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E-Learning in Jordanian Higher Education: Cultural Perspectives and Institutional Readiness

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Abstract. This study explores students' acceptance of e-learning technology in Jordanian higher educational institutions. A paucity of studies that were conducted in individual institutions indicated that different cultural perspectives and resistance to change are overlaying the wide adoption of e-learning and influencing users' perceptions pertaining the technology usefulness and/or ease of use. Our study utilises the technology acceptance model (TAM) and explores the influence of the main antecedents of accepting this technology from users' perspectives, that is, perceived usefulness (PU) and perceived ease of use (PEU) in order to reveal the country's readiness to adopt this technology and move from individual innovations to institutional standards. The results obtained using a survey-based methodology from three main public and private institutions distributed in multiple geographical areas show that the actual behaviour of usage is influenced by behavioural intention (BI), which is directed by PU, PEU, and attitude. Based on these results, multiple recommendations pertaining to cultural perspectives and educational institutions readiness are proposed and implications of the study are discussed.

Keywords: Technology acceptance model; e-learning; Jordanian higher education; structural equation modelling.

1. Introduction

The accelerating development of Information and Communication Technology (ICT) assists learning process and has attracted many educational institutions' attention to adopting Internet-based learning, which is widely known as e-learning (Pazos *et al.*, 2002). Growing needs are noticed worldwide to adopt new tools to exchange knowledge by fostering knowledge management and e-learning development (Yordanova, 2007). Generally, e-learning is adopted by multiple institutions to

transform the learning process to a more dynamic and interactive milieu in which knowledge is created, stored and distributed efficiently using computer and networking technologies (Kasem *et al.*, 2015). Jordan is a developing country that has more than 20 higher educational institutions. E-learning technology use has been limited to some academic institutions along with traditional learning; however, the traditional learning presented in face-to-face lectures still formulates the prevailing learning style in most educational institutions. Usually, the decision of using an available e-learning system in these institutions is left to individual faculty members or departments, which minimises the benefits that could be obtained from utilising the system. Consequently, this led to a limited application of the technology only to those having the expertise (MoHESR, 2009).

In general, most new technologies are designed and developed in developed countries; therefore, these technologies are biased to these industrialised countries' cultural and social systems. When transferred to developing countries, these technologies encounter multiple social and cultural obstacles that eliminate its adoption and acceptance (Hill *et al.*, 1998; Abdel-Jaber, 2017). In developing countries, cultural perspectives do not usually support e-learning technology. Face-to-face learning style stands out as the prevailing style of knowledge sharing and dissemination in educational institutions. Generally, a technology could be adopted in one culture and rejected in another (Fullan and Smith, 1999). For example, Egyptian students indicated that although e-learning is their preferred learning style since it qualifies them later to pursue their higher education in the U.S. or Europe, they still face multiple issues with employers who underestimate their degrees and prefer face-to-face education (Alzeny, 2015). In Jordan, the transition from traditional face-to-face education to e-learning is still at early stages. Jordan has only one private university that has some branches in the middle east that offers pure and blended online degrees. This private institution represents less than 3% of the total number of higher educational institutions in Jordan; unfortunately, the branch in Bahrain has been banned for poor educational outcomes (Alzeny, 2015). As a matter of fact, e-learning in Jordan is not considered the preferred teaching style in higher educational institutions by both instructors and students. They prefer using traditional tools for collaboration and exploring course materials such as papers and boards (Al-Adwan and Smedley, 2012).

Some studies have been conducted to investigate the major issues influencing e-learning projects in Jordan. People who were directly involved in developing and implementing these projects in some public and private universities indicated that the prevailing issues confronting e-learning projects were human, cultural, regulatory, support, technical and financial factors. The human factors were correlated with threatening instructor's career, lack of sufficient experts to manage and share knowledge using e-learning systems, and the lack of training for both instructors and students. Besides, the cultural perspectives towards e-learning and the difficulty in changing the way of traditional teaching that has prevailed for decades have framed new barriers in the adoption process (Al-yaseen *et al.*, 2011). Abbad *et al.* (2009)

indicated that when applying studies related to technology acceptance, it is worthy to take cultural variations into consideration. Jordan is a developing country that has different social patterns and language structure compared to developed countries, which may lead to restricted engagement in e-learning systems and rely more on the face to face interactive learning structure. Comparing to the U.S. and Europe, very limited studies have been conducted to evaluate users' satisfaction and acceptance of e-learning in Jordan (Al-Adwan *et al.*, 2013). In addition, studies that investigated e-learning acceptance were conducted within a single institution per study, which presents limited generalisability and may not be able to address the current situation of e-learning acceptance in Jordan.

The ministry of higher education in Jordan has realised that there is a need to develop a deeper understanding of e-learning by investigating user acceptance in multiple educational institutions and examine the educational sector's readiness to adopt this technology (MoHESR, 2009). With the discerning view of His Majesty King Abdullah II, the higher education mission endeavoured is to move these initiatives from individual innovations to institutional standards. Therefore, some institutions have recently started to adopt e-learning systems to improve students' skills and teach them new ways of managing knowledge and information. The amplified growth of ICT and the altered policies adopted by educational institutions especially in the government sector established new trends in e-learning adoption in higher education. Thus, multiple universities now offer e-learning tools such as Moodle and Blackboard to improve students' knowledge base, share course materials, and facilitate instructor-students interactions (Almarabeh *et al.*, 2014). Based on that, it is necessary to portray a broader view of the current situation of e-learning in Jordan and decide whether this country is ready to adopt this technology in a broad manner based on students' perceptions especially when researchers indicated that the main factors hindering e-learning acceptance in Jordan are manifested in users' perceptions (Al-Adwan and Smedley, 2012).

