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Highlights

• We extended the TAM in the context of e-learning in developing countries (Lebanon). • We examined if social influence affect the user perceptions towards using e-learning. • Examined the moderating effect of gender, age and experience on the key factors. • The extended model achieved acceptable fit and most of the paths were significant. • Providing the required skills and infrastructure will increase the usage of e-learning.

The effects of individual differences on e-learning users' behaviour in developing countries: A structural equation model

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ABSTRACT

The main objective of our study is to (1) empirically investigate the factors that affect the acceptance and use of e-learning in Lebanon, and (2) investigate the role of a set of individual differences as moderators (e.g., age, gender, experience, educational level) in an extended Technology Acceptance Model (TAM). A quantitative methodology approach was adopted in this study. To test the hypothesized research model, data was collected from 569 undergraduate and postgraduate students studying in Lebanon via questionnaire. The collected data were analysed using Structural Equation Modeling (SEM) technique based on AMOS methods in conjunction with multi-group analysis. The result revealed that perceived usefulness (PU), perceived ease of use (PEOU), subjective norms (SN) and Quality of Work Life (QWL) positively affect students' behavioural intention (BI). We also found that experience moderates the relationship between PEOU, PU and SN on e-learning use intention, and that age difference moderates the effects of PEOU, SN and QWL on BI. In addition, educational level moderates the effects of PEOU, SN on BI, and gender moderates the effects of PU, SN and QWL on BI. Contrary to expectations, a moderating role of age on the relationship between PU and BI was not found. Similarly, gender was not found to affect the relationship between PEOU and BI, and educational level did not moderate the relationship between PU or QWL and BI. In light of these findings, implications to both theory and practice are discussed.

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1. Introduction

The development of information and communication technologies (ICTs) has provided the universities and other educational institutions a significant opportunities to support both face-to-face and remote course delivery (Fletcher, 2005; Ngai, Poon, & Chan, 2007). E-learning environments reduce the cost of provision and therefore increase revenues for academic institutions (Saadé & Bahli, 2005). They also afford students with more study flexibility and improve their learning experience and performance (Nora & Snyder, 2009).

Despite the perceived benefits of e-learning mentioned above, the efficiency of such tools will not be fully utilized if the users fail to use the system. Therefore, the successful implementation of e-learning tools depends on whether or not students are willing to adopt and accept the technology (Clay, Rowland, & Packard, 2009). This is crucial, especially in developing countries such as Lebanon where e-learning is still in its infancy and universities

and higher education institutions support traditional styles of pedagogy in education (Baroud & Abouchedid, 2010; Nasser, Khoury, & Abouchedid, 2008). In addition, the other challenge for online learning system is the consistently high drop-out rates (Dodge, Mitchell, & Mensch, 2009). A study conducted by Rovai (2007) revealed that drop-out rates in online courses have been cited to be 10–20 percent higher than face-to-face courses. Patterson and McFadden (2009) indicated that dropout rates in online courses may be six to seven times higher in comparison to face-to-face courses. Thus, it has become imperative for practitioners and policy makers to understand the factors affecting the user acceptance of web-based learning systems in order to enhance the students' learning experience (Liaw & Huang, 2011; Tarhini, Hone, & Liu, 2013).

During the past decade and with the support of the government, the rate of e-learning system usage in higher education has been steadily increasing in Lebanon (Matar, Hunaiti, Halling, & Matar, 2011; Nasser et al., 2008). Additionally; as a context of study; Lebanon differs socially and culturally from Western countries (see Q4 Hofstede, 2005) where most of the studies that examined user acceptance and usage behaviour towards new technologies were conducted. It should be noted that in the case of Lebanon, the

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use of web-based learning system (e.g. Blackboard) by students and instructors is mandatory in education. It is, therefore, clear that both students and instructors from Lebanon are exposed to web-based learning system literacy differently. For this reason, it may influence the way they think about, feel about and view e-learning in education.

