Factors Influencing the Adoption of E-Learning in Jordan: an Extended TAM Model

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Abstract

This study examines the factors contributing to attitudes towards E-Learning in higher education among students in Jordan. The research developed a TAM-EL (Technology Acceptance Model for E-learning) for predicting the intention to adopt E-Learning using the constructs of the Technology Acceptance Model (TAM). TAM-EL proposes that Perception of usefulness of technology, Perception of ease of use of the technology, Patronised (degree of support for the technology), and Practised (previous experience with the technology) influence attitude towards the adoption of E-Learning. Data was collected from 380 undergraduate students to test the model. Factor analysis and confirmatory factor analysis were used to validate the instrument, however; the partial least square method was used to test the model for the study, moreover; stepwise regression analysis were used to test the hypotheses of the study. The findings indicate that students have an important role as stakeholders in the adoption of E-Learning in Jordan. While the variable of Attitude contributes to approximately 57% of the variance in the Prediction of E-Learning, the variable of Patronised contributes only approximately 28% of the variance in the Prediction of E-Learning. Moreover, the findings show an obvious recommendation is the need to engage users in a more determined manner.

Keywords: E-Learning; Technology Acceptance Model for E-Learning (TAM-EL); Perception; Patronised; Practised.

1. Introduction

E-Learning is the use of internet-based courses or programs that deliver instruction using pedagogical tools as part of a formal educational program (Debbagh, 2005; Seok, 2008). The development of E-Learning is a result of the growth of information and communications technology (ICT) in education because of the need to provide education for larger numbers of students as well as training (Karlsudd & Tagerud, 2008; Stensaker, Maassen, Borgan, et al., 2007).

E-Learning differs significantly from traditional classroom education because it can be both synchronous and asynchronous (Desai, et al, 2008). With synchronous E-Learning, students and faculty interact simultaneously at a specific time using the internet for direct communication. With asynchronous E-Learning, the students and faculty interact at different times by placing messages or coursework in files that are accessed at different times. With either approach, E-Learning provides the advantage of allowing an educational institution to provide learning without requiring the physical presence of the student or faculty on the institution's campus, which theoretically increases students' access to higher education. Another advantage of E-Learning is the flexibility it provides to students that can accommodate various types of learning styles (Lam & Bordia, 2008). Using E-Learning in education can also reduce costs for the institution and for the students.

In the last decade, there has been an increasing global trend of using E-Learning in higher education; however, the technology has not been evenly dispersed throughout all groups and cultures (Hodgkinson-Williams, Slay, & Sieborger, 2008). This disparity was prevalent in many countries across the Middle East, including Jordan.

Many higher education institutions in the Middle East are increasing their emphasis on ICT education and access because of the need for these institutions to compete with universities outside the region in retaining students (Lefrere, 2007). The attitude towards E-Learning adoption varied in these countries. In Turkey there was a generally positive attitude towards E-Learning (Inal, Karakus & Cagiltay, 2008). In contrast, the rates of adoption of E-Learning in Jordan and the UAE have been slow (Alshara & Alsharo, 2007). This can be partially attributed to the difficulties with the practical development and implementation of E-Learning programs.

Various reasons explaining the resistance to E-Learning among students, administrators and educators in higher education has been offered by many researchers. For instance, Jones & Gregor (2006) emphasize that insufficient ICT infrastructure at the national and institutional levels discourage the adoption of E-Learning because students and administrators do not have adequate internet connectivity or bandwidth to support transmitting large files. Additionally, Stella & Gnanam (2004) point that the absence of technical support (patronized) services from the educational institution also fosters a perception among educators and students that E-Learning may not be a practical educational solution because of difficulties resolving technical problems in a timely manner. Moreover, an educational institution can slow the rate of diffusion of E-Learning in the organisation by placing relatively low value on the importance of ICT and E-Learning, which discourages educators from adopting learning methods mediated by ICT (Minishi-Majanja & Kiplang'at, 2005).

Students' attitudes towards E-Learning are dependent on access to ICT as well as the perception of the usefulness of E-Learning in the educational process (Kirkwood & Price, 2005). Students' attitudes are also influenced by their previous experience (Practised) with ICT and E-Learning.

The issue of ICT use in higher education and the factors influencing the adoption of E-Learning in Jordan have not been extensively investigated before. Countries in the region have both private and public institutions, with similar structure of the educational system (Jensen, 2006). Additionally, the higher education systems in the Middle East countries are facing stakeholder pressures to adopt many of the educational practices found in western university systems (Lefrere, 2007), including E-learning. This study investigates the effect of student attitudes on the adoption of E-Learning in universities in Jordan. The study uses the Technology Acceptance Model (TAM), which postulates that the subjective norms and perceptions of individuals influence attitudes towards a technology, with attitude as the best predictor of the intention to adopt a technology (Shin & Kim, 2008). This study proposes the use of an extended model; the TAM-EL, which stipulates that the perception of the technology, experience (Practised) with using the technology, and the subjective assessment of the degree of support (Patronized) for use of the technology, are the primary factors influencing attitude and the intention to adopt the technology. The extended model is used to determine the way in which individuals view and use a specific technology. This model was used in this study because it identifies key variables that can be measured and analyzed to support an empirical assessment of the effect of the variables on the intention to adopt E-Learning.

The rest of this paper is organised as follows. In section 2 and section 3 we discuss the theoretical background and the expanded TAM model. Section 4 presents the research hypotheses. Research instrument and analysis is discussed in section 5. Finally, we discuss the findings in section 6 and provide a conclusion in section 7.

2. Theoretical Background

A critical review of the literature regarding stakeholder attitudes offers insight into how students' attitude might influence E-Learning adoption in institutions of higher education in Jordan. It is important however, to identify a theoretical framework within which the relationship between attitudes towards ICT and the adoption of E-Learning methods and strategies can be examined. The related theory supports the assumption that positive attitudes towards ICT can drive the development of E-Learning by fostering acceptance and application of this educational model in Jordan's system of higher education.

In this paper, the Technology Acceptance Model (TAM) is used to explain the willingness of stakeholders to accept ICT and its components. The model, as presented in Figure 1, relates system design features, perceived usefulness, perceived ease of use, and attitude towards using and actual usage behaviour (Davis, 1993). The TAM is based on principles derived from psychology, which attempts to understand and measure the "behaviour-relevant components of attitudes" and makes possible the understanding of how external stimuli can influence the beliefs, attitudes and behaviour of the individual towards such a thing as technology (Davis, 1993, p. 476).