Generally, students' acceptance plays a vital role in e-learning experience success (Zuvic-Butorac *et al.*, 2011). Some studies showed that several students were dissatisfied with their e-learning experience because of the absence of an e-learning atmosphere, lack of direct interaction between them and instructors, and the lack of a standard framework to encourage them to learn (Liaw, 2008). In addition, Lee *et al.* (2011) studied a case of failed e-learning system and found that the lack of students' motivation and beliefs towards system usefulness has played an essential role in the system failure. As a result, the e-learning implementation strategies have to address many factors like delivering effective contents and assessing students' acceptance (Saadé, 2003). Based on the lack of studies conducted in Jordan, the cultural differences compared to the developed countries, and the necessity to focus on users perceptions and beliefs pertaining this technology, the purpose of our study is to explore students' acceptance of e-learning technology in multiple higher education institutions based on students' perceived usefulness (PU) and perceived ease of use (PEU) which are considered the main determinants of technologies adoption

and acceptance by multiple researchers (Davis *et al.*, 1989; Davis, 1993; Al-Adwan *et al.*, 2013).

Data for this study were collected from three higher educational institutions that offer face-to-face learning supported by e-learning tools. These tools are used regularly by students and instructors to share knowledge and view course materials. A survey method based on a questionnaire was used to explore students' acceptance. The three higher educational institutions include two large public institutions and one private institution which are Yarmouk University, Jordan University of Science and Technology, and Al-Isra University, respectively. They were selected because they offer e-learning systems to support educational process and they cover the main regions in the country, that is, north, east, and mid-south which attract students from all cities to pursue their degrees in various empirical sciences. Additionally, these three universities attract more than 25% of higher education students in Jordan (Frej and Shehab, 2012).

The technology acceptance model (TAM) is used in our study to explore the main factors influencing technology acceptance, that is, PU and PEU. The TAM has been successfully used by several researchers worldwide to evaluate e-learning acceptance (Selim, 2003; Park *et al.*, 2007; Al-Adwan *et al.*, 2013; Lee *et al.*, 2013; Adewole-Odeshi, 2014; Teo *et al.*, 2014). Apparently, investigating students' acceptance using the TAM is considered a robust methodology not only because of its valid and reliable theoretical framework but also because of its parsimonious and distinct ability to capture the practical and psychological implications concerned with the acceptance of new technologies (Venkatesh and Davis, 2000).

2. Related Work

E-learning is referred to any e-learning system used by a higher educational institution to support the learning process and to facilitate information and knowledge sharing between learners and instructors. Public and private educational institutions worldwide attempted to upgrade their learning environment and facilitate knowledge sharing and transfer (Al-Hawamdeh and Kuntoro, 2003). This technology opens the gate to millions of students worldwide to pursue their study; either by pure online or blended education, no matter their background, location, or resources. It provides several benefits including (1) analytics: the ability to collect detailed information about students' characteristics and performance during the learning process, (2) access: the use of various kinds of gadgets like iPads and e-textbooks in addition to services like Facebook facilitates learners' accessibility and established the stage for a globalised education, (3) adaptivity: the ability of e-learning systems to accommodate different students' needs and (4) assessment: the technology beneath these systems assessing learners in a continuous fashion (Cook and Triola, 2014). In spite of these tangible benefits, some scholars reported failures in the e-learning experience because end users did not perceive the potential benefits of using these systems or because they experienced some difficulties during their interaction (Sun *et al.*, 2008).

Several educational institutions have moved radically towards investment in their learning systems like Korea (Park, 2009), Thailand (Teo *et al.*, 2014), Middle East (Selim, 2003; Al-Adwan *et al.*, 2013; Almarabeh *et al.*, 2014), Taiwan (Lee *et al.*, 2013), Australia (Alsabawy *et al.*, 2013), Africa (Adewole-Odeshi, 2014), and USA (Landry *et al.*, 2006). With the growing adoption of e-learning, a decision has to be made to accept or reject it. The TAM, as a model generated from the theory of reasoned action (TRA) and the theory of planned behaviour (TPB), has demonstrated its ability to assess technology acceptance by focussing on two major determinants, including PU and PEU (Davis, 1989). Based on this theoretical basis, an early study conducted by Abbad *et al.* (2009) addressed the factors affecting students' acceptance of e-learning system in a private university in Jordan that adopt a compulsory scheme of the system usage. Based on the TAM, the authors studied external factors affecting the adoption to understand acceptance behaviour. After conducting their study on more than 400 undergraduate students and using structural equation modelling (SEM) to explain relationships between the factors, they found that Internet experience, self-efficacy, and technical support were the main factors affecting students' beliefs to adopt the system. However, the tested sample reflects a learning experience based on a compulsory use of the e-learning system cannot be generalised to all educational institutions.

Al-Adwan *et al.* (2013) conducted a study in another Jordanian private university to investigate the behaviour of students who attempted to adopt e-learning technology. The authors applied a survey methodology to explore the effect of PU and PEU on attitude and behavioural intention (BI) without exploring the actual use reported by system's users. A regression analysis was conducted to test their model and they found that PEU has a significant effect on PU and students' attitude towards using the system. In addition, the study found that PU has a significant effect on students' BI to use the system but does not significantly influence the attitude towards the system usage. On the other hand, the study showed that students' attitude towards usage has no influence on their intention to use the system. Almarabeh *et al.* (2014) investigated the impact of e-learning system in another university in Jordan and focussed on the effect of external factors on acceptance such as student's college and GPA. Their study found that only PU and attitude directly affect system BI to use e-learning technology. Landry *et al.* (2006) applied the TAM to examine students' perception of actual system usage, PU and EOU of a blackboard system in one of the U.S. universities. The authors used survey methodology to assess users' acceptance and the outcomes supported what has been reported in the literature that PU and PEU have an influence on system usage. Adewole-Odeshi (2014) conducted a study to examine the students' attitudes towards using e-learning system in several southwest Nigerian universities using the TAM. Their study explored the relationship between PEU and attitude. The students found that the e-learning system was easy to use indicating a positive attitude towards the system usage. Additionally, the students agreed that the system enhanced their learning process and increased their productivity. This implied that PU has a

positive influence on the attitude of students towards using e-learning system. The results also manifested that there is a significant relationship between attitude and BI to use the system. A recent trend in e-learning sector in Korea, driven by changing students' demographic factors and technology innovation, motivated researchers to investigate e-learning acceptance by university students. Based on the TAM, Park (2009) proposed a theoretical framework to study students' e-learning acceptance and their BI to use the system. The author intended to study the relationship between students' BI to use the e-learning system and selected factors like their attitudes, PU, PEU, self-efficacy, subjective norm, and system accessibility. Similar to several studies, the TAM manifested its ability to grasp and explain BI to accept e-learning systems. Contrarily, PU and PEU had an insignificant effect on the usage.