In the technology acceptance and adoption literature, a considerable number of models have been applied (e.g., the theory of reasoned action (TRA), the theory of planned behaviour (TPB) and the Technology Acceptance Model (TAM), unified theory of acceptance and use of technology (UTAUT)) to investigate and explore the determinants of user's behaviour towards adoption and using information technology. Among these models, the Technology Acceptance Model (TAM) (Davis, 1989) is the most frequently cited and influential model for explaining technology acceptance and adoption. Since it has been developed, TAM has been extensively used, tested, and extended to explain technology adoption and success in a number of application areas e.g. see (Bagozzi, 2007; Venkatesh & Bala, 2008; Yousafzai, Foxall, & Pallister, 2007a) and in e-learning (Park, 2009; Saeed & Abdinnour-Helm, 2008; Teo, 2011; Yi-Cheng, Chun-Yu, Yi-Chen, & Ron-Chen, 2007; Zhang, Zhao, & Tan, 2008).

User acceptance and usage behaviour towards technology can be influenced by a variety of factors such as cultural, individual differences and social influence. The limitation of TAM in explaining these factors in addition to the inconsistences in previous studies limit its applicability. Additionally, many TAM studies focus on Western/developed countries while TAM has not been widely tested within non-western/developing countries (Teo, Luan, & Sing, 2008). Additionally, TAM showed bias when tested in non-western countries (McCoy, Everard, & Jones, 2005; Srite, 2006) and the applicability of TAM less clear in the educational settings as much of the research has been carried out in non-educational contexts.

In an attempt to increase the explanatory power of TAM, moderator factors such as individual differences potentially play an important role in the explanation of TAM's limitations (Venkatesh, Morris, Davis, & Davis, 2003). For example, when including gender and experience in TAM2, the explanatory power increased from 35% to 53% (Venkatesh et al., 2003). Furthermore, after testing eight models, Venkatesh et al. (2003) found that the predictive validity of six models was increased significantly after the inclusion of the moderating variables. Users may hold different perceptions based on their individual differences about e-learning technologies; understanding of such different perceptions is therefore essential for policy makers to provide better design and features. Despite finding many examples of the use of TAM in the Information Systems literature, thus far little published research includes moderator factors in technology acceptance (Yousafzai et al., 2007a) especially in the case of acceptance of e-learning (Castañeda, Muñoz-Leiva, & Luque, 2007).

To address these limitations, this study will extend TAM to include two constructs, social norms and quality of work life (Kripanont, 2007; Venkatesh & Bala, 2008; Zakour, 2004) and a set of individual differences (age, gender, educational level and experience) as moderators (Venkatesh et al., 2003) in order to enhance the understanding of the e-learning users. Specifically, our research will empirically investigate the factors that affect the acceptance and use of e-learning in the developing world, particularly in Lebanon as a cultural context. Second, this study also investigates the role of a set of individual differences as moderator (e.g., age, gender, experience, educational level) in an extended Technology Acceptance Model (TAM).

The paper is structured as follows. Section 2 presents and explains our research model and describes the research hypotheses in detail. The data collection method, analysis and results are then described in Sections 3-5 respectively. Section 6 discusses the implications of the findings for both theory and practice. The limitations of this study as well as future work are highlighted in Section 7. Finally, Section 8 concludes the paper.

2. Research model and hypotheses

This paper proposes and tests a conceptual model of e-learning technology acceptance based on TAM and drawing from previous literature that used TAM in an educational context. The model extends TAM through the inclusion of subjective norms (SN) and Quality of Working Life (QWL) as additional predictor variables and through the inclusion of a number of individual differences as moderators. The overall conceptual model is illustrated in Fig. 1 and the sections which follow explain and justify each of the predicted relationships in light of previous findings from the literature.