Figure 1: Technology Acceptance Model (Davis, 1993)
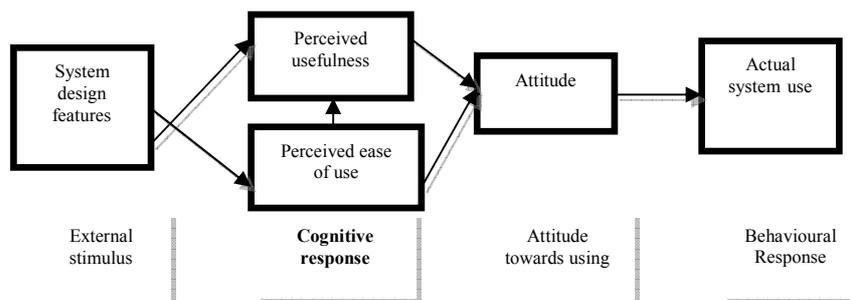
The TAM is predicated on the assumption that "both the attitude towards an action and subjective norm have an impact on behavioural intention, which in turn affects how people perform the action" (Shin & Kim, 2008, p. 379). Therefore, the model can be effectively applied to provide insight into the specific variables which influence the decision of the individual to engage in technology use. Issues such as the perceived usefulness of technology and the ease of use of technology are considered to be essential elements for understanding technology acceptance. These issues facilitate decision making of the individual or the group, and explain how technology adoption will occur.

Schneberger, Amoroso and Durfee (2008) noted that this model provides a method for understanding the process by which technology is used by the individual. By examining specific factors related to the perceived usefulness and perceived ease of use, this model provides important insights regarding the development of attitudes and behaviours towards technology. Perceived usefulness, in this case, is defined as "the extent to which a person believes that using a technology will enhance her/his productivity". Perceived ease of use is "the extent to which a person believes that using a technology will be free of effort" (Schneberger, Amoroso & Durfee, 2008, p. 76). The behavioural intentions which are developed in this context will provide insight into actual system use.

The Technology Acceptance Model can provide such important insights into the development of decision making with regard to technology acceptance and rejection. It is pertinent therefore to consider how this model can be used for understanding both ICT and E-Learning adoption in higher education.

Park, Lee and Cheong (2007) used TAM to examine the process of acceptance of electronic courseware by university instructors. In total 191 university educators were surveyed regarding their intention to use electronic courseware. The data collected indicate that ease of use for courseware had a definite impact on developing positive perceptions of courseware among university educators. This ease of use influenced behavioural intentions of educators to use the courseware, demonstrating the efficacy of the model in understanding the acceptance of new technologies in the university environment.

The role of students, their attitudes and the overall influence of these attitudes on the development of E-Learning adoption in higher education must be further examined. The relationship between stakeholders and their influence on each other in the development of technology and E-Learning acceptance must also be considered. These relationships should be determined through an investigation of the stakeholders identified and the specific external variables that influence their attitudes towards ICT including Perception, Patronised and Practised factors. The TAM is likely to be relevant in understanding the current stakeholder attitudes for ICT in the development of E-Learning in higher education in Jordan.

3. The Expanded Model

The present study expands the original TAM by integrating a new construct that addresses the following variables: Perception, Patronised (degree of support), and Practised. Because the TAM supports the assumption that external factors influence the adoption of ICT, the modification of the TAM is regularly carried out in the research to reflect variables unique to regional and/or local contexts (Musa, 2006). This requires an understanding of the factors that influence the acceptance of ICT and the application in E-Learning, which can be then used to modify the TAM and address the unique characteristics of the population to be studied.

The following section provides a review of the literature on these external variables as well as a discussion of the relationship between these factors and the TAM variables of perceived usefulness, perceived ease of use, attitude towards using ICT and actual use of E-Learning. For this paper, the expanded model will be called the TAM-EL.

3.1 The Relationship between External Variables and TAM Variables

Identifying the relationship between the external variables and the TAM variables in the integrated model (see Figure 2) is essential to understand how external factors might influence the attitudes that drive ICT, and how those attitudes can ultimately contribute to the proliferation of E-Learning.

Figure 2: The Extended Model
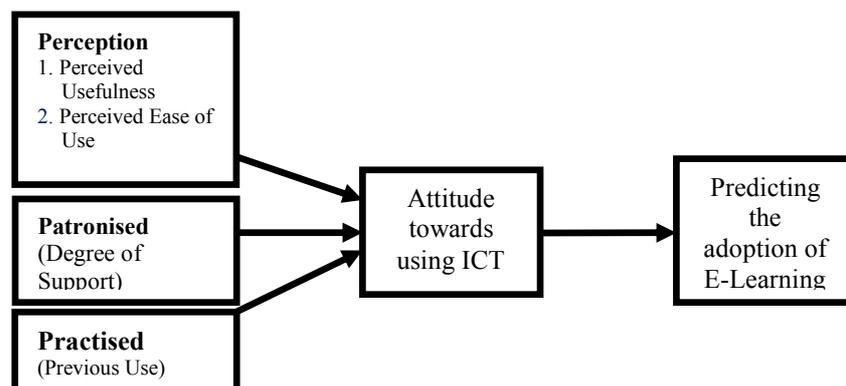
3.1.1. The Perception Factor

For the purpose of the study, individual perception is handled as an external factor for its significance in influencing distinctly personal responses in the form of perceptions of usefulness, perceptions of ease of use, attitudes to technology (i.e. ICT) and actual use of technology (i.e. E-Learning methods and strategies). Calsoyas (2005) suggests that individual perception plays a significant role in how one responds to things, where individual perception is intrinsically influenced by broader external factors such as culture, environment, and belief systems. Individual perception will, in turn, influence the development of specific perceptions of these factors. This chain of inter-connectedness explains why some variables like technology, are readily embraced at the individual, institutional and governmental levels in some cultures, and not in others. It is important to note that TAM has been identified for it appropriateness in investigating how national culture impacts on the acceptance and implementation of technology (Veiga, Floyd & Dechant, 2001).

An ideal example of this inter-connectedness is demonstrated in how the perceived usefulness of ICT influences the application of E-Learning methods and strategies in higher education. In a study examining the development of E-Learning for organizations of higher education in the United Arab Emirates (UAE), Randeree (2008) discovered that increased use of ICT in the region has spurred greater interest in the development of E-Learning in higher education. This demonstrates how broader cultural shifts can influence individual perception. Randaree (2008) also suggests that a framework of organizational support is necessary to provide institutions of higher education and their educators with the ability to translate individual perceptions into a real application of E-Learning methods and strategies.

The relationships between individual perception, perceived usefulness and perceived ease of use of technology are relatively straightforward. Similar to the results in the UAE study, a proliferation of ICT in Jordan or the surrounding region could manifest a similar cultural shift and influence on individual perception of technology in general, and the perception of its usefulness and ease of use, in particular.

Although there is limited research on this relationship with regard to education in Jordan, an extensive amount of research exists to prove this relationship, which can be reasonably generalized to the educational environment in Jordan.

Wu, Change and Guo (2008) looked at factors that motivated secondary teachers to accept technology in the educational environment. The authors concluded that the perceptions of teachers on the usefulness and ease of use of computer technology were strongly determined by whether or not they believed that the use of technology was an appropriate fit in the classroom environment.