3. Theoretical Foundation

The model introduced by Davis more than two decades ago proposed two fundamental determinants of user acceptance, which are PU and PEU (Davis, 1989). Several studies were applied to analyse the TAM. A study conducted by King and He (2006) using statistical meta-analysis revealed that the TAM is a robust and valid model. In this context, it is essential to explore the origins of this model to build a solid theoretical basis for the study. Starting from the TRA, Ajzen and Fishbein (1980) assumed that people hold multiple behavioural beliefs each of which links performance of the behaviour to a different outcome. In other words, it is assumed that these behavioural beliefs and outcome evaluations are combined to generate a positive or negative attitude towards the behaviour. According to this theory, the human behaviour could be predicted by attitudes mediated by BI. After applying further developments to this theory, the authors realised that it could fail to predict and explain all manners of socially significant behaviour since many behaviours can pose serious difficulties of execution. Consequently, having people with little, or people who feel they have little power over their behaviours was considered one of the limitations (Marangunić and Granić, 2015).

Adding the concept of perceived behavioural control (i.e. taking into account a degree of control over the behaviour) to the TRA led to the creation of the TPB. According to the TPB, intention, that is, a function of attitude towards the behaviour, subjective norm, and perceived behavioural control is the immediate antecedent of behaviour. Human behaviour is guided by three kinds of determinants: (1) behavioural beliefs: which are originated from likely consequences and other attributes of the behaviour, (2) normative beliefs: which follow from normative expectations from others, and (3) control beliefs: which follow from factors that may affect performance of the behaviour (Ajzen, 2002, 2011). This theory succeeded only in predicting and understanding the behaviour that is not under a person's volitional control. In other words, it is based on the assumptions that individuals are rational and make decisions based on available information. Accordingly, unconscious motivations were not considered in this theory (Marangunić and Granić, 2015).

Based on the idea of considering the actual use of a system as a behaviour, Davis (1986) proposed the TAM by adapting the TRA and the TPB. In his model, Davis considered the attitude of a person in predicting behaviour rather than subjective norms. Additionally, the model proposed two novel beliefs which are PU and PEU. Davis defined PU as "the degree to which an individual believes that using a particular system would enhance his or her job performance" (Davis, 1986, p. 26) and defined PEU as "the degree to which an individual believes that using a particular system would be free of physical and mental effort." (Davis, 1986, p. 26). Undoubtedly, PU reflects the existence of a use performance relationship between the user and the system, and PEU reflects system acceptance by users when it is designed in a way that makes it easy to use.

Davis *et al.* (1989) provided a better explanation and prediction of user acceptance and rejection of computer usage. The authors found that PEU had a significant but tarnished effect on BI, and the attitude had a partially mediated effect on BI. Therefore, BI was included as a new mediated variable in the model which was directly influenced by PU. However, BI measures the strength of individual's intention to perform a specific behaviour. On the other hand, attitude represents user's positive or negative feelings towards conducting a specific behaviour. In the TAM, BI is jointly determined by attitude and PU.

4. Research Model and Hypotheses

In our study, the TAM proposed by Davis *et al.* (1989) was used to explore students' acceptance of e-learning systems in several Jordanian public and private universities based on their beliefs, which are considered the main antecedents of any technology adoption behaviour. Figure 1 represents the model adopted in the study.

Davis *et al.* (1989) model shows that PU is the main determinant of users' BI and has a direct influence on attitude toward usage (Davis *et al.*, 1989; Selim, 2003; Park, 2009). Furthermore, researchers asserted that PU is a direct indicator of system usage (Davis, 1989; Davis *et al.*, 1989; Venkatesh, 2000). In terms of e-learning

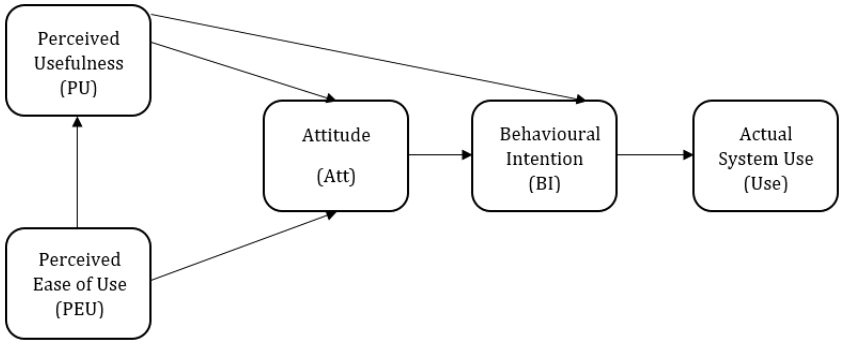


Fig. 1. Research model based on the TAM proposed by Davis *et al.* (1989).

studies, some studies were conducted and their findings confirm the role of PU on BI and attitude (Park *et al.*, 2007; Adewole-Odeshi, 2014). Consequently, we hypothesise that:

H1: PU will significantly affect the students' BI to use the e-learning system.

The TAM showed that PEU has a direct influence on PU and it is a direct determinant of attitude (Davis, 1989; Davis *et al.*, 1989). Also, the TAM hypothesises that PU is influenced by EOU (Davis *et al.*, 1989; Venkatesh and Davis, 2000). However, the strength of PU-systems usage relationship versus the PEU-system usage relationship was noticed by researchers. In other words, users need to feel that the system is useful or they will not use it whether it has functionalities that are easy to use or not (Davis, 1993; Gardner and Amoroso, 2004). As a result, we hypothesise the following:

H2: PEU will significantly affect PU.

