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Exploring students acceptance of e-learning using Technology Acceptance Model in Jordanian universities

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ABSTRACT

Today's rapid changing world highlights the influence and impact of technology in all aspects of learning life. Higher Education institutions in developed Western countries believe that these developments offer rich opportunities to embed technological innovations within the learning environment. This places developing countries, striving to be equally competitive in international markets, under tremendous pressure to similarly embed appropriate blends of technologies within their learning and curriculum approaches, and consequently enhance and innovate their learning experiences. Although many universities across the world have incorporated internet-based learning systems, the success of their implementation requires an extensive understanding of the end user acceptance process. Learning using technology has become a popular approach within higher education institutions due to the continuous growth of Internet innovations and technologies. Therefore, this paper focuses on the investigation of students, who attempt to successfully adopt e-learning systems at universities in Jordan. The conceptual research framework of e-learning adoption, which is used in the analysis, is based on the technology acceptance model. The study also provides an indicator of students' acceptance of e-learning as well as identifying the important factors that would contribute to its successful use. The outcomes will enrich the understanding of students' acceptance of e-learning and will assist in its continuing implementation at Jordanian Universities.

Keywords: *E-learning; Technology Acceptance Model; Perceived usefulness*; *Ease of use; Attitude; Behavioural intentions; Jordan; The Applied Science University.*

INTRODUCTION

The rapid growth of internet-based technology/innovations has resulted in many approaches to learning development, manifested in different forms of e-learning (Shawar, B., Al-Sadi, J. & Sarie, T., 2007). These often supplement or replace traditional methods, enabling students to engage with their learning through various web technologies alongside or instead of face-to-face delivery. *E-learning* has been defined according to the contexts and environments where it operates (Asabere and Enguah, 2012). However, in this study, e-learning is approached as a system that uses internet technology to deliver information to students with interactions through computer interfaces. Masrom (2007, p.1) defines e-learning as "*learning facilitated and supported through the utilization of information and communication technology (ICTs)".* Its use in different educational processes is designed to improve the performance of learning (Al-Adwan and Smedley, 2012). It may be used in many forms, i.e. as a supplement to traditional lectures, asynchronous distance learning, learning management systems or online learning (Concannon, F., Flynn, A & Campbell, M. (2005). The combination of traditional learning (face-to-face lectures)

and web-based courses is known as "blended learning". This mixes the features of virtual and real environments to provide a holistic information production and enhance the students' learning experience.

Providing a flexible and responsive learning experience frequently requires the involvement of modern information and communication technologies (ICTs) to enhance access to continuous professional development practices in today's fast mobile work place environment. E-learning offers flexibility of time and place which allows higher education institutions and their student to deliver or receive learning materials in a more flexible manner. Concannon *et al* (2005) state that the increased demand of integrating ICT into the educational process due to the change of students demography places higher education institutions under pressure to utilize information and communication technologies at universities. Additionally, universities through effective implementation of e-learning could attract and engage larger numbers of students.

With the ever-present need to demonstrate value for money and maximise efficiency and effectiveness from training and development within an often restricted time and expenditure framework, the measurement of impact from enhancing knowledge management using technology is of a constant interest and importance (Smedley, 2010). Despite the many advantages offered by e-learning systems, the transformation of the educational style presents various challenges that would significantly affect culture and the continuing need for the development of technological skills of students and staff (Al-Adwan and Smedley, 2012). Saade, R., Nebebe, F. & Tan, W. (2007, p.176) point out that "*in general, like any information systems, user acceptance and usage are important primary measures of system success*".

Therefore, students' involvement and acceptance must be considered; otherwise advanced systems will most likely fail. Many universities that offer e-learning services encounter various difficulties in terms of adopting successful strategies including the acceptance and effectiveness of delivering courses. More importantly, understanding students' acceptance of e-learning is considered the most major step toward implementing and developing a successful e-learning environment (Butorac, M., Nebic, Z & Nemcanin, D. , 2001). It is essential that developers and universities' management understand how students perceive and participate in an e-learning environment along with how to apply an effective e-learning approach to improve the learning process (Kohang and Durante, 2003). Moreover, exploring students' intentions and investigating the factors that impact on students' beliefs about e-learning can help management to create new methods for attracting a larger number of students who are willing to be involved in e-learning systems (Park, 2009). Therefore, it is crucial to investigate issues that explain students' acceptance, intention and attitude towards using e-learning systems.