2.1. Perceived ease of use and perceived usefulness

Perceived ease of use (PEOU) is defined as 'the degree to which a person believes that using a particular system would be free of effort' (Davis, Bagozzi, & Warshaw, 1989 p. 320). Perceived usefulness (PU) is defined as "the degree to which a person believes that using a particular system would enhance his/her job performance" (Davis et al., 1989, p. 453). Reviewing the literature, several studies in the educational context were found to be inconsistent. Some claim that PEOU and PU had a significant influence on the intention to use the system (Liu, Chen, Sun, Wible, & Kuo, 2010; Park, Nam, & Cha, 2012). However, the degree of significance was different between the findings in the literature. The difference in the findings was based on the field of study, sample size, or techniques used for analysing. For example, Peng et al. (2009) found that PEOU was the strongest determinant on the intention to use the system, which supported the findings of Chao and Tung's (2008) study. Furthermore, Saeed and Abdinnour (2008) found that PEOU have a direct and significant influence on BI. However, it was not the strongest predictor on the BI to use to the system. In addition, some researcher found that PU was the most influential variable in TAM in predicting the intention to use the web-based learning system (Chang & Tung, 2008; Liu et al., 2010). On the other hand, Chao and Tung's (2008) found that PU has an influence on the intention to use but was not the most influential factor. Based on the above discussion, it is hypothesized that:

H1. PU will have a direct positive influence on the intention to use web-based learning in the Lebanese sample.

H2. PEOU will have a direct positive influence on the intention to use web-based learning system in the Lebanese sample.

2.2. Social norms impact usage behaviour

SN was adopted and included in the TAM model, in order to overcome a limitation of TAM in measuring the influence of social environments (Venkatesh & Davis, 2000). SN is defined as a person's perception that most people who are important to him or her think he or she should or should not perform the behaviour in question (Ajzen & Fishbein, 1980). SN was studied in some research as an antecedent of BI and in other studies as an antecedent to PU. However, as Venkatesh et al. (2003) argue the influence of SN is very complex. This view is supported by the fact that there has been some inconsistency in the literature about the influence of SN on the intention to use the technology. For example, many
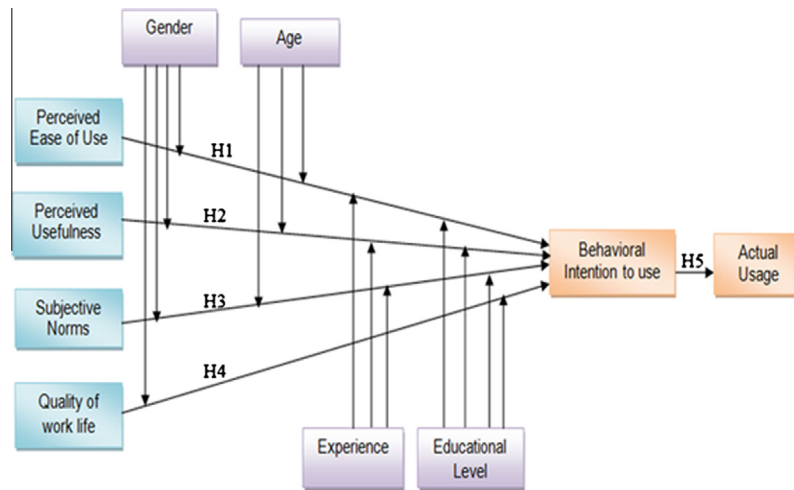
Fig. 1. Theoretical framework.

researchers found a significant impact of SN on BI (Lucas & Spitler, 1999; Taylor & Todd, 1995b; Van Raaij & Schepers, 2008; Venkatesh & Davis, 2000; Venkatesh & Morris, 2000; Venkatesh et al., 2003), while a number of others failed to find any impact (Chau & Hu, 2002; Dishaw & Strong, 1999; Lewis, Agarwal, & Sambamurthy, 2003). Davis (1989) omitted the SN construct from the original TAM due to theoretical and measurement problems, however SN was added later in TAM2 due to its importance in explaining the external influence of others on the behaviour of an individual.