The TAM shows that attitude mediates the effects of users' beliefs and BI. Attitude was hypothesised to have a partially mediated effect of PU and PEU beliefs on BI (Davis, 1989). In information systems research, it has been proved that PEU and PU are the main determinants of attitude (Davis, 1989; Venkatesh, 2000). Attitude refers to "an individual's positive or negative feelings about performing the target behaviour" (Davis *et al.*, 1989, p. 984). All endeavours exerted to implement e-learning systems rely mainly on taking into consideration users' attitudes towards the system usage (Al-Adwan *et al.*, 2013). Additionally, Davis indicated that the combined effect of PU, PEU, and attitude would positively affect actual system use and its duration. BI is jointly influenced by PU and attitude towards using the system (Davis *et al.*, 1989; Davis, 1993; Venkatesh, 2000). These findings were supported by multiple e-learning acceptance studies in the literature (Liu *et al.*, 2005; Park *et al.*, 2007; Lee *et al.*, 2013; Adewole-Odeshi, 2014). As a result, we hypothesise the following:

H3a: PU has a significant effect on the attitude towards using the e-learning system.
H3b: PEU has a significant effect on the attitude towards using the e-learning system.
H3c: Attitude towards using the system will significantly affect the students' BI to use the e-learning system.

Davis and others indicated that if we want to evaluate an outcome that is homogeneous across various beliefs, it will be related to actual use of the system (Davis *et al.*, 1989). However, some researchers indicated that actual system use is not widely examined in literature even though it is considered one of the constructs of TAM (Park *et al.*, 2007). In terms of exploring e-learning acceptance in Jordan, a paucity of studies addressed the influence of BI on actual system usage reported by end users, which we aimed to address in our study. Therefore:

H4: BI will significantly affect the students' actual use of the e-learning system.

5. Methodology

5.1. *Sample and procedure*

The participating universities were comprised of public and private institutions distributed in multiple areas in Jordan that have used e-learning systems along with traditional face-to-face learning. Venkatesh stated that actual behavioural experience is influenced by users' experience which could affect their PU and PEU (Venkatesh, 2000). As a result, this study recruited students from several colleges but those with computer and information technology backgrounds. An electronic survey was developed and conducted from March to April 2016 to assess students' acceptance using *Qualtrics* online survey tool. A reminder was sent to some volunteer instructors who announced the survey goal, date, and time. The survey started by a brief introduction and some necessary instructions to complete the study appropriately and the respondents were assured that their information will be handled professionally and kept confidentially.

5.2. *Measurement*

In this study, validated scales were used and contextualised from previous studies. The survey instruments and the corresponding list of source for scale items are

Table 1. Scale items for the conducted survey.

Construct	Item	Supporting literature
PU	PU1. Using the e-learning system during my learning process would enable me to accomplish tasks more quickly. PU2. Using the e-learning system would improve my learning performance. PU3. Using the e-learning system in my learning process would increase my productivity. PU4. Using the e-learning system would enhance my effectiveness on the learning process. PU5. Using the e-learning system would make it easier to do my work. PU5. I would find the e-learning system useful in my learning process.	Davis (1989)
PEU	PEU1. Learning to operate the e-learning system would be easy for me. PEU2. I would find it easy to get the e-learning system to do what I want it to do. PEU3. My interaction with the e-learning system would be clear and understandable. PEU4. I would find the e-learning system to be flexible to interact with. PEU5. It would be easy for me to become skillful at using the e-learning system. PEU6. I would find the e-learning system easy to use.	Davis (1989)
Attitude (Att)	Att1. I dislike the idea of using e-learning tools. Att2. I have a generally favourable attitude towards using e-learning tools. Att3. I believe it will be a good idea to use e-learning tools. Att4: Using e-learning tools is a foolish idea.	Adewole-Odeshi (2014)

Table 1. (*Continued*)

Construct	Item	Supporting literature
BI	BI1. If available, I intend to use e-learning tools during the semester. BI2. If available, I intend to use e-learning tools as frequently as possible. BI3. If available, I intend to use e-learning tools whenever possible for my coursework.	Adewole-Odeshi (2014)
Actual System Use (USE)	USE1. I use the e-learning system a lot to do my course work. USE2. I use the e-learning system whenever possible to do my course work. USE3. I use the e-learning system frequently to do my course work. USE4. I use the e-learning system whenever appropriate to do my course work.	Selim (2003)

presented in Table 1. A 7-point Likert scale survey range from strongly agree to strongly disagree was used to assess the items. The survey contained two main sections; demographic data and items assumed to form the constructs of the proposed model. The demographic data covered students' age, gender, GPA, year of study, the level of Internet experience, Internet access, and web browser used. The second part covered the PU, PEU, attitude, BI and actual use of the system. All these instruments were adopted from previous studies which already tested for validity and reliability.

5.3. *Data analysis*

Responses were gathered from 175 students. All those responses that followed a pattern or conducted insufficiently were excluded resulting in 127 accepted responses. The descriptive statistics for the constructs including items means and standard deviation are presented in Table 2. Partial least squares (PLS) was used to

Table 2. Descriptive statistics.

Construct	Items	Mean	STDEV
PU	PU1	5.07874	1.530672
	PU2	4.425197	1.739
	PU3	4.15748	1.887407
	PU4	4.582677	1.770306
	PU5	5.401575	1.56479
	PU6	5.212598	1.596772
PEU	PEU1	5.724409	1.38402
	PEU2	5.19685	1.469474
	PEU3	5.275591	1.38402
	PEU4	5.275591	1.472915
	PEU5	5.03937	1.52961
	PEU6	5.598425	1.370088

Table 2. (*Continued*)

Construct	Items	Mean	STDEV
Attitude (Att)	Att1	4.692913	1.858109
	Att2	4.590551	1.610256
	Att3	5.307086	1.306345
	Att4	5.346457	1.615294
BI	BI1	5.07874	1.450814
	BI2	4.992126	1.477321
	BI3	5.11811	1.461757
Actual Use (Use)	Use1	4.724409	1.771365
	Use2	4.818898	1.580724
	Use3	4.519685	1.712931
	Use4	5.055118	1.57514

investigate the relationship between the independent and dependent variables (Wold, 1985). The exploratory nature of the model and the inclusion of both formative and reflective constructs supports the use of structural equation modelling (PLS-SEM) (Hair *et al.*, 2012). In order to estimate the relationships in the initial structural models, the analysis was done using SmartPLS 2.0 with path weighting scheme (Ringle *et al.*, 2005). Evaluation of a model within PLS-SEM is a two-step sequential approach that requires the initial assessment of the measurement model, which provides information regarding the reliability and validity of latent constructs. Confirmation of reliability and validity via the measurement model is followed by an evaluation of the structural model (Henseler *et al.*, 2009). It is only possible to make inferences regarding the inner model and their path coefficients after the outer model is confirmed for reliability and validity. This step is essential to test if the empirical data conformed to the presumed model.