E-learning was first introduced in Jordan by the Arab Open University (AOU) (Abbad *et al*., 2009). The AOU was established in 2002 by Prince Talal bin Abdul Aziz under the sponsorship of the Arab Gulf Program for united notation development organizations. Located in Kuwait, the first branch was founded in Jordan in 2002. AOU has a partnership with the United Kingdom Open University, which plays a primary role in e-learning development at the national level. MoHESR (2009) points out there is a trend in the country's higher education institutions to use e-learning as a method to enhance learning outcomes of campus-based students. While traditional methods, such as tutorials and face-to-face lectures, are still strongly dominant in the Jordanian higher education arena, universities are intensively investing in learning technologies to facilitate greater quality enhancements in students learning experiences. Therefore, as many universities in Jordan have introduced e-learning schemes, the current study aims to help Jordanian universities in their efforts to successfully adopt e-learning systems by exploring the main challenges that inhibit students' acceptance of e-learning.

In this paper, the theoretical framework of university students' e-learning acceptance and intention to use technology is based on the technology acceptance model (TAM). TAM is robust to investigate the acceptance of various information system applications (Chen, S., Li, S & Li, C. (2011). The model captures both practical and psychological implications in regards of the acceptance of a new information system. It considers the impact of perceived ease of use and perceived usefulness on students' intention and attitude to use e-learning in their education.

THEORETICAL FRAMEWORK

According to Davis, F., Bagozzir, R. & Warshaw, P. (1989, p.985), the technology acceptance model (TAM) is "*an adaptation of Theory of Reasoned Action (TRA) specifically tailored for modelling user acceptance of information systems*". TAM is considered one of the well-known models related to technology acceptance and use; it has shown great potential in explaining and predicting user behaviour of information technology (Park, 2009). This research suggests TAM as the most suitable model to explore the acceptance of e-learning in Jordan through the existance of focused elements. TAM is built on two fundamental elements - *perceived ease of use* (PEOU) and *perceived usefulness* (PU). The main mechanisms underlying perceived ease of use are system design and features, whereas the core mean underlying perceived usefulness is effort decreasing (Moore, 2012). TAM is originally an extension of Theory Reasoned Action (TRA) (Fishbein & Ajzen, 1980). Davis first introduced TAM in his Ph.D thesis in 1986, and three years later Davies (1989) created TAM to explain why users accept or reject information technology by adopting TRA (Figure 1). Fishbein (1967) demonstrated the relationship between intention and behaviour by linking the relationship between beliefs, attitudes, intentions and behaviour. According to TRA, behaviour is driven by the behavioural intention, which is one of the functions of individual attitudes and subjective norms of the behaviour in question (Davis *et al.,* 1989). Ajzen and Fishbein (1975, 216) state that attitude is "*an individual's positive or negative feelings (evaluative affect) about performing the target behaviour*", and subjective norm is defined as "*the person's perception that most people who are important to him think he should or should not perform the behaviour in question*". In other words, TRA suggests that intention is the main determinant of an individual's behaviour, whereas intention to behave is determined by subjective norms and an individual's attitude towards the behaviour and their perception of it.

