the mental effort that technology use requires. Accordingly, intensive training programs are needed to spread the culture of e-learning technologies. Finally, the interesting findings in this research are that even though the analysis illustrates

that women still have less confidence in performing particular learning tasks in this digital age, this low self-efficacy does not seem to affect their decision to continue using the technology. For men, however, the study suggests that self-efficacy might have a strong influence on their decision to adopt LMSs.

It is essential to highlight the limitations of this research in order to establish a firm frame for the above discussion. First, the participant population in this research was limited to Computer Science undergraduates. As such, their overall perceptions may not reflect the beliefs and perceptions of higher education undergraduate students in other disciplines. This invites further research to investigate and compare the moderating influence of users' gender on attitudes and intention to use technologies within different disciplines. Researchers also need to investigate the relationship between individual differences, online interaction behaviour, and e-learning adoption. Furthermore, the variables integrated into the proposed research framework explained 53.1% of the variance of behavioural intention, indicating a good fit. However, there is a need to include other variables that may help in understanding the 46.9% unexplained variance. Finally, the present study investigated learners' attitudes towards LMS use at a specific point in time. Thus, there is a need for further longitudinal research to consider the perspectives of learners at different time periods.

7. CONCLUSIONS

This research was initially grounded on TAM, Social Cognitive Theory and Satisfaction Theory to investigate the predictors of LMSs acceptance in a higher education context in the Middle East. The findings support the extended model: it was found that perceived usefulness is the strongest predictor of LMSs acceptance. Furthermore, e-learning self-efficacy and attitude towards LMSs use were insignificant predictors of technology acceptance.

The key aim of this investigation was to understand the impact of gender differences on path strength between the proposed model variables, an issue that is still a researcher concern. Generally, women are found to be more concerned about ease of use, whereas men are more concerned about technology usefulness. However, the difference in path strength was insignificant for all variables, except for the relationship between self-efficacy and behavioural intention. Self-efficacy has a stronger influence on behavioural intention for men than for women. The research provides significant findings, although it suffers from several limitations that invite further cross-cultural research.

8. REFERENCES

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APPENDIX A: THE RESEARCH QUESTIONNAIRE

FACTORS AND QUESTIONS
INTENTION TO USE (ITU)
ITU1: Assuming that I have access to e-learning (Moodle) in blended learning, I intend to use it.
ITU2: Given that I have access to e-learning (Moodle), in blended learning, I predict that I would use it.
ATTITUDE TOWARDS USE (ATU)
ATU1: Blended e-learning makes learning more interesting.
ATU2: I look forward to those aspects of my learning that require me to use blended e-learning.
PERCEIVED USEFULNESS (PU)
PU1: Using e-learning (Moodle) improves my performance in blended learning.
PU2: Using e-learning (Moodle) in blended learning increases my scientific performance.
PU3: Using e-learning (Moodle) in blended learning enhances my learning effectiveness.
PERCEIVED EASE OF USE (PEOU)
PEOU1: Interaction with e-learning (Moodle) is clear and understandable.
PEOU2: Interacting with e-learning (Moodle) in blended learning does not require a lot of mental effort.
PEOU3: I find e-learning (Moodle) to be easy to use in blended learning.
PEOU4: I find the e-learning environment (Moodle) to be easy to use.
E-LEARNING SELF-EFFICACY (ELSE)
ELSE1: I can use e-learning (Moodle) in blended learning, even if there is no one around to tell me what to do as I go.
ELSE2: I can use e-learning (Moodle) in blended learning, even if I have never used a system like it before.
ELSE3: I can use e-learning (Moodle) in blended learning, even if there is no assistant illustration tool with the system.
PERCEIVED SATISFACTION (PS)
PS1: I am satisfied with the blended e-learning efficiency.
PS2: I am satisfied with the blended e-learning effectiveness.
PS3: Overall, I am satisfied with the blended e-learning.