With cursory analysis of the descriptive statistics, and an established *a priori* model, the analysis was performed with the raw data set using PLS-SEM. Verification of the internal consistency reliability of the reflective latent indicator variables in the outer model was conducted. As seen in Table 3, indicators met the accepted thresholds for composite reliability (Werts *et al.*, 1974) by exceeding recommended value of 0.7 (Nunnally *et al.*, 1967). We used Smart PLS 2.0 to measure composite reliability. "Composite reliability calculations make use of

Table 3. Reliability analysis results.

	AVE	Composite reliability	*R*-square	Cronbach alpha (α)
Att	0.558	0.832	16.65%	0.742
BI	0.768	0.907	33.57%	0.847
PEU	0.589	0.898	0	0.864
PU	0.592	0.902	28.76%	0.869
USE	0.719	0.910	29.78%	0.869

unequal indicator weighting technique due to which composite reliability is considered superior to Cronbach's alpha when used in context of SEM" (George and Prybutok, 2015).

Convergent validity of the reflective item indicators was verified through the analysis of the outer loadings of the indicator being greater than the accepted threshold of 0.7, or through the verifications of indicators above the minimum cutoff value of 0.4, and the negligible impact of their removal on the composite reliability of the latent reflective construct (Hair *et al.*, 2012). By applying exploratory factor analysis using SPSS, on the model, the total variance explained by the components is 66.798%. The convergent validity results are shown in Table 4.

At the individual reflective construct level, convergent validity was established with the average variance extracted (AVE) value of the reflective latent construct exceeding the established criteria of 0.5 (Fornell and Larcker, 1981). Table 4 shows that factor loadings of items greater than 0.5 are grouped together and are consistent with the theoretical construct on which they are supposed to load. Discriminant

Table 4. Convergent validity.

Rotated component matrix					
Item	Component				
	1	2	3	4	5
PU1	0.723	0.167	0.238	0.231	−0.109
PU2	0.721	0.268	0.237	0.031	0.086
PU3	0.740	0.094	0.043	0.038	0.044
PU4	0.772	0.199	0.171	0.105	0.149
PU5	0.654	0.173	−0.002	0.159	0.138
PU6	0.736	0.265	0.007	0.199	0.240
PEO1	0.135	0.697	0.025	0.158	0.152
PEO2	0.223	0.730	−0.097	0.146	0.246
PEO3	0.173	0.782	0.184	0.023	0.112
PEO4	0.257	0.756	0.105	0.046	−0.065
PEO5	0.325	0.569	0.277	0.072	0.079
PEO6	0.103	0.804	0.031	0.218	−0.020
Att1	0.118	0.079	0.164	−0.034	0.839
Att2	0.186	0.056	0.230	0.277	0.687
Att3	0.153	0.077	0.114	0.546	0.457
Att4	0.037	0.144	−0.075	0.160	0.711
BI1	0.277	0.238	0.161	0.743	0.080
BI2	0.209	0.103	0.222	0.759	0.228
BI3	0.083	0.196	0.333	0.789	0.066
Use1	0.193	0.053	0.800	0.166	0.051
Use2	0.244	−0.012	0.820	0.227	0.170
Use3	0.121	0.112	0.860	0.109	0.161
Use4	−0.081	0.300	0.667	0.401	−0.091

Note: Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalisation. The Rotation converged in six iterations.

Table 5. Discriminant validity.

	Att	BI	PEO	PU	USE
Att	**0.746**	0	0	0	0
BI	−0.509	**0.875**	0	0	0
PEU	−0.326	0.423	**0.772**	0	0
PU	−0.381	0.449	0.536	**0.779**	0
USE	−0.354	0.545	0.311	0.364	**0.847**

validity was supported through the analysis of indicator cross loadings. Additionally, the indicators were consistent with the Fornell–Larcker criterion (Fornell and Larcker, 1981) that the square root of the AVE values of the reflective constructs should be higher than the highest correlation of the latent constructs (see Table 5).

5.4. *Structural model*

SEM is being used widely in management information systems research because of its strength to explore and understand the factors behind IT usage (Chin and Todd, 1995). The cultural and environmental difference, the lack of studies investigating e-learning acceptance in Jordanian higher educational institutions and the number of responses led us to use partial least square SEM (PLS-SEM). PLS-SEM is considered a robust statistical analysis method because of the minimal demands required, such as sample size and measurement scales. Hoyle indicated that a sample size larger than 100 is considered acceptable in carrying out PLS path modelling (Hoyle, 1995). In addition, this model can be used for theory confirmation and test suggested relationships among variables (Chin, 1998).

After the confirmation of the reliability and validity of the outer measurement model, the individual path coefficients from the inner structural model were examined. Estimated bootstrap standard error was generated to calculate the T-statistics with the recommended 5,000 bootstrap samples (Hair *et al.*, 2012). R-squared (R^2) coefficients that reflect the percentage of the explained variance by the model latent variables are also calculated. The value of R^2 ranges from 1.0 (perfect prediction) to 0.0 (no prediction). Figure 2 shows that all variables have significance in predicting the actual system use since we have 127 respondents and 0.05 significance level (Hair *et al.*, 2012).

Convergent validity was established through redundancy analysis of the individual latent formative constructs. Analysis of the collinearity diagnostics shows acceptable levels of inter-item correlation among the first-order indicators. Also, verification of the significance of the indicator weights of the individual first-order reflective latent constructs that comprise the higher order formative construct confirms the presence of each underlying latent factor (Hair *et al.*, 2012). Figure 3 shows the T-Statistics from SmartPLS 2.0.