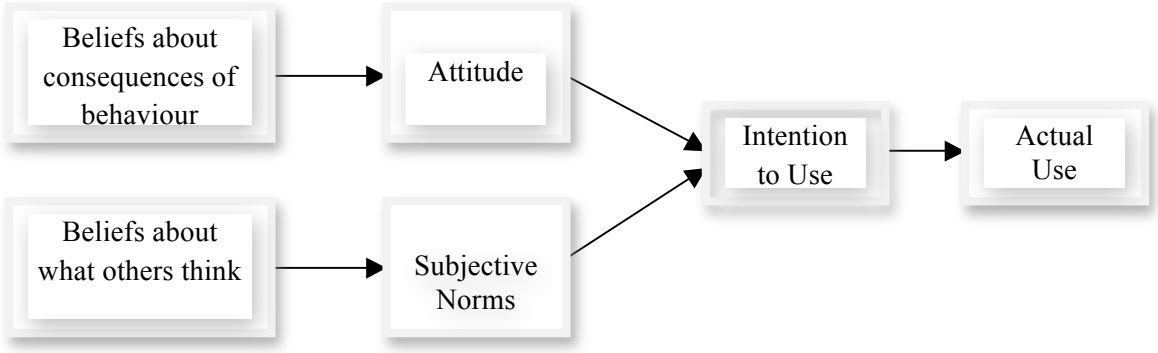


Figure 1: *Theory of Reasoned Action (Adapted from Ajzen and Fishbein, 1980)*

TAM has been applied into many contexts and fields investigating user acceptance of information technology, including the World Wide Web (Lederer *et al.,* 2000), mobile banking (Lule *et al.*,

2012), multimedia (Lau and Woods, 2008) and healthcare (Chau and Hu, 2002). However, along with the relationships suggested by TAM, many researchers have also examined the antecedents of both perceived ease of use and perceived usefulness (Porter and Dnthu, 2006; Yu *et al*., 2003). Most importantly, the majority of technology acceptance models have been developed and modified in Western countries, particullarly in Europe and South America and (Kripanont, 2006). According to Linjun (2003) "*Information systems research reveals that there are different technology adoption and usage patterns when cultural difference is taken into account*". The determinants of different patterns of user perception and acceptance across cultures is still unclear, and therefore It is a controversial to admit whether the models/theories of technology acceptance that have been developed, extended, and modified in western counties could be applied in other countries or cultures, specifically in Jordan.

Figure (2) shows the relationship between the components of TAM. This indicates that *perceived usefulness* (PU) and *perceived ease of use* (PEOU) jointly predict the *attitudes towards using technology* (ATU). *Perceived usefulness* (PU) also influences the user's *behavioural intention* (BI) in using technology. *Intention to use* (ITU) also determines the actual use of technology.

With regards to the relationship between *perceived usefulness* (PU) and *behavioural intention* (BI), Davis *et al.* (1989, p.986) point out that "*within organizational settings, people form intentions toward behaviours they believe will increase their job performance, over and above whatever positive or negative feelings may be evoked toward the behaviour per se*". Additionally, the model posits that (PEOU) is likely to influence *perceived use* (PU), where the increase of *perceived ease of use* (PEOU) leads to improved performance. Consequently, PEOU has a direct influence on PU. According to Davis *et al.* (1989), PEOU refers *to* the level to which users feel that they can save or minimise their efforts by using a specific technology. PU refers to the level to which users feel that they can improve and increase their job performance by using a specific technology.

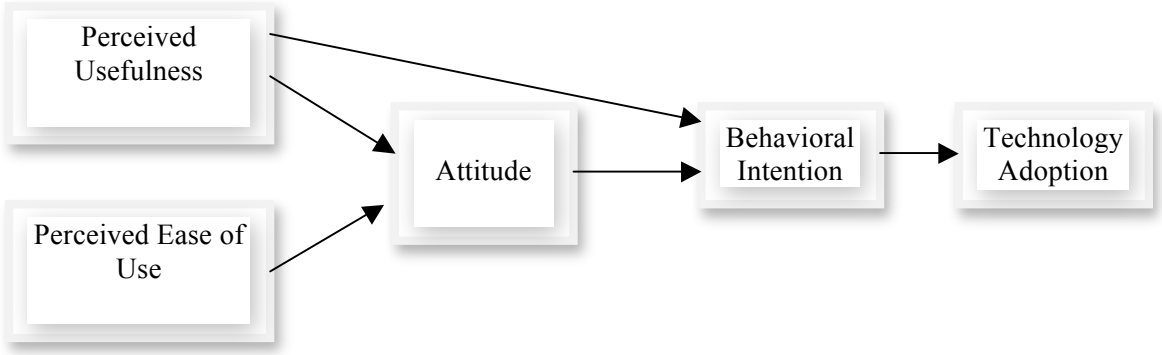


Figure 2: *Technology Acceptance Model (Adopted from Davis et al., 1989)*

DEFINING THE RESEARCH HYPOTHESES

High level of *perceived use* (PU) results in more positive *attitude towards use* (ATU) (Teo *et al,* 2008). *Perceived use* (PU) has been consistently found as a direct determinant of *intention to use* (ITU), and it also influences user's ITU indirectly as a direct determinant of ATU (Liu *et al*. 2005).