Alsunbul (2002) suggests an even broader influence on individual perception in the form of a global cultural movement towards distance education, which the research contends present major implications for the Arab World. This is especially true for a region of the world where many individuals seeking higher education are often unable to gain admission into colleges and universities (p. 61). This phenomenon suggests that individuals who were denied access to a conventional higher education would likely find the concept of E-Learning a viable and privileged option for pursuing an academic career, and would, therefore, develop a positive individual perception of technology. In this case, ICT would certainly demonstrate its usefulness while perceptions on ease of use would be supported by the quality of information and/or experience in E-Learning obtained by the student.

In Jordan, the government has demonstrated a strong interest in modernizing its educational system with the goal of "raising the level of Jordanian students to become more competitive in the labour market" ("King Meets French," 2007). In terms of addressing the diverse needs of students, the research shows that the Jordanian education system is already "adapting innovative methods of teaching and technology to further advance the quality of education" ("Harvard's Women's Leadership Board," 2007).

Findings like these confirm that the relationship between individual perception and attitude towards using ICT could manifest an indirect but significant influence on the actual use of E-Learning in Jordan. Even more, the findings present important implications for understanding how individual perceptions among the stakeholders identified will influence their attitudes on ICT as well as contribute to the actual use of E-Learning in Jordan's system of higher education.

3.1.2. The Patronised Factor

This factor, which signifies the role of support, addresses the assumption that the acceptance of technology depends on the level of support that technology is given with regard to its introduction and application in society. Numerous publications throughout the Middle East including Jordan have documented the growing interest and support of technology in education. This is especially true of E-Learning, which has been perceived for several years as the vehicle by which Jordanian students will be made better equipped to compete outside the academic arena. The positive perception on the usefulness of technology is manifested at the highest level of government, as Jordan's king and queen advocated the use of technology and E-Learning in specific on several occasions ("Queen Rania Briefs US," 2005; "King Meets French," 2007).

The level of support factor bears a major influence on both the perception of usefulness and the perception of

ease of use. In the same way that Jordan's king and queen influence a positive perception of technology's usefulness, a positive perception of technology's ease of use can be developed through the support of entities that are prepared and equipped to demonstrate its use. These can include public agencies as well as public and private institutions willing to advocate the use of ICT and offer opportunities for educators and students to familiarize themselves with its various applications.

Fusilier and Durlabhji (2008) established that university support in combination with student training and attitude, were significant predictors of perceived ease of use and ultimately, of technology usage. Although the researchers looked specifically at the role of support in influencing Internet use among university students, the findings can reasonably be generalized to other uses of ICT such as E-Learning methods and strategies.

Literature confirms that the role of support is especially evident when it comes to fostering the actual use of technology, as it is predicated on the widely-held belief that organizational support is a "driving" factor in technology usage (Bhattacherjee & Hikmet, 2008, p. 69). The authors also established that organizational support is capable of influencing perceptions of usefulness and ease of use and, in turn, influencing the acceptance of technology. The willingness of employees to use technology will then influence further development, use and acceptance of technology in the organization as a whole.

Teachers are believed to manifest a considerably greater level of influence than students in the education process. As a consequence, their part in the role of support has a significant bearing on acceptance decision and the degree to which student demands for technology in education will be met. Gong, Xu and Yu (2004) investigated this relationship in a study examining the use of technology among several hundred Japanese teachers. The researchers recognized that teachers have considerable control when it comes to the acceptance and application of technology in the educational environment because they are "relatively independent and have considerable autonomy over their teaching activities, including technology choice" (p. 365). Using the TAM in combination with social cognitive theory, the researchers employed a framework of analysis that revealed the teachers' computer self-efficacy was one of the most significant determinants in perceived ease of use and the actual use of technology (p. 371). The findings suggest that unless teachers are confident in their own ability to use technology, they will likely be reluctant to support its application in their own classrooms or in higher education in general.

The importance of support in driving the acceptance of ICT and E-Learning in higher education in the Middle East is fairly evident. Kilic et al. (2006) found that while many teachers in the region have positive perceptions towards technology, they also complain of significant barriers to the development and implementation of technology in higher education. More specifically, the researchers found that support in the form of preparation for and training in the use of technology were needed. This finding suggests that in order to improve or increase the acceptance of ICT among educators in the Middle East in general, and in Jordan, in particular, course work and/or training should be developed and implemented that better prepares teachers for the use of technology in the educational environment.

Wu and Lederer (2009) considered the variables that influence perception of usefulness of technology in the organization as support mechanisms. Specifically, the researchers noted that the willingness of users in an organization to accept and engage with new technology is determined by the presence of social influence or voluntariness as supporting mechanisms; that is, the social context for the development of new technology will have a direct impact on individual perceptions regarding ease of use, usefulness of the technology and willingness to use the technology. This indicates the important role of stakeholders who are in a position of influence and power sufficient to foster broad social acceptance of ICT.

3.1.3. The Practised Factor

Al-Gahtani and King (1999) established that attitudes, especially as they are developed through satisfaction, could be influenced by certain external variables such as training, computer experience and computing support. The results revealed that perception of ease of use, satisfaction and relative advantage could be predicted by an individual's experience with and exposure to technology, as well as by the support that they received in the understanding and use of that technology. Additionally, the actual use of technology could be predicted by the individual's perception of ease of use, satisfaction and relative advantage (Al-Gahtani and King, 1999).

Many researchers such as Gurbuz et al. (2000) and Abbad et al. (2009) attempted to find whether specific characteristics of a stakeholder group, namely the students and teachers, were likely to affect their learning behaviour and consequently predict outcomes for E-Learning adoption. These included gender, computer literacy, course type, whether any computer-related course was taken before, previous computer attitude, and possession of home computer. They found a positive relation; in particular, the results demonstrated that perceived usefulness of E-Learning was influenced by the understanding of the technology. On the other hand, the ease of use was influenced by user experience and self-confidence with regard to the ability to use the technology in everyday life, especially over the long-term. The results of these studies suggest that students who are more receptive to communication technologies are also more likely to engage in the use E-Learning programs.

Using in-depth interviews with students and educators, Dirani and Yoon (2009) sought to identify specific issues that affected these stakeholders, which ultimately influenced the development of E-Learning adoption in a higher education institution. The results showed that exposure through the diffusion of ICT at local and regional as well as national levels have a significant impact on the development and utilization of the E-Learning model. Nevertheless, the research also showed that ICT development in Arab countries continued to lag behind in comparison to its development in other countries, thus creating obstacles for individuals to view technology as a positive step towards evolution and change (Dirani and Yoon, 2009). As a consequence the acceptance and application of E-Learning continues to lag as well.

3.1.4. The Attitude toward Acceptance Factor

In the TAM, the variables of Perception, Patronised, and Practised are antecedent variables influencing attitude towards ICT. Attitudes are the beliefs of an individual that predisposes him to act in a certain manner, with effect, behaviour and cognition as constituent components of attitude (Paris, 2004). Attitude is composed of the positive and negative feelings of the individual about a contemplated action (Abdel-Wahab, 2008). With respect to ICT and E-Learning adoption, attitude is a critical factor for the intent to use the computer as a tool for learning and the translation of the intent into the action of using the computer. Attitude is also an important factor underlying student self-efficacy in E-Learning, with a positive or favourable attitude supporting a perception of greater self-efficacy (Yiong, Sam, & Wah, 2008).