The hypotheses were tested using SmartPLS 2.0. The total number of survey responses was 174 and the response rate was 72%. 81% of the respondents were

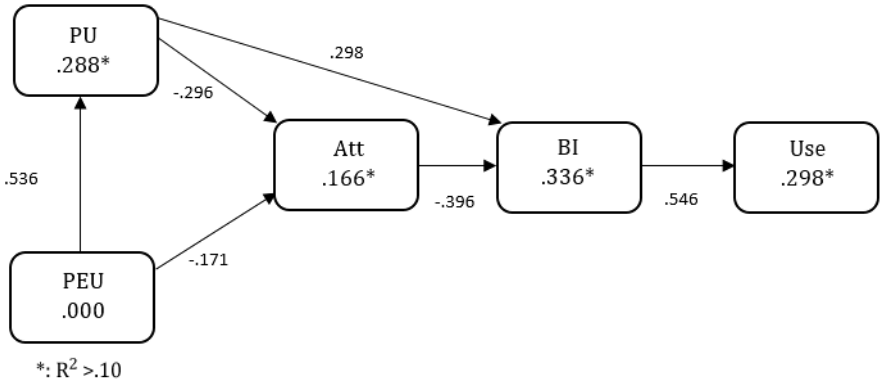
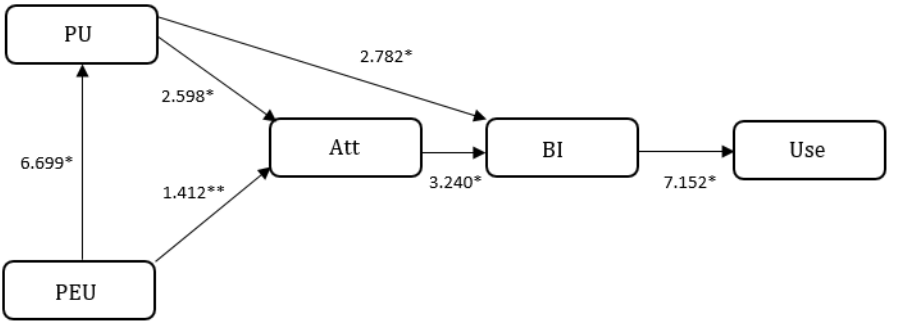


Fig. 2. R^2 from SmartPLS 2.0.



Note: *: T-statistics > 1.96 **: T-statistics < 1.96

Fig. 3. T-statistics from Smart PLS 2.0.

females, 72% of the students were sophomores, 68% of them have an intermediate level of experience in using the Internet, and 98% of them have access to it. According to Fig. 3, all hypotheses are supported except for *H3b* since it has less than 1.96 of T-statistics value (Hair *et al.*, 2012). Also, we noticed from the T-statistics test that the strongest supporting hypothesis is *H4* whilst the less supporting one is

Table 6. A summary of hypothesis testing.

Hypotheses	Path	T-statistics value	Result
H1	PU → BI	2.782*	Supported
H2	PEU → PU	6.699*	Supported
H3a	PU → Att	2.598*	Supported
H3b	PEU → Att	1.412**	Not Supported
H3c	Att → BI	3.240*	Supported
H4	BI → Use	7.152*	Supported

Note: *: T-statistics > 1.96 **: T-statistics < 1.96.

H3a. Additionally, the result showed that the effect of BI on actual system usage, which has not been addressed sufficiently before in e-learning sector in Jordanian higher educational institutions, is the main determinant of actual system use which is consistent with Davis *et al.* (1989) conclusions. Table 6 shows a summary of the hypothesis testing.

6. Discussion and Conclusions

This study explored e-learning acceptance in multiple public and private Jordanian higher educational institutions and examined this sector readiness to adopt e-learning technology on an institutional basis rather than on individual initiatives. Because of the limited conducted research and the varying cultural perspectives that have been found underestimating the technology benefits and value for both students and educational sector alike, this study expanded our understanding to e-learning systems adoption behaviour of students in multiple universities and to portray the current perspectives of students pertaining this technology usage. TAM was selected because of its robust theoretical framework and its capability to capture practical and psychological implications related to individuals' perceptions pertaining e-learning usage. The survey items were tested for reliability and validity and the hypotheses were examined using PLS_SEM which has not been widely used in prior studies conducted in Jordan. This technique is considered powerful with the potentials to identify relationships between constructs that could not be easily found by other models (Hair *et al.*, 2012). The descriptive statistics indicate that the majority of students were females with moderate experience in using the Internet and most of the participants have Internet access. This could imply that the Internet accessibility and ICT growth in Jordan plays a major role in adopting e-learning although the majority experience level is recorded between primitive to intermediate. Thus, educational institutions need to pay more attention to providing students with Internet access and technologies.

Our results have not been found aligned with some of the few individual studies conducted in Jordan. PEU effect on students' attitude towards e-learning usage is mediated by PU. With respect to the survey participants, 12% of the students are not familiar with using the Internet and 68% have moderate experience. This modest percentage of experience level might imply that the students might not find the system easy enough and they need further practice to accomplish their daily tasks and duties. Sun *et al.* (2008) indicated that the attitude of technology experienced users would be more positive and less anxious. Thus, higher educational institutions need to provide more training and assistance to enhance students' technical skills. On the other hand, we notice that PEU has a noticeable impact on PU, which conforms to prior studies (Davis, 1989; Al-Adwan *et al.*, 2013). Generally, when we have two identical functioning systems, users tend to consider the one which is more easier to use (Davis, 1993). Our findings also demonstrate that PU has a significant effect on BI and attitude, which leads us to presume that the students believe that

e-learning is beneficial to their academic work, and these beliefs drive their attitudes to adopt it regardless of its easy to use functionalities.