Therefore,

H1: *Perceived usefulness* (PU) will significantly influence the intensity of students' *intention to use* (ITU).
H2: *Perceived usefulness* (PU) will significantly influence the intensity of student's *attitude towards use* (ATU).

Perceived ease of usefulness (PEOU) was theorized as a direct determinant of *attitude towards use* (ATU) by many researchers (Park, 2009; Chang *et al.,* 2012). Improvements in ease of use may not only be beneficial to influence intentions, but also lead to positive attitude. Additionally, PEOU *was* found to indirectly impact *intention to use (*ITU) through increased perceived usefulness(PU) (Sek *et al.*, 2010; Lee *et al.,* 2011). Teo (2009, p.108) argues that *perceived usefulness (PU)* mediates the effect of *perceived ease of use* (PEOU) on *attitude towards use* (ATU). Enhanced *ease of use* (EOU) produces better performance and greater perception of usefulness (Venkatesh and Davis, 2000). Therefore,

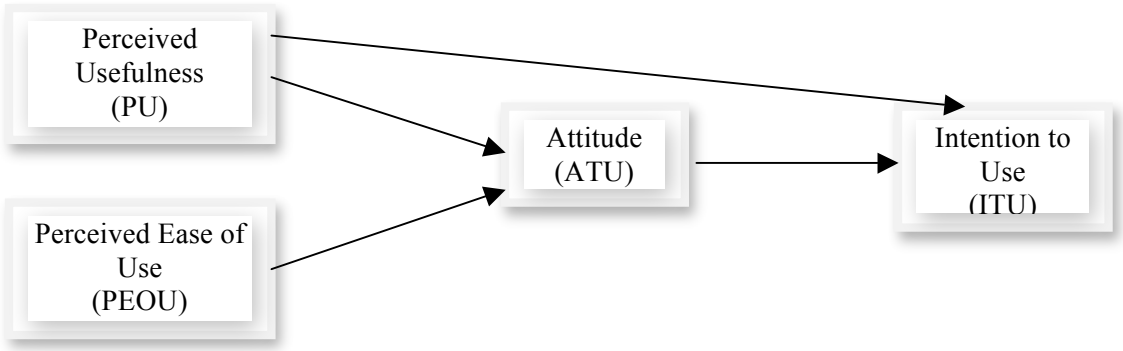
H3: *Perceived ease of use* (PEOU) will significantly influence the intensity of students' *attitude towards use* (ATU).

H4: *Perceived ease of use* (PEOU) will significantly influence *perceived usefulness* (PU).

Finally, according to Ajzen and Fishbein (2005), ATU drives behaviour and refers to the way that individuals respond to or ignore an object. More importantly, any efforts exerted to heavily implement e-learning rely on the involvement of users attitude. For example, if lecturers believe that technology is insufficient to satisfy their own needs or their students', they will resist using it in the learning process (Yildrim, 2000). Thus, successful e-learning engagement requires users to possess a positive attitude towards it (Huang and Liaw, 2005). Therefore, ATU has been hypothesized as a direct determinant of *intention to use* (ITU) in the available literature (Malhotra and Galletta, 1999).

Therefore,

H5: *Attitude towards use* (ATU) will significantly influence *intention to use* (ITU).