Previous studies examining attitude towards E-Learning among students have found that attitude was primarily influenced by perceived usefulness, although previous use and degree of support also accounted for some of the variance in student attitudes (Lau & Woods, 2008; Jung, et al., n.d.). The contribution to attitude effect from previous use may also involve the two dimensions, namely, previous use of computers, which creates greater facility with employing computer applications, and previous experience specifically with the use of computers for E-Learning (Paris, 2004). Although the TAM focuses on perceived ease of use, degree of support and previous use as determinants of attitude, additional intrinsic factors such as enjoyment, curiosity or ability to concentrate as related to the online environment, may also account for variance in attitude towards E-Learning among students (Moon & Kim, 2001). There is also evidence of variation in attitude towards E-Learning among different cultural groups and between genders (Al-Doub et al., 2008). It is therefore important for educational institutions promoting the adoption of E-Learning to understand student attitudes because the students are the end-users of any E-Learning system (Mahdizadeh et al., 2008). The institution may be capable of implementing programs that positively influence the attitudes of students to foster more positive attitudes towards E-Learning.

Research conducted by Teo, Luan, and Sing (2008) determined that the attitude of teachers and administrators in an educational institution was a critical variable for the adoption of E-Learning. If the teachers have a negative attitude towards computer-assisted learning and online learning, they will influence the institution against accepting E-Learning and resist adopting the technology if it is mandated. The attitude of the teachers and administrators towards E-Learning also influences the attitudes of students because the instructors are major actors in the learning process (Sun, et al. 2008). There may also be a difference in attitude towards E-Learning between administrators and teachers. If administrators promote the use of technology for E-Learning, it may nonetheless meet with resistance from teachers if they do not have a positive attitude towards E-Learning (Mahdizadeh et al., 2008).

The attitude of students and teachers towards E-Learning may not be static, and may be modified over time in response to changes in the factors contributing to attitude (Lau and Woods, 2008). Developments in technology and new E-Learning platforms can influence perceptions of ease of usefulness, and the provision of additional support resources in an institution can influence the perception of degree of support. Administrators and teachers with a positive attitude towards E-Learning may also influence the perception of usefulness among students. Because educational institutions can influence attitude with persuasion and infrastructure, assessment of the variable is important for planning and implementation of E-Learning.

3.1.5. E-Learning Prediction

The TAM model identifies the intention to use E-Learning as the dependent variable. In the theory of reasoned action that underlies the TAM, the intention to perform an action precedes undertaking the action. As a result, the intention to use E-Learning or E-Learning prediction must precede the actual use of an E-Learning system by students (van Schaik et al., 2006). The E-Learning prediction or intention to use is the strongest predictor of actual use of E-Learning (Lau and Woods, 2008). Because factors such as resource availability can intervene between the intention to use a technology and the actual use of the technology, the intention to use or E-Learning prediction may be considered as a more appropriate measure for E-Learning than the actual use (Teo et al., 2008). Previous research examining students' intention to use technology in Middle Eastern nations has concluded that usefulness, previous experience and resource availability were antecedent variables influencing the intermediate variable of attitude, which influences E-Learning predication (Abel-Wahab, 2008; Al-Doub et al., 2008; van Schaik at al., 2006). The perception of self-efficacy might also influence the decision of the student to translate

the intention to use the technology into the behaviour or using the technology (Yiong et al., 2008). Although students may have a generally positive attitude towards E-Learning, they must also have the belief that they can effectively use E-Learning to achieve their educational objectives.

In summary, the review of the literature presented here, reveals that many variables can be examined for their role in driving ICT and ultimately contributing to or preventing the proliferation of E-Learning. In this paper, this included external and internal factors such as Perception, Patronised (degree of support), and Practised (pervious use of technology) which are likely to impact key TAM variables such as attitude towards and actual use of technology. A summary of the above discussion is presented in Table 1.

The extended TAM model (TAM-EL) will be used to assess the extent to which each of the external variables; Perception, Patronised, and Practised, will impacts the attitude towards using ICT and the predicted use among a representative sample of business students in Jordanian universities.

Table 1: A summary of the literature regarding each factor of the TAM-EL Model

Concept/Variable to explore	Construct	Rationale to support central research question/gap	Support References
Personal data	Demographic data	Personal characteristics of the individual user have been shown to impact outcomes for technology adoption and use. These variables impact acceptance and the willingness of the individual to use the technology. These variables can include gender, age, position, education, and experience.	Birol, Bekirogullari, Etci, et al., 2008; Karsten and Schmidt, 2008.
Perception: (*Perceived usefulness and Perceived ease of use*).	Capabilities to use technology and Fit of the technology for individual use.	Research has shown that the manner in which the individual perceived technology use will impact outcomes for use and adoption. How well technology fits for the individual user will influence the degree to which the individual uses the technology and the overall attitude that the individual develops with regard to the technology. If the technology is viewed as a good fit the opportunities for use will increase. If the technology is not viewed as a good fit, it will impact how the individual looks at the technology and the decision to use the technology.	Calsoyas (2005); Veiga, Floyd & Dechant, (2001); Davis, (1989); Wu, Change and Guo (2008); O'Neil, Singh, O'Donoghue and Cope (2004).
Patronised	Support structures Degree of support required	Support structures which are put in place to facilitate technology adoption will play a significant role in the decision of the individual to adopt a new technology.	Durlabhji(2008); (Bhattacherjee & Hikmet, 2008); Gong, Xu and Yu (2004); Kilic, Baran, Bakar, Cagiltay, Knukseven, Yalabik, et al. (2006); Wu and Lederer (2009); Gibson, Harris and Colaric (2008).
Practised	Previous use of the technology and Degree to which technology is used.	Previous use of a particular technology will shape the manner in which the individual responds. If the user has extensive use with a technology application of the technology in a new way will be more easily accepted. In addition, previous exposure to a technology will shape attitudes of further applications. The degree to which other similar technologies have been used by the individual will influence the adoption of new technology.	Al-Gahtani and King (1999); (Gurbuz, Yildirim and Ozden, 2000); Abbad, Morris and de Nahlik (2009); Dirani and Yoon (2009).
Attitude	Attitudes towards the acceptance	Attitudes towards the acceptance of technology play a major role to determining the respondent's behaviour	(Marie-Louise L. Jung, Karla Loria,Rana Mostaghel,Parmita

	of technology.	towards the adoption of new phenomena.	Saha(2008)); Pei-Chen Sun , Ray J. Tsai, Glenn Finger, Yueh-Yang Chen, Dowming Yeh; Mahdizadeh, H.; Biemans, H.; Mulder, M.; Ahmed Gad Abdel-WAHAB, (2008).
Prediction	Statement or particular claim, event will occur in the future in more certain terms.	To inform the research to what extend the respondents are willing to adopt the new approach in delivering and the use of the new phenomena.	Sandars and Langlois (2005). Seok (2008). Dabbagh (2005). Nichols (2003). Desai, Hart and Richards (2008). Lam and Bordia (2008). Stella and Gnanam (2004). Conole, Carusi and de Laat (2006). MacDonald and Thompson (2005). Hughes and Hay (2001)

4. The Study Hypotheses

The research aims to test the expanded TAM-EL model and to find the extent to which the role of the three components, namely; Perception, Patronised, and Practised, play in the adoption of E-Learning. The derivation of the hypothesis involved a systematic process in which three stages of investigation were considered (See Table 2):

1. The first stage involved taking the variable E-learning Prediction (shortened for Prediction of Adoption of E-learning as the dependent variable and all other variables as the independent variables. In this case taking all four factors Perception, Patronised, Practised, and Attitude together lead to hypothesis H1. Taking Attitude and Patronised factors separately as independent variables leads to hypothesis H2 and H10, respectively.