The effect of BI on actual system usage, which has not been considered sufficiently in previous studies conducted in Jordan, is also addressed in this study. Generally, educational institutions cannot realise the return on their investments in e-learning technology unless they evaluate the actual use of the system. Some studies indicated that BI did not significantly influence the actual behaviour of users. On the other hand, our results indicated that BI has a significant role in describing actual system use which supports the literature such that TAM can be used as a strong theoretical basis to describe users' adoption behaviour for a technology. However, these results were different from prior studies conducted in Jordan concluding that attitude has an insignificant effect on BI and PU has no significant effect on attitude (Al-Adwan *et al.*, 2013; Almarabeh *et al.*, 2014). Therefore, our findings imply that the cultural perspectives might be altering, and students start considering this technology useful and necessary to learn and share knowledge. Thus, the higher education sector could be earnestly ready to move towards adopting this technology on a wider basis.

Although our study explored students' acceptance in multiple educational institutions, the sample only covered three of the major public and private universities in Jordan during one semester. Because instructors volunteered to participate in the survey, the classes were not selected randomly. As a result, the results we found may vary due to the changes of time and selected sample and this may not be generalised to all universities in Jordan or another country. It is expected that our study could provide a better understanding of students' acceptance level of e-learning in Jordanian higher educational institutions. This could provide a foundation to apply further research to explore the role of external factors in this acceptance. Also, factors from other technological areas could be imported to e-learning milieu. Therefore, new theoretical foundations can be used to provide a better understanding of the effect and relationships between the proposed factors.

7. Study Implications

Besides exploring students' beliefs towards e-learning adoption in multiple higher educational institutions, this study addresses students' beliefs towards e-learning technology. Our results show that the students might be more aware of the benefits brought by e-learning technology in terms of acquiring and sharing knowledge. Moreover, students' beliefs that seem to be more rational and less resistant to this innovation could be an indication that it is ready for the educational sector to adopt e-learning. Their beliefs pertain to e-learning usefulness and ease of use, that is to say, the main antecedents of technologies acceptance as indicated by multiple researchers could be a potential evidence on a change of the cultural values that used to resist e-learning and underestimate its potentials and benefits for all axes of the education process. Future research needs to focus on the factors that might influence this possible transition and try to expand government efforts to utilise this

technology. In summary, education sector in Jordan spares no effort to raise the quality of learning outcomes and harnesses all possible resources to handle limited potentials and face obstacles that might arise under the current situation of the surrounding economic crises; however, these endeavours need to be expanded to comprise all higher educational institutions by adopting e-learning technology which has been found to be very beneficial to the educational sector.

References

Abbad, MM, D Morris and C de Nahlik (2009). Looking under the bonnet: Factors affecting student adoption of E-learning systems in Jordan. *International Review of Research in Open and Distance Learning*, 10(2), 1–25.

Abdel-Jaber, H (2017). Experimental analysis of students' satisfaction factors in e-Learning environment: A case study on Saudi arabian university. *Journal of Information & Knowledge Management*, 16(2), 1750018.

Adewole-Odeshi, E (2014). Attitude of students towards e-learning in South-West Nigerian universities: An application of technology acceptance model. *Library Philosophy and Practice (e-Journal)*, Paper 1035.

Ajzen, I (2002). Perceived behavioral control, self-efficacy, locus of control, and the theory of planned behavior. *Journal of Applied Social Psychology*, 32(4), 665–683.

Ajzen, I (2011). The theory of planned behavior. In *Handbook of Theories of Social Psychology*, Vol. 1, PAM Van Lange, AW Kruglanski and TE Higgins (eds.), pp. 438–460. London: Sage Publications.

Ajzen, I and M Fishbein (1980). *Understanding Attitudes and Predicting Social Behaviour*. Englewood Cliffs, NJ: Prentice-Hall.

Al-Adwan, A, A Al-Adwan and J Smedley (2013). Exploring students acceptance of e-learning using technology acceptance model in Jordanian universities. *International Journal of Education and Development Using Information and Communication Technology*, 9(2), 4–18.

Al-Adwan, A and J Smedley (2012). Implementing e-learning in the Jordanian higher education system: Factors affecting impact. *International Journal of Education and Development Using Information and Communication Technology*, 8(1), 121–135.

Al-Hawamdeh, S and RD Kuntoro (2003). E-learning in higher educational institutions in Indonesia. *Journal of Information & Knowledge Management*, 2(4), 361–374.

Almarabeh, T, H Mohammad, R Yousef and YK Majdalawi (2014). The University of Jordan e-learning platform: State, students' acceptance and challenges. *Journal of Software Engineering and Applications*, 7, 999–1007.

Alsabawy, AY, A Cater-Steel and J Soar (2013). IT infrastructure services as a requirement for e-learning system success. *Computers and Education*, 69, 431–451.

Al-Yaseen, H, S Al-Jaghoub and N Al-Salhi (2011). Issues and challenges in implementing eLearning projects in higher education: The case of Jordan. In *Proceedings of the 10th European Conference on E-Learning: ECEL*, Brighton, UK, 10–11 November, pp. 16–22.

Alzeny, I (2015). Distance education — Banned in Bahrain. Available at https://www.alfanarmedia.org/2015/03/distance-education-banned-in-bahrain/. Accessed on 6 May 2017.

Chin, WW (1998). The partial least squares approach to structural equation modeling. *Modern Methods for Business Research*, 295(2), 295–336.

Chin, WW and PA Todd (1995). On the use, usefulness, and ease of use of structural equation modeling in MIS research: A note of caution. *MIS Quarterly*, 19(2), 237–246.

Cook, DA and MM Triol (2014). What is the role of e-learning? Looking past the hype. *Medical Education*, 48(9), 930–937.

Davis, FD (1986). A technology acceptance model for empirically testing new end-user information systems: Theory and results, Doctoral dissertation, Massachusetts Institute of Technology.

Davis, FD (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*, 13(3), 319–340.

Davis, FD (1993). User acceptance of information technology: System characteristics, user perceptions and behavioral impacts. *International Journal of Man–Machine Studies*, 38(3), 475–487.

Davis, FD, RP Bagozzi and PR Warshaw (1989). User acceptance of computer technology: A comparison of two theoretical models. *Management Science*, 35(8), 982–1003.

Fornell, C and DF Larcker (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research*, 18, 39–50.