Previous research has suggested that inconsistencies in whether SN is found to affect BI may be related to the cultural setting in which the research has been conducted (Srite & Karahanna, 2006). They found that SN will play a larger role in collectivist cultures than individualist cultures. This research assumes that SN will play an important role in predicting BI and those students will be highly influenced by their colleagues and instructors. The rationale is based on the cultural index which is proposed by Hofstede (1980). He indicated that power distance (PD) and Masculinity (M/F) are high and Individualism (I/C) is low in Lebanon. Therefore, based on the inconsistencies of the above findings and the importance of SN in establishing behavioural intention towards adoption and acceptance of a technology and its impact on PU, and in an attempt to overcome the limitation of TAM in measuring the influence of social environments (Teo, 2009), it is hypothesised:

H3. SN will have a positive influence on student's behavioural intention to use and accept the e-learning technology.

2.3. Quality of Work Life (QWL)

QWL was included due to its proposed importance in technology acceptance (Kripanont, 2007; Srite & karahanna, 2000; Zakour, 2004). However, it has not previously been considered within an educational context and the current study therefore explores whether it plays a role within this context. In this paper, QWL is defined in terms of students' perception and belief that using the technology will improve their quality of work life such as saving expenses when downloading e-journals, or in communication when using email to communicate with their instructors and friends. Generally speaking, a mismatch between students and the impact of technology on their lives can be disadvantageous for both students and institutions which in turn affect their behavioural intention to use the web-based learning systems. Thus, the

inclusion of this construct was due to the economic gains and increases in opportunities for advancement in students' lives and it is expected that the higher the QWL the better the acceptance of the technology. This is especially important in our study due to the fact that QWL is more dominated in the feminine cultures such as Lebanon, compared to masculine ones such as USA and England. In addition, we propose that understanding the relationship between QWL and BI is an important goal, in order to satisfy the various needs of the students and in return eliciting favourable behavioural intention. According to Zakour (2004), the include of QWL in TAM will help in better understanding the technology acceptance by users and conclude that future research should highly consider this construct due to its importance. Therefore, it is hypothesised that:

H4. QWL will have a positive influence on student's behavioural intention to use the web-based learning system.

2.4. Behavioural intentions for using an e-learning system

One of the major differences between TAM and earlier theories of acceptance is the presence of behavioural intention (BI). BI is considered to be an immediate antecedent of usage behaviour and gives an indication about an individuals' readiness to perform a specific behaviour. In TAM, both PU and PEOU influence an individual's intention to use the technology, which in turns influences the usage behaviour (Davis, 1989). There is considerable support in literature for the relationship between BI and usage behaviour in general (Davis et al., 1989; Taylor & Todd, 1995b; Taylor & Todd, 1995; Venkatesh & Davis, 2000; Venkatesh et al., 2003). This has recently been extended to the e-learning context (Chang & Tung, 2008; Liu et al., 2010; McCarthy, 2006; Park, 2009; Saeed & Abdinnour-Helm, 2008; Walker & Johnson, 2008; Yi-Cheng et al., 2007; Zhang et al., 2008). In addition, the path from BI to AU is significant in the TAM, DTPB, and TPB and models. BI has a large influence on AU. However, it is worth mentioning that when individuals have prior experience with using the technology, the effect of BI is more predictive on AU (Taylor & Todd, 1995b). In the context of this research and similar to previous studies, this research considered both BI and AU as dependent variables in the theoretical framework. It is expected that BI will have a direct influence in predicting the usage behaviour of students to accept and use the Blackboard system in the future (Self-reported usage measures). Therefore, we propose the following hypothesis:

H5. Students' BI will have a positive effect on his or her actual use of web-based learning system.