2. The second stage involved taking the variable Attitude as the dependent variable and all other variables as the independent variables. Taking Perception, Patronised and Practised separately as independent variables leads to hypothesis H3, H4, and H5; whereas taking all three variables together Perception, Patronised and Practised lead to hypothesis H6.

3. The third stage involved the internal interaction between each of three variables: Perception, Patronised and Practised taken pairwise as independent variables upon the third as dependent variable leads to the formation of hypotheses H7, H8 and H9 respectively.

Table 2: A Summary of the Hypotheses in each Stage

Stage	Hypothesis	Independent Variable	Dependent Variable
1	H1: Perception, Patronised, Practised and Attitude have a positive effect upon the Prediction of E-Learning among students.	Perception, Patronised, Practised and Attitude	Prediction (E-Learning)
	H2: Students Attitudes have a positive effect upon the prediction of (E-Learning).	Attitude	Prediction (E-Learning)
	H10: Patronised has a positive effect upon Prediction of E-learning among students.	Patronised	Prediction (E-Learning)
2	H3: Students Perceptions have a positive effect upon Attitude.	Perception	Attitude
	H4: Patronised (degree of support) have a positive effect upon Attitude towards using ICT among students.	Patronised	Attitude
	H5: Practised (Previous use) has a positive effect upon Attitude towards using ICT among students.	Practised	Attitude
	H6: Perception, Patronised and Practised have a positive effect upon Attitude towards using ICT among students.	Perception, Patronised and Practised	Attitude
3	H7: Patronised and Practised have a positive effect upon Perception of students.	Patronised and Practised	Perception
	H8: Students Perception and Practised have positive effect upon Patronised.	Perception and Practised	Patronised
	H9: Students Perception, Patronised have a positive effect upon Practised.	Perception and Patronised	Practised

The hypotheses as they relate to various factors are presented in a graphical format (Figure 3).

Figure 3: The hypotheses as they relate to various factors
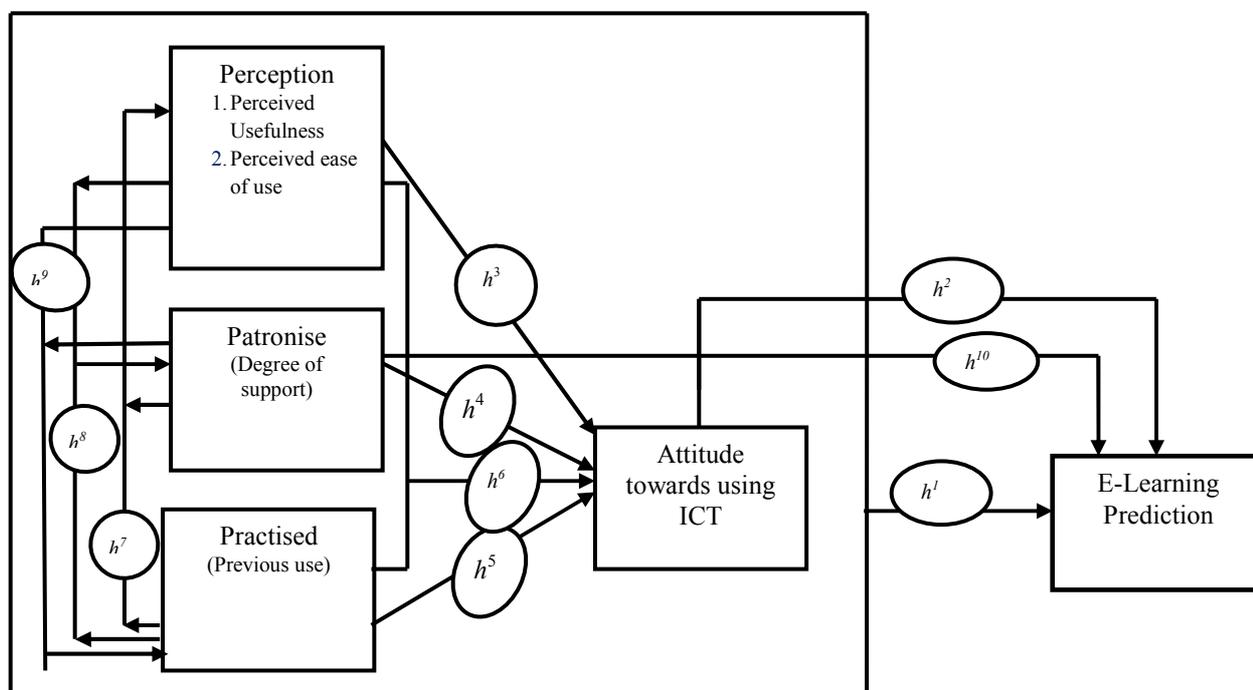
5. Method
5.1 instrument construction

A questionnaire was used to obtained data across six dimensions consisting of: 1) personal data; 2) Perception; 3) Patronised; 4) Practised; 5) attitude; and 6) prediction of E-Learning. Each dimension was a construct related to the independent and dependent variables of the study. The structure of the questionnaire consisted of six sections. The first section obtained demographic information about the respondents. The second section consisted of 14