Frej, K and Z Shehab (2012). Higher education in Jordan, reality and challanges. Federation of Arab Universities News, pp. 1–6. Available at http://aarunews.ju.edu.jo/Lists/EventsAndNews/DisplayNews.aspx?id=558. Accessed on 5 January 2017.

Fullan, M and G Smith (1999). Technology and the problem of change. Available at http://www.michaelfullan.ca/wp-content/uploads/2016/06/13396041050.pdf. Accessed on 10 December 2016.

Gardner, C and DL Amoroso (2004). Development of an instrument to measure the acceptance of Internet technology by consumers. In *Proceedings of the 37th Annual Hawaii International Conference on System Sciences*, Big Island, HI, USA, 5–8 January, pp. 1–10.

George, B and V Prybutok (2015). Development of a polar extreme method for use in partial least squares SEM. *Quality & Quantity*, 49(2), 471–488.

Hair, JF, M Sarstedt, TM Pieper and CM Ringle (2012). The use of partial least squares structural equation modeling in strategic management research: A review of past practices and recommendations for future applications. *Long Range Planning*, 45(5), 320–340.

Henseler, J, CM Ringle and RR Sinkovics (2009). The use of partial least squares path modeling in international marketing. *Advances in International Marketing*, 20, 277–319.

Hill, CE, KD Loch, D Straub and K El-Sheshai (1998). A qualitative assessment of Arab culture and information technology transfer. *Journal of Global Information Management*, 6(3), 29–38.

Hoyle, RH (1995). *Structural Equation Modeling: Concepts, Issues, and Applications*. Thousand Oaks: Sage Publications.

Kasem, S, S Hammami and MN Alraja (2015). Elearning environment as a facilitator for knowledge creation using SECI model in the context of BA. *Journal of Theoretical and Applied Information Technology*, 80(2), 372–380.

King, WR and J He (2006). A meta-analysis of the technology acceptance model. *Information and Management*, 43(6), 740–755.

Landry, BJL, R Griffeth and S Hartman (2006). Measuring student perceptions of Blackboard using the technology acceptance model. *Decision Sciences Journal of Innovative Education*, 4(1), 87–100.

Lee, H, JW Kim and R Hackney (2011). Knowledge hoarding and user acceptance of online discussion board systems in eLearning: A case study. *Computers in Human Behavior*, 27(4), 1431–1437.

Lee, Y, Y Hsieh and Y Chen (2013). An investigation of employees' use of e-learning systems: Applying the technology acceptance model. *Behaviour & Information Technology*, 32(2), 173–189.

Liaw, S-S (2008). Investigating students' perceived satisfaction, behavioral intention, and effectiveness of e-learning: A case study of the Blackboard system. *Computers and Education*, 51(2), 864–873.

Liu, S, C Yuan and C-J Peng (2005). Applying the technology acceptance model and flow theory to online e-learning users' acceptance behavior. *International Association for Computer Information Systems*, 5(2), 175–181.

Marangunić, N and A Granić (2015). Technology acceptance model: A literature review from 1986 to 2013. *Universal Access in the Information Society*, 14(1), 81–95.

MoHESR (2009). National eLearning strategy for higher education. Available at https://www.uop.edu.jo/download/research/members/Gissa-elearn-jordan.pdf. Accessed on 12 September 2015.

Nunnally, JC, IH Bernstein and JT Berge (1967). *Psychometric Theory*, Vol. 226. New York: McGraw-Hill.

Park, N, KM Lee and PH Cheong (2007). University instructors' acceptance of electronic courseware: An application of the technology acceptance model. *Journal of Computer-Mediated Communication*, 13(1), 163–186.

Park, SY (2009). An analysis of the technology acceptance model in understanding university students' behavioral intention to use e-learning. *Educational Technology & Society*, 12(3), 150–162.

Pazos, J, J Azpiazu, A Silva and A Rodríguez-Patón (2002). A virtual classroom based on academic memories. In *Proceedings ICTE2002 of Information Society and Education: Monitoring a Revolution*, Badajoz, Spain, pp. 87–92.

Ringle, CM, S Wende and A Will (2005). *SmartPLS 2.0 (M3) Beta*. Hamburg, Germany: University of Hamburg.

Saadé, R (2003). Web-based educational information system for enhanced learning, EISEL: Student assessment. *Journal of Information Technology Education*, 2(1), 267–277.

Selim, HM (2003). An empirical investigation of student acceptance of course websites. *Computers and Education*, 40(4), 343–360.

Sun, PC, RJ Tsai, G Finger, Y-Y Chen and D Yeh (2008). What drives a successful e-learning? An empirical investigation of the critical factors influencing learner satisfaction. *Computers and Education*, 50(4), 1183–1202.

Teo, T, N Ruangrit, J Khlaisang, T Thammetar and K Sunphakitjumnong (2014). Exploring e-learning acceptance among university students in Thailand: A national survey. *Journal of Educational Computing Research*, 50(4), 489–506.

Venkatesh, V (2000). Determinants of perceived ease of use?: Integrating control, intrinsic motivation, and emotion into the technology acceptance model. *Information System Research*, 11(4), 342–365.

Venkatesh, V and FD Davis (2000). A theoretical extension of the technology acceptance model: Four longitudinal field studies. *Management Science*, 46(2), 186–204.

Werts, CE, RL Linn and KG Jöreskog (1974). Intraclass reliability estimates: Testing structural assumptions. *Educational and Psychological Measurement*, 34(1), 25–33.

Wold, H (1985). Systems analysis by partial least squares. In *Measuring the Unmeasurable*, P Nijkamp, H Leitner and N Wrigley (eds.), pp. 221–252. Dordrecht, The Netherlands: Martinus Nijhoff.

Yordanova, K (2007). Integration of Knowledge management and e-learning — common features. In *International Conference on Computer Systems and Technologies*, Rousse, Bulgaria, 14–15 June, pp. 1–6.

Zuvic-Butorac, M, N Rončević, D Nemčanin and Z Nebić (2011). Blended e-learning in higher education: Research on students' perspective. *Issues in Informing Science and Information Technology*, 8, 409–429.