2.5. The moderating effects of individual differences on technology acceptance

In this research we included a set of individual differences (age, gender, educational level and experience) as moderators due to their potential importance in technology acceptance. These are explained as follows:

2.5.1. Experience

Previous research has found that a user's degree of relevant experience moderates a number of relationships within TAM (Lymperopoulos & Chaniotakis, 2005; Venkatesh & Morris, 2000; Venkatesh et al., 2003). For PU, research reported that experience significantly moderated the relationship of PU and BI (Taylor & Todd, 1995b; Venkatesh et al., 2003) with the relationship stronger for experienced users. Additionally, the moderating effect of experience on the relationship between PEOU and BI is clear and constant in the literature (Venkatesh & Davis, 2000; Venkatesh & Morris, 2000). Generally speaking, when users have prior knowledge in using the technology, this will provide the users with a more robust base to learn as users will relate their incoming information with what their already know (Cohen & Levinthal, 1990). In other words, experienced users will perceive that PEOU is not a major issue when learning a new technology (Taylor & Todd, 1995a; Venkatesh et al., 2003). In contrast, inexperienced users with no prior knowledge will prefer to use the technology which is easy to use.

With respect to SN, experience was also found to significantly moderate the relationship between SN on BI (Venkatesh et al., 2003). Venkatesh and Davis (2000) argued that the influence of SN on BI will decrease over time. Where users already have extensive experience, the role of SN will be expected to be lower as users are more able to draw on their own past experiences to shape their perception rather than the opinions of others (Venkatesh & Davis, 2000; Venkatesh & Morris, 2000). Similarly, Karahanna, Straub, and Chervany (1999) found that inexperienced users are more driven by SNs more than experienced users. It is expected that the relationship will be stronger for inexperienced users in computers and internet since they will be more sensitive to their colleagues' opinion (Venkatesh et al., 2003). Therefore, we propose the following hypotheses:

H6a. The relationship between PU and BI is moderated by Experience such that the relationship is stronger for users with higher level of experience in using computers and internet than users with lower level of experience.

H6b, c. The relationship between (PEOU, SN) and BI is moderated by Experience such that the relationship is stronger for users with lower level of experience in using computers and internet than users with higher level of experience.

2.5.2. Age

Research has shown that age is an important demographic variable that has direct and moderating effects on the behavioural intention, adoption and acceptance of technology e.g., (Akhter, 2003; Chung, Park, Wang, Fulk, & McLaughlin, 2010; King & He, 2006; McCoy et al., 2005; Porter & Donthu, 2006; Sun & Zhang, 2006; Venkatesh et al., 2003; Walker & Johnson, 2008; Wang, Wu, & Wang, 2009; Yousafzai, Foxall, & Pallister, 2007b). Venkatesh et al. (2003) reported that age was an important moderator within their UTAUT model. They found that within an organizational context, the relationship between performance expectancy (similar to PU) and BI was stronger for younger employees, while the relationship between effort expectancy (similar to PEOU) and SN was stronger for older employees in accepting and using the technology (Venkatesh et al. (2003). Similarly, Morris and Venkatesh (2000) found the same moderating effects of age. It could be that age increased the positive effect of SN due to greater need of affiliation e.g., (Burton-Jones & Hubona, 2006; Morris & Venkatesh, 2000). Correspondingly and since QWL also perceive the benefit of technology, it is expected that the relationship between QWL and BI will be stronger for younger users. Therefore, in the context of this study, it is expected that the effect of age on the relationship between PEOU, SN and BI will be stronger for older students, while the influence of PU on BI will be stronger for younger students. Therefore, we propose the following hypotheses:

H7a, b. The relationship between (PU, QWL) and BI is moderated by age such that the relationship is stronger for younger users than for older users.

H7c, d. The relationship between (PEOU, SN) and BI is moderated by age such that the relationship is stronger for older users than for younger users.

2.5.3. Educational level

Educational level like other individual factors has been studied as an antecedent of PU or PEOU (Agarwal & Prasad, 1999) and as a moderator that may affect the relationship between main determinates and behavioural intention (Burton-Jones & Hubona, 2006). In particular, educational level was found to influence the relationships between PEOU, PU, SN and BI (Burton-Jones & Hubona, 2006; Mahmood, Hall, & Swanberg, 2001; Porter & Donthu, 2006; Rogers, 2003; Sun & Zhang, 2006; Zakaria, 2001).