questions obtaining data in the dimension of perception, which is a construct involving the perceived usefulness of and perceived ease of use of E-Learning. The 14 questions were adopted from Davis (1989). Questions 1, 2, 3, 4, 5, 8, 10, 11, and 14 were slightly modified to meet the investigation goal, while the rest of the questions were left alone. The questions were to elicit the perceptions of individuals of the usefulness and the ease of use influencing the adoption of the technology. In the TAM model, the construct is also an antecedent variable for attitude, which influences the intention to adopt E-Learning. The third section consisted of 10 questions obtaining data in the dimension of Patronised. Five of these questions were adopted from Bhattacherjee & Hikmet (2008): these are questions 15, 16, 17, 18, and 24. The rest were constructed from the literature. This construct measures the respondent's Patronised (degree of support) for technology adoption from structures in place in the learning environment. Adequacy of the support structures theoretically influences the intention to adopt E-Learning. The Patronised is also an antecedent variable influencing attitude towards E-Learning. The fourth section used 10 questions to obtain data from the respondents for the construct of Practised; all these questions were constructed from previous literature. This construct examines the previous use of the technology by the respondents and the degree to which the technology is used. The construct is based on the assumption that previous use of a technology increases familiarity and competency, which facilitate willingness to use the technology in new applications. The construct of Practised influences the intent to adopt E-Learning, and is an antecedent variable influencing attitude towards E-Learning. The fifth section contained 10 questions intended to obtain data from the respondents about the construct of attitude. Questions 35 and 36 were adopted from Marie-Louise L. Jung, Karla Loria, Rana Mostaghel, and Parmita Saha (2009) and, slightly modified; questions 37, 38, and 39 were adopted from Pei-Chen Sun, Ray J. Tsai, Glenn Finger, Yueh-Yang Chen, and Dowming Yeh (2008). Questions 40 and 41 were adopted from H. Mahdizadeh, HBiemans, and M. Mulder, (2008), and questions 42, 43, and 44 were adopted from Ahmed Gad Abdel-Wahab, (2008). In the theoretical model, attitude towards E-Learning has a significant influence over the intention to adopt E-Learning. The inclusion of the construct in the survey questionnaire is intended to obtain sufficient data to test the effect of the antecedent variables of Perception, Patronised and Practised on Attitude and to test the effect of attitude for the prediction of E-Learning. The final section consisted of 10 questions to assess the prediction of E-Learning, which is the dependent variable of the study; all these questions were constructed from the literature. The construct involves the claim that the respondents will adopt E-Learning at some point in the future, and is a measure of the respondents' intention. In the theoretical TAM model, the independent variables of Perception, Patronised, Practised and Attitude influence the dependent variable of prediction.

The questionnaire was designed using a 5-point Likert scale. The Likert scale asks respondents to rate their level of agreement with statements ranging from strongly disagree to strongly agree. Through the use of the Likert scale, the respondent is provided with a clear foundation for expressing opinion without the interference or interpretation of the researcher. Moreover; The Likert scale was selected for the survey instrument because it is commonly used in social research, and provides data in a form similar to an interval scale (Punch, 2005).

5.2 The study sample

Data was collected from 380 students at Al-Balaqa Applied University. The university was established in and it was selected for the research because of its size and diversity. It is a public university operating 10 college universities and four community colleges in Jordan. Because of the extent of its operations, Al-Balaqa Applied University is the second largest university in Jordan in terms of both student population and total staff members. The university has 29,671 students enrolled in all of its programs. Of this group 62% of students are male and 38% are female. The university also employs 1,152 educational staff members, which are 73.5% male and 26.5% female. The size of the study population as well as the diversity of the student population supports the ability to generalize the findings. The total population of Users is 30823. As recommended by Kothari (2008) the central limit theorem was applied to determine the appropriate sample size required to achieve the desired confidence level and a confidence interval of 5 upon the assumption of a normal distribution of the population. Thus, the target sample size for students was 376, which was necessary to obtain a confidence interval of 5 at a confidence level of 95%. The actual sample size use in the study (380 students) was sufficient to meet this target sample size.

6.Analysis and Results

6.1 Principle component analysis

Table 3 below provides simply a summary of the analysis. Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO) was applied to check if factor analysis is appropriate for this analysis. Perception, Patronised, Practised, Attitude, and Prediction were tested and showed that the entire component presented in this investigation has a value greater than 0.6 and the Bartlett's test is significant at (p=.000). Therefore, we can argue that all the components are appropriate for factor analysis. Moreover, a Correlation Matrix Table was performed to look for correlation coefficients of 0.3. This test helps the researcher to spot which questions in the instrument should be removed and which could be retained. Looking at the Table 3, we can see that Patronised and Prediction each

started off with 10 items, which were all retained. However, Perception ended up with 10 items out of 14. Practised, on the other hand, started off with 10 items and ended up with a factor loading of 6 items, while Attitude ended up with 7 items. Moreover, all the five components of the study were represented by the retained items with acceptable percentages that explain the variance, as shown in the table. This demonstrates that all components are valid for investigating students' use of ICT in the prediction of E-Learning.

Table 3: Principle component analysis results for Students.

Students	Number of Questions in Survey Instrument	KMO & Bartlett's Test	Sig	Total Variance Explained	Factor Loading	Number of Extracted Component
Perception	14	0.917	.000	46%	10	1
Patronised	10	0.934	.000	64%	10	1
Practised	10	0.894	.000	59%	6	1
Attitude	10	0.867	.000	55%	7	1
Prediction	10	0.934	.000	64%	10	1

Applying exploratory factor analysis to our investigation gives the researchers the ability to extract five factors in all the 54 items in the instrument, accounting for Total Variance Explained that exceeded the cut-off point of 0.4, which shows that the instrument that was used for the purpose of this investigation is valid. Moreover, the reliability test was also applied using Cronbach's alpha, which shows that all components exceed 0.7, which is recommended by Dunn-Ranking (2004) for the instrument to be reliable.

6.2 Confirmatory factor analysis

Confirmatory factor analysis was used to verify the number of underlying factors in the instrument and the factor loadings. The Perception, Patronised, Practised, Attitude and prediction scales have been validated, supporting the use of confirmatory factor analysis. The factor loading considered factors with a cut-off point at 0.50. Table 4 shows the results of the confirmatory factor analysis, which indicates that all factors remaining in the survey questionnaire were above the cut-off point. Therefore, we can conclude that the instrument is validated and confirmed to be used for further investigation such as regression.

Moreover, Perception, Patronised, Practised, Attitude and Prediction are key factors in explaining the variance in the phenomenon under investigation.

Table 4: Factor loading for Students Adoption of E-Learning

	Perception	Patronised	Practised	Attitude	Prediction
Q7	.736				
Q2	.698				
Q8	.696				
Q9	.708				
Q5	.682				
Q4	.672				
Q6	.650				
Q3	.644				
Q10	.652				
Q1	.616				
Q16		.871			
Q17		.835			
Q15		.827			
Q18		.822			
Q19		.814			
Q20		.813			
Q22		.792			
Q21		.788			
Q23		.746			
Q24		.694			
Q31			.809		
Q32			.803		
Q34			.789		
Q28			.776		
Q25			.730		
Q26			.702		
Q41				.885	
Q37				.802	
Q40				.803	
Q38				.710	
Q35				.706	
Q43				.726	
Q36				.647	
Q39				.610	
Q49					.871
Q47					.832
Q48					.829
Q46					.813
Q50					.790
Q54					.791
Q53					.783
Q51					.767
Q45					.784
Q52					.737

5.3 Structural model

The factor analysis of the survey questionnaire presented earlier indicated that the model demonstrated sufficient reliability and validity, with the retained items in the model able to measure the construct under investigation. This section contains the results of the testing of the research model through the use of structural equation modelling (SEM). According to Hoyle (1995, p. 1), SEM is a comprehensive statistical approach for testing hypotheses concerning the relationships between observed and latent variables. The model represents the statistical statements concerning the relationships among the variables and can include the directionality of the relationship. In this study, the Partial Least Square (PLS) method was used to assess the specifications of the model, using SmartPLS 2.0. The PLS method is suitable for use with SEM when the model is complex and

involves a greater number of degrees of freedom that influence the model fit indices (Hoyle, 1999, p. 310). The PLS approach produces results reflecting the covariance structure between the predictor and the response variables, which makes the method appropriate for complex models with many latent variables (Hill & Lewicki, 2006, p. 396).