F***igure 3:*** *Research Model Based on Original TAM (Davis et al., 1989)*

THE APPLIED SCIENCE UNIVERSITY, AMMAN

The Applied Science University (ASU) has developed several strategic plans for e-learning courses by setting up a project plan that is split into phases for implementation (ASU, 2012). It provides its students with several electronic services, such as e-registration, e-library, e-exams and e-mails. It has recently launched a new service called the Open Course System (OCS), which offers students flexibility by providing them with online educational materials. The OCS allows students to access all educational materials whenever they want and wherever they are and includes videos of lectures and the opportunities to browse previous exams and lectures.

RESEARCH METHODOLOGY

This study used case study as a methodology and adopted quantitative methods of data collection to explore the factors that impact the acceptance of e-learning in ASU. The goal was to link comprehensive details of an event, action and relationship between stakeholders and events as they occured over a period of time (Cooper and Schindler, 2006). Case study as a methodology is effective in answering the questions "why?", "how" and "what" related to specific phenomenon. It is more adequate when it offers access to information that is barely accessable to researchers. According to Blumberg *et al*. (2005, P.131) "*a single well-designed case study can provide a major challenge to a theory".* The data in this study was gathered via a questionnire distributed to 107 students in the Foreign Languages Department at the Applied Science University (ASU) in Amman. This study avoided science and computing departments, where students were more likely to be familiar with technology and computer applications. Questionnaire method is an effective tool to collect large amount of data within short period of time (Saunders *et al.*, 2009).

The literature of information systems (IS) has been reviewed to identify the measures for constructs that have been applied in previous IS research. The first section relates to students' demographics; respondents were asked three questions including age, gender and academic year. The second section relates to the measurement of factors assumed to impact on e-learning acceptance and adoption. The items of *perceived ease of use* (PEOU), *perceived usefulness* (PU), *attitude towards use* (ATU) and *intention to use* (ITU) constructs are adopted from previous IS research (Masrom, 2007; Malhotra, Galletta, 1999; Kripanont, 2007; Sek *et al.*, 2010). The research model consists of 16 items with each construct being measured by 4 Likert scal options (strongly agree, agree, disagree and stronggly disagree) . A five part Likert scale was used to gather responses with a response ranges from strongly agree to strongly disagree. All respondents had been given a brief introduction about the purpose of the study and some instructions to help them complete the survey.

MEASURES

The descriptive statistics of the four constructs are shown in Table 1. The standard deviations range from 0.66 and 1.3, and all means above midpoint of 2.00.

Table 1: *Descriptive Statistics*

Factors	Question	Mean	St.d dev.
Perceived Usefulness (PU)	PU1	3.0280	.84069
	PU2	3.1589	.77884
	PU3	3.2523	.82523
	PU4	3.1869	.80248
	Total	2.3598	.49189
Perceived Ease of Use (PEOU)	PEOU1	3.1308	.80193
	PEOU2	3.0841	.91240
	PEOU3	3.2056	.86590
	PEOU4	2.7944	.89799
	Total	3.0537	.70630
Attitude Towards Usage (ATU)	ATU1	2.2056	1.13884
	ATU2	2.3738	1.05082
	ATU3	1.8411	1.37463
	ATU4	2.5234	.87249
	Total	2.2360	.95958
Intention To Use (ITU)	ITU1	2.7009	.71658
	ITU2	2.7103	.72697
	ITU3	2.7383	.70492
	ITU4	2.4953	.66409
	Total	2.6612	.61165

Construct validity and reliability have been tested to ensure that the results are reliable and consistent. The reliability analysis measured the internal validity and consistency of items used for each construct. Calculating Cronbach's alpha coefficient tested the factor reliability. This measures the internal consistency by indicating how a set of items are closely related as a group (Moola and Bisschoff, 2012). Nunnally (1967) suggests that a Cronbach alpha value of 0.7 is acceptable, with a slightly lower value might sometimes be acceptable. Cronbach's alpha values for all factors are above 0.7 (see Table 1) indicating that all measures employed in this study demonstrate a satisfactory internal consistency. Therefore, the survey is considered a reliable measurement instrument.