Venkatesh, Morris, and Ackerman (2000) found a positive correlation between the level of education and PU, Similarly, Burton-Jones and Hubona (2006) suggested that higher education level leads to positive association with PU and more educated users are less sensitive to PEOU since it will reduce the computer anxiety and improve the overall attitude. On the other hand, educational level was also found to negatively affect the social influence on behaviour when adopting new technology in an organization as both education and experience will empower the users (Burton-Jones & Hubona, 2006; Lymperopoulos & Chaniotakis, 2005).

The moderating impact of educational level on the relationship between quality of life and behavioural intention has not been investigated in literature. Nevertheless, it is expected that educational level will have an impact on the relationship between QWL and BI such that the relationship will be stronger for students with higher educational level. The rationale is that students who have higher level of education will perceive the benefits of e-learning system and value the impact of this system on their career.

Despite mixed results, however the moderating role that educational level can play on the adoption and acceptance of technology is indisputable (see meta-analysis of Mahmood et al. (2001) and Sun and Zhang (2006)). Hence, in the context of this study, it is expected that the relationships between (PU, QWL) and BI will be stronger for users with higher educational level, while the relationships between (SN, PEOU) will be stronger for users with lower educational level. We thus propose the following hypotheses:

H8a, b. The relationship between (PU, QWL) and BI is moderated by educational level such that the relationship is stronger for users with higher level of education than users with lower level of education.

H8c, d. The relationship between (PEOU, SN) and BI is moderated by educational level such that the relationship is stronger for users with lower level of education than users with higher level of education.

2.5.4. Gender

Previous research have suggested that gender plays an important role on usage behaviour in the domain of IS research e.g. (Gefen & Straub, 1997; He & Freeman, 2010; Morris & Venkatesh, 2000; Porter & Donthu, 2006; Venkatesh & Morris, 2000; Venkatesh et al., 2003; Wang et al., 2009). Venkatesh et al. (2003) found that the explanatory power of TAM significantly increased to 52% after the inclusion of gender as a moderator. More specifically, gender was found to have a moderating impact on the influence of PU, PEOU, QWL, SN, on BI and AU.

Venkatesh et al. (2003) found gender to influence the relationship between PU and BI, with the relationship significantly stronger for men compared to women. Their findings are consistent with literature in social psychology, which emphasizes that men are more "pragmatic" compared to women and highly task-oriented (Minton, Schneider, & Wrightsman, 1980) and usually have a greater emphasis on earnings and motivated by achievement needs (Hoffmann, 1980; Hofstede & Hofstede, 2005) which is directly related to usefulness perceptions. Their argument is also supported by other researchers e.g. (Srite & Karahanna, 2006; Terzis & Economides, 2011; Venkatesh & Morris, 2000). In contrast, in an educational context Wang et al. (2009) did not find any moderating effect of gender on the relationship between performance expectancy (similar to PU) and BI. Accordingly, it is also expected that gender will also affect the relationship between QWL and BI since it is focused on the benefits of the technology and this is more related men than females (Kripanont, 2007).

In terms of the moderating impact of gender on the relationship between PEOU and BI, it is expected to be stronger for women compared to men. Venkatesh et al. (2003) reported that the intention to adopt and use a system is more affected by effort expectancy for women compared to men. The reason could be that women compared to men generally have higher computer anxiety. Additionally, it has been found that gender affects the relationship between SN and BI such that the effect is stronger for women (Venkatesh & Morris, 2000; Venkatesh et al., 2003). Women are found to rely more than men on others' opinion (Hofstede & Hofstede, 2005; Venkatesh & Morris, 2000) as they have a greater awareness of others' feelings compared to men and are therefore more easily motivated by social pressure and affiliation needs than men (Venkatesh & Morris, 2000). Thus we propose the following hypotheses:

H9a, b. The relationship between (PU, QWL) and BI is moderated by gender such that the relationship is stronger for males than to females.

H9c, d. The relationship between (PEOU, SN) and BI to use is moderated by gender such that the relationship is stronger for females than to males.