When compared to other approaches to SEM analysis, PLS has a limitation because it lacks a goodness-of-fit measure to determine how well the statistical model fits the set of observations. An approach to determining goodness-of-fit commonly used by researchers employing PLS relies on the coefficient of determination, R2, which is used with linear regression models (Anderson-Sprecher, 1994). While the coefficient of determination is not a fully accurate representation of the goodness of fit when used with PLS, it nonetheless explains the majority of the variation captured by the model. The analysis of the overall model used in this study is decomposed into two parts. The first part of the model shown in Figure 4 examined the goodness of fit among the Students with the analysis indicating that the model accounted for approximately 59% of the variation (R2 = .587). The closer the coefficient of determination is to 1, the better the goodness-of-fit and the amount of variation explained by the model (Asadoorian & Kantarelis, 2005, p. 160).

Figure 4: Partial Least Square (PLS) results for Students R2 are presented and β values
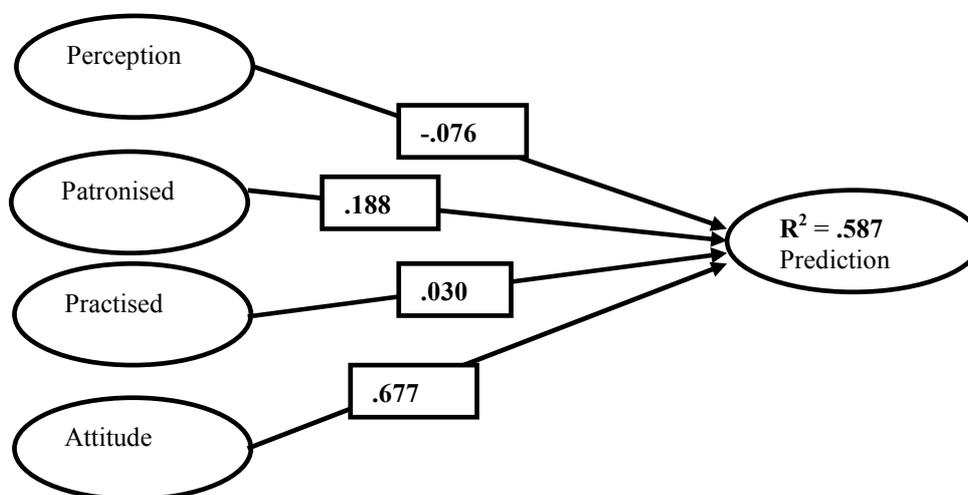
The analysis of the model using SEM and the PLS approach indicated that the overall TAM-EL explains approximately 59% of the variance in the prediction or intention to use E-Learning among students (R2 = 58.7%). The percentages for the goodness-of-fit for the TAM-EL model are slightly similar to the findings of other researchers investigating the model in other contexts, for instance, in (Park, Lee, & Cheong, 2007) the percentage for the goodness-of-fit was (R2 = 66%). The overall model included the construct of attitude, which is considered an intermediate variable influenced by Perception, Patronised, and Practised.

6. Findings and Discussion

Based on the analysis only the variables of Attitude and Patronised had a statistically significant effect on Prediction of E-Learning. The finding that the variables of Perception and Practised are not statistically significant is contrary to the implications of the findings of previous researchers. Gallien and Ooomen-Early (2008) found that previous online experience contributed to overall student satisfaction with E-Learning, which presumably increases willingness to adopt E-Learning. Ojo and Olakulehin (2006), however, found that students generally have a positive perception of E-Learning. While the analysis of the TAM-EL does not address the reasons for the lack of significance of the variables of Perception and Practised, however, it does in a distinct manner put forward the importance of Patronised (the degree of support), and Attitude. Students may have a positive attitude towards E-Learning when it has sufficient support regardless of their level of experience using ICT. Figure 5 shows the analysis of the model and the significance of the variables for Students.

Figure 5: The analysis of the model and the significance of the variables for Students
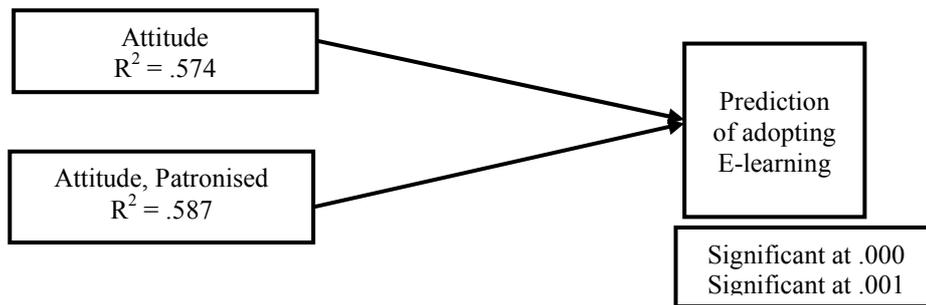
There is clearly a strong association between Patronised and Attitude and E-learning Prediction. However, the individual factors have a low association with Attitude, but the three taken together have a moderate association. The nature of the inter-relationship between Practised, Perception and Patronised has some strong association and a more accurate model would be as shown figure 6.

Therefore, the model indicates that the three factors taken together moderately shapes Attitude and Attitude itself is strongly associated with E-learning Prediction.

As the Figure above shows, attitude towards ICT examined in hypothesis h2 accounted for a substantial amount of the variance in the prediction of E-Learning for. The goodness-of-fit is high and significant (Users R^2 = .574, sig. = .000). The finding of the importance of attitude for the prediction of E-Learning provides further support for the determination that attitude is the key variable in the model as analyzed through stepwise regression. The finding of a strong relationship between positive attitude towards ICT and prediction of E-Learning is also similar to the findings of researchers in other nations examining the relationship between attitude and adoption of E-Learning (Inal, Karakus & Cagiltay, 2008). The findings also conform to the proposition of the TAM-EL model, that attitude is the most significant predictor for the intention to adopt a technology (Shin & Kim, 2008).