Table 2: *Cronbach's Alpha*

Scale	Cronbach's alpha
Perceived Usefulness (PU)	0.7968
Perceived Ease of Use (PEOU)	0.8269
Attitude Towards Usage (ATU)	0.8761
Intention To Use (ITU)	0.8923
TOTAL	0.8820

According to Davies (1989, p.323), the construct validity is "*the degree to which the score or scale being used represents the concept about which generalization are to be made*". In this study, factor analysis was performed in order to measure the convergent validity of the sixteen

items of the TAM questionnaire. The convergent validity evaluates whether the items of a variable are converging together on a single construct or not (Premkumar & Ramamurthy, 1995). Hair *et al.* (1998) and Nunnally (1967) suggest that 0.5 to be valid value of factor loading for each item. Based on the fact that the items were designed to measure constructs, four factors were requested: (PU), (ITU), (PEOU) and (ATU). Table 2 displays the factor loadings of e-learning usage questionnaire for the sample of 107 students.

Table 3: *Factor Loadings*

Scale Item	1	2	3	4
ATU1	.869			
ATU2	.839			
ATU3	.788			
ATU4	.733			
ITU2		.888		
ITU3		.850		
ITU4		.779		
ITU1		.736		
PEOU3			.819	
PEOU2			.802	
PEOU1			.739	
PEOU4			.694	
PU3				.788
PU2				.782
PU1				.710
PU4				.619
% of variance explained	22.859	19.285	18.288	15.125
Cumulative percentage	22.859	42.145	60.433	75.558

Factor 1 = ATU; Factor 2 = ITU; Factor 3 = PEOU; Factor 4 = PU

The results show that all factors loading were above 0.5, which indicates a good convergent validity. All used items are converging together on a single construct.

ANALYSIS

The hypotheses are tested by the Statistical Package for Social Sciences (SPSS) software. The total number of valid surveys is 107, giving a response rate of around 76%. The majority of the respondents' age varied between 18 and 25, and 61% of the respondents were females.

A regression analysis was conducted to test the first Hypothesis (H1), i.e. *perceived use* (PU) as an independent variable and *intention to use* (ITU) as dependent variable. Table 4 below summarizes the result of regression used to test H1.

Table 4: *Regression results for H1*

	β	Standard Error of β	t	P	R^2
Perceived Usefulness (PU)	0.265	0.119	2.234	<0.05	0.045

As seen, *perceived usefulness* (PU) has significantly influenced *intention to use* (ITU) (*P<0.05*). Therefore, PU dramatically impacts on ITU. Consequently, hypothesis 1 (H1) is supported.

Hypothesis 2 (H2) was also tested; *perceived usefulness* (PU) was independent and *attitude towards use* (ATU) was dependent. The results in Table 5 indicate that PU has no significant influence on (ATU) (P>0.05). Therefore, hypothesis 2 (H2) proves to be not supported and PU has no influence on the attitude of students' (ATU).

Table 5: *Regression results for H2*

	B	Standard Error of β	t	P	R^2
Perceived Usefulness (PU)	0.462	0.185	2.499	>0.05	0.056

As appears in Table 6, the test of Hypothesis 3 (H3) shows that *perceived ease of use* (PEOU) has a significant influence on *attitude towards use* (ATU) (*P<0.01*). Thus, PEOU significantly influences the attitude of students (ATU).

Table 6: *Regression results for H3*

	B	Standard Error of β	t	P	R^2
Perceived Ease of Use (PEOU)	0.504	0.123	4.092	<0.01	0.138

Regarding Hypothesis 4 (H4), the regression analysis shows that *perceived ease of use* (PEOU) significantly influences *perceived usefulness* (PU) (*P<0.01*). The results presented in Table 7 indicate that PEOU significantly influences PU.

Table 7: *Regression results for H4*

	B	Standard Error of β	t	p	R^2
Perceived Ease of Use (PEOU)	0.340	0.059	5.738	<0.01	0.239

Finally, hypothesis 5 (H5) is deemed to be not supported. As Table 8 shows, attitude towards use (ATU) has no significant impact on ITU (*P>0.01*).