3. Research methodology

3.1. Sampling and survey administration

The target sample for this survey was Lebanese web-based learning system users, studying full or part time for Masters or undergraduate degrees (in a number of disciplines) at two universities located in Beirut. Participation was on a voluntary basis and no financial incentive was offered. The current study, as the majority of empirical research in technology acceptance, has used a non-probability convenience sampling technique as it enables the researcher to collect data from the participants based on their availability. It also helps the researcher to improvise with the resource available for the research especially when there is lack of time and financial resources. A total of 1000 self-administered questionnaires were distributed to the students, the number of returned questionnaires were 640 indicating a 64% response rate. We also excluded the incomplete questionnaires which resulted in 596 valid questionnaires.

3.2. Measures

All the items (questions) used by this research have been drawn from the literature, where they were quoted to be reliable and valid to measure constructs of the phenomena that they intend to represent. The three constructs, PEOU, PU and BI were measured using 5, 5 and 2 items respectively, and were adapted from the empirical study of Davis (1989) and related work. The SN and AU constructs were measured using 4 and 2 items respectively and adapted from the empirical work of Ajzen and Fishbein (1980). The QWL construct was measured using a 5 item scale and was adapted from the work of Kripanont (2007) and Srite and Karahanna (2000). In addition, the four individual differences variables Experience, Age (1 = less than or equal 22, 2 = greater than 22), Educational level (1 = postgraduate, 2 = undergraduate) and Gender (1 = Male, 2 = Female) and Experience (1 = some experience, 2 = Experienced) were adapted based on the work of Venkatesh and Davis (2000) and Venkatesh et al. (2003).

Most of the items used in the questionnaire use a 7 point Likert scale, where respondents indicate their extent of agreement with a statement from a scale of 1 to 7 (1 = strongly disagree and 7 = strongly agree), while AU construct uses scales from 1 to 6 (1 = less than once a month and 6 = several times a day) to measure the frequency of using web-based learning system and (1 = Almost never and 6 = more than 3 h) to measure the average of daily usage per hour.

4. Results

The analysis of the research was conducted in two phases. The first phase examined the descriptive statistics of the measurement items and mainly involved the analysis of the measurement model to examine reliability and validity of the model. The second phase involved the analysis of the structural model and hypothesis testing.

4.1. Sample descriptive analysis

Table 1 presents the demographic characteristics of the respondents. A total of 596 participants took part in the study. The participants' age range varied from 17 to 35 years old, with 64.1% (366 participants) undergraduates and 35.9% (204 participants) postgraduates; their self-rated Web-based learning experience was either some or experienced, with either an intermediate or expert level in using the Internet. Males represent 53.8% (306 participants) of the sample and females represent 46.2% (263 participants).

Also the descriptive statistics showed that the majority of participants indicate positive responses to the constructs that are measured in this study (see Table 2). All means were greater than 5 for the independent variables (PEOU, PU, SN and QWL) and 4.21 for the dependent variables (BI and AU). This result was unexpected as the previous literature suggests that Web-based learning system in Lebanon is still in its infancy (Baroud & Abouchedid, **Q5**

Table 1
Profile of the respondents.

Demographic characteristics		Frequency	Percentage
Gender	Male	306	53.8
	Female	263	46.2
Age	Younger ⩽ 22	410	72.4
	Older > 23	157	27.6
Educational level	Undergraduate	365	64.1
	Postgraduate	204	35.9
Experience	Some experience	277	48.7
	Experienced	292	51.3

Table 2
Descriptive statistics of the constructs.

Construct	Mean	Std. deviation	Cronbach α
Perceived ease of use (PEOU)	5.26	1.064	.903
Perceived usefulness (PU)	5.17	1.098	.905
Social norms (SN)	4.96	1.169	.757
Quality of Work Life (QWL)	5.2	1.002	.835
Behavioural intention (BI)	4.78	1.133	.868
Actual usage (usage)	4.22	1.016	.657

2010; Nasser & Abouchedid, 2000; UNDP, 2002). A plausible explanation could be that the majority of the Lebanese students already perceive the benefits of using the e-learning system on their learning experience and performance.