Figure 6: Hypotheses Testing
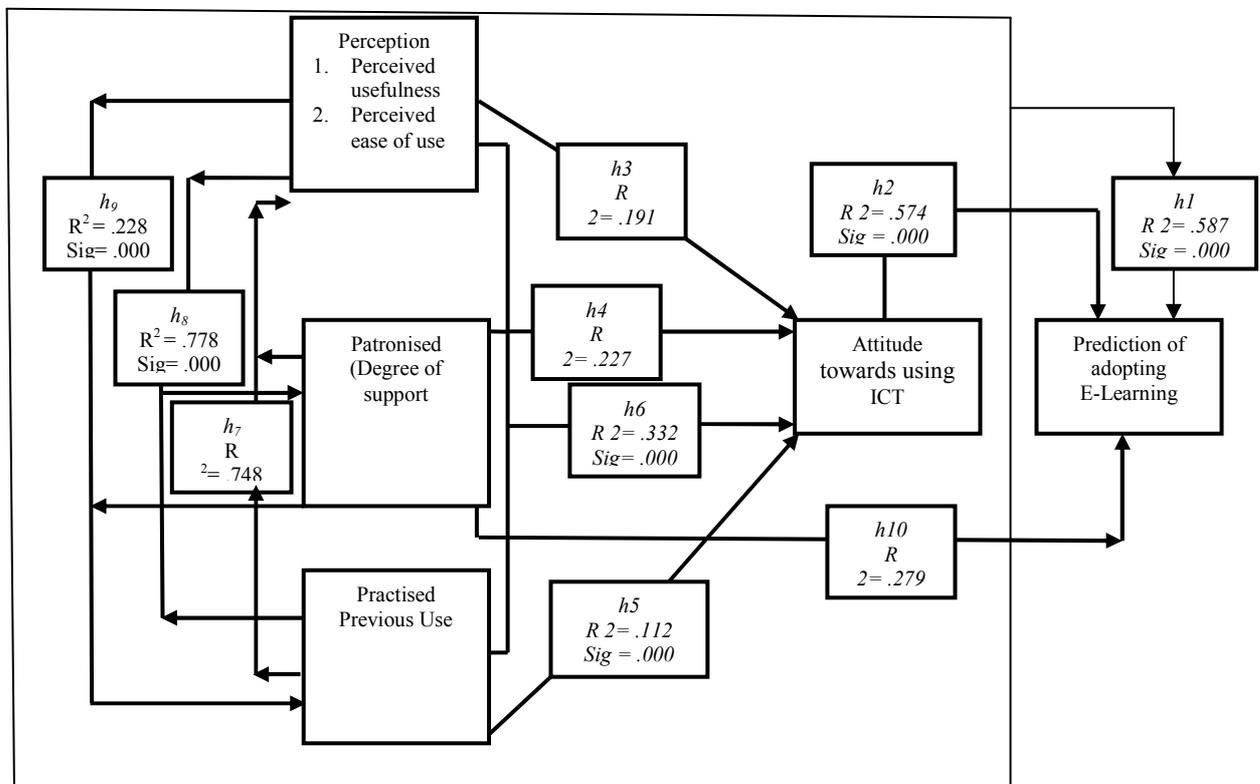
The analysis also identified a significant relationship between the variable of Patronised and Prediction of E-Learning, which was assessed with hypothesis h10. The amount of support with ICT systems accounted for approximately 28% of the variance in Prediction of E-Learning among Users (R^2 = .279). The variable of Patronised also contributes to the variance in Prediction of E-Learning by influencing Attitude, which has an

effect on Prediction of E-Learning as an intermediate variable. The findings of a stronger relationship between the variables of Patronised and Prediction among the Providers when compared to students provides some support for the argument of Fusilier and Durlabhji (2008) and might explain how ICT has become embedded to the degree of support in the general infrastructure of institutions of higher education. Moreover, Bhattacherjee and Hikmet (2008) argued that organizational support is capable of influencing perceptions of usefulness and ease of use, in turn influencing the acceptance of technology.

Hypotheses h3, h4, and h5 assessed the direct relationship of the variables of Perception, Patronised and Practised on the variable of Attitude, while hypothesis h6 evaluated the combined effect of these three variables on attitude. The purpose of the analysis was to determine the degree to which these three variables influenced Attitude, which was established by hypotheses h2 as significant for Prediction of E-Learning. The TAM-EL model proposes that these three variables account for the majority of the variance in attitude (Schneberger, Amoroso & Durfee, 2008).

The analysis as shown in Figure 6 indicated that the variables of Perception and Practised did not account for a significant amount of the variance in Attitude based on goodness-of-fit (R^2 Perception = .191; R^2 Practised = .112), although a weak correlation was found with both variables. The variable of Perception is composed of perceived usefulness of ICT and perceived ease of use. Based on the studies conducted by previous researchers, the low relationship between Perception and Attitude may be attributed to factors such as the absence of a university-led drive to encourage students to use computers in the learning process (Breen, et al., 2001). The findings suggest that the user population examined in this study had only a very low perception that ICT was useful and could easily be used in E-Learning. Similarly, the finding of a very weak correlation for Practised did not conform to the findings of previous researchers. Students with higher levels of experience with computers generally have more positive attitudes towards ICT and E-Learning (Breen, Lindsay, Roger, et al., 2001). In contrast to the findings concerning Perception and Practised, the Patronised variable had a stronger effect through model on Attitude among the user group (R^2 = .227, sig. = .000).

When the three variables of Perception, Patronised and Practised were considered together in a multiple regression analysis, they had a moderate effect on Attitude (R^2 = .332, sig. = .000). While these findings were significant, they nonetheless showed that the three variables accounted for only approximately 33% of the variance in Attitude among the students. The low amount of variance accounted for by these three variables suggests that other variables not accounted for by the model may have influenced the relationship between Perception, Patronised, and Practised with Attitude. Deepwell and Malik (2008) as well as Kirkwood (2008) noted that factors such as difficulty with ICT equipment could be a contributing factor influencing attitudes towards ICT and E-Learning, which may have influenced the users in this study. Nonetheless, the findings generally confirm the validity of the TAM-EL model with respect to the factors influencing attitude among university students in Jordan, but the relationships are weaker than expected based on the findings of previous researchers (Schneberger, Amoroso & Durfee, 2008). The findings are also similar to those of Lam and Bordia (2008) concerning the importance of educational institutions providing sufficient support services to ensure that students and faculties can use ICT systems.

7. Conclusion

The findings and the analysis concerned indicate that students have an important role in the adoption of E-Learning in Jordan. While the variable of Attitude contributes to approximately 57% of the variance in the Prediction of E-Learning, the variable of Patronised contributes only approximately 28% of the variance in the Prediction of E-Learning. The findings also suggest that variables other than Perception, Patronised and Practised influence Attitude towards E-Learning and contribute to the variance in Attitude. A conclusion supported by these findings is that efforts to improve the variables of Perception and Patronised among university students in Jordan will have a beneficial effect on Attitude. This conclusion generally conforms to the findings of Breen, Lindsay, Roger, et al., (2001) regarding the importance of considering customer or end-user attitudes when developing and implementing E-Learning courses.

Moreover, the findings suggest that administrators and educators are responsible for ensuring that students have the necessary skills and access to ICT for E-Learning, which can contribute to an increase in the positive perception of the students in Jordan towards E-Learning. By increasing the amount of support training available to the students, institutions of higher education can foster a positive improvement in students' attitudes towards E-Learning.

The findings of the study demonstrated the importance of perceptions of usefulness and ease of use, the perception of support for ICT, and the prior ICT experience of students for attitudes towards E-Learning. The research model and the findings of the study can serve as a model for developing instructional programs to improve ICT skills among students and other stakeholders, which are a prerequisite for influencing attitudes positively towards E-Learning.

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