Table 8: *Regression results for H5*

	B	Standard Error of β	t	p	R^2
Attitude Towards Use (ATU)	0.325	0.054	6.063	>0.01	0.259

Table 9 summarises the results obtained from testing the research hypotheses. The results confirmed that there was a statistical correlation between the predicted directions of the research model. Overall, four out of five hypotheses were supported by the collected data. PEOU was found consistent with prior related research (Davies, 1989; Hu *et al*., 1999), it had a significant effect on PU with P<0.01, and it also had a significant effect on ATU with P<0.01. Inconsistent with the proposed research hypotheses, PU had no significant effect on ATU with P>0.05.

Table 9: *Summary of the Hypothesis Testing*

Hypotheses	Path	Path coefficient	*t*-value	Results
H1	PU ➔ ITU	0.265	2.234	Supported (P<0.05)
H2	PU ➔ ATU	0.462	2.499	Not Supported (P>0.05)
H3	PEOU➔ PU	0.504	4.092	Supported (P<0.01)
H4	PEOU ➔ ATU	0.340	5.738	Supported (P<0.01)
H5	ATU ➔ ITU	0.325	6.063	Not Supported (P>0.01)

Using a hypothesis approach, three out of five hypotheses were supported. As in other studies (Shroff *et al.,* 2011*;* Davies, 1989), PEOU has a significant effect on both PU and ATU. Students who find e-learning systems easy to use could explain this and therefore may have favourable attitudes toward the usefulness of the system. According to Shroff *et al.* (p.610, 2011), "*user's positive feelings toward the ease of use of technology are associated with sustained use of the technology*". Additionally, Davis (1989) points out that although potential users perceive a technology to be useful, they may also believe that it is too complicated to use in terms of skills development, time etc. Consequently, this suggests that PU is influenced by PEOU. The findings of this study also demonstrate that PU has a significant effect on ITU, whereas it does not have the same affect on ATU. This may be due to the fact that students are willing to adopt e-learning systems, while focusing on its benefits.

Contrary to original TAM assertions, ATU was found to have no influence on ITU. Teo and Schalk (2009) support this result in their research, which found out that attitude toward computer use has no significant influence on intention to use. Furthermore, Davies *et al.* (1989) admit that the role

of attitude toward usage turns out to be modest in predicting technology acceptance as it is possible that users may use technology even if they do not have positive attitude toward it. Users would most probably employ technology if its benefits were clearly visible through its simplicity, ease of use or usefulness.

CONCLUSION

In light of the global trend towards e-learning, the higher education institutions in Jordan have witnessed radical changes in the way they operate (Alshboul, 2011). However, the adoption of e-learning has resulted in several challenges, more particularly users acceptance. The current study using the technology acceptance model (TAM) aimed to predict the acceptance of e-learning by Jordanian students. The findings have clearly revealed several useful implications.

As in similar studies (Cheung, K., Lee, O.& Chen, Z. (2005); Saade *et al*., 2007), this work indicated that TAM can be employed as a useful theoretical base to predict and understand users' intentions to use e-learning. It also confirmed that in order to motivate students' intentions to use technology in their learning environment, it is essential to present a positive perception of technology usefulness - particularly as students' attitude may not associate this element with being at a similar level of importance.

From a managerial perspective, e-learning training and development helped to focus on how technology could help students to improve their performance and effectiveness in learning, rather than on the actual usage of technology. Moreover, while the results demonstrated that perceived usefulness had no significant influence on students' attitude, perceived ease of use significantly influenced both attitude and perceived usefulness. Therefore, learning technologists and educational developers should ensure that e-learning interfaces are user-friendly through regular user engagement during development.Outcomes suggest that this will encourage users (students) to more readily identify the benefits of e-learning and explore the opportunities it offers them to improve their performance.Consequently, this will motivate greater participation in e-learning with a positive and creative attitude.

Future studies could be conducted to examine TAM with a different sample of students and a wider range of information technology applications. This could involve testing TAM by including the technology actual usage construct in the research model, which could increase the predictable levels of information technology acceptance by students. Finally, the TAM model could be expanded to include additional beliefs that could impact e-learning acceptance such as social influance. Furthermore, TAM could be modified by adding antecedents of both perceived ease of use and perceived usefulness. These antecedents should be exclusive to the e-learning context in the academic setting.

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