4.1.1. The measurement model analysis-examination of reliability and validity

A confirmatory factor analysis (CFA) based on AMOS 18.0 was used to examine the relationships among the constructs within the proposed model (Arbuckle, 2009). We adopt the maximum-likelihood method to estimate the model's parameters where all analyses were conducted on variance–covariance matrices (Hair, Black, Babin, Anderson, & Tatham, 2010). There are some fit indices that should be considered in order to assess the model goodness-of-fit (Hair et al., 2010; Kline, 2005). First, it was determined using the minimum fit function χ^2. However, as the χ^2 was found to be too sensitive to sample size (Hu & Bentler, 1999), the ratio of the χ^2 static to its degree of freedom (χ^2/df) was used, with a value of less than 3 indicating acceptable fit (Carmines & McIver, 1981). These indices are: 'Goodness of Fit Index (GFI); Normed Fit Index (NFI); Parsimony Normed Fit Index (PNFI); Root Mean Square Residuals (RMSR); Comparative Fit Index (CFI); Adjusted Goodness-of-Fit Index (AGFI); the Root Mean Square Error of Approximation (RMSEA)'. Table 3 shows the level of acceptance fit and the fit indices for the Lebanese sample after the improvement in model fit.

Table 3
Model fit summary for the final measurement and structural model.

Fit index	Recommended value	Measurement model	Structural model
χ^2	NS at $p < 0.05$	639.150	648.493
Df	n/a	237	241
χ^2/df	<5 preferable < 3	2.697	2.691
GFI	>0.90	.909	.908
AGFI	>0.80	.885	.886
CFI	>0.90	.951	.950
RMSR	<0.10	.077	.079
RMSEA	<0.08	.055	.055
NFI	>0.90	.924	.923
PNFI	>0.60	.793	.806

Note: Degrees of freedom (*df*), Comparative Fit Index (CFI), Root Mean Square Residuals (RMSR), Root Mean Square Error of Approximation (RMSEA), Tucker-Lewis Index (TLI).

The results of the CFA have shown the good measurement model fit to the data for the proposed model for the sample (see Table 3). Therefore, the next step is to assess convergent validity, discriminant validity in addition to reliability in order to evaluate that the psychometric properties of the measurement model are adequate.

To estimate the reliability and convergent validity of the factors within the proposed model, composite reliability (CR) and average variance extracted (AVE) were used (see Table 4). Hair et al. (2010) suggest that the CR value should be greater than 0.6 and that the AVE should be greater than 0.5. As can be shown in Table 4, the average extracted variances were all above 0.511 and above 0.672 for CR. Therefore, all factors have adequate reliability and convergent validity. Additionally, with the exception of AU, the total AVE of the average value of variables used for the research model is larger than their correlation value, thus there were discriminant validity issues. However, since AU is measured by two items only, deleting one of the variables might cause un-identification problems, therefore we established discriminant validity.

4.1.2. The structural model analysis

The same criteria used for the measurement model was also used to measure the goodness-of-fit for the proposed model. The estimated values of fit indices have shown the good structural model fit to the data for the proposed research model in this study (see Table 3). This is clear from the table that all values were in the recommended range. The relationships between constructs were tested after supporting the validity and reliability of the measurement model. Structural equation modeling using AMOS 18.0 was used to test all the direct hypothesized relationships and the moderating effects of the individual variables.

As can be shown in Table 5, all the direct hypotheses were supported. Firstly, PEOU and PU are the two factors that directly affect the behavioural intention whereas PEOU ($\gamma = 0.194^{***}$) is the most significant determinant compared with PU ($\gamma = 0.143^{**}$) towards using Blackboard, supporting H1 and H2. This means that students like to use the system if it's easy to use and also if they have good feelings about the usefulness of Blackboard in enhancing their productivity and knowledge. Moreover, the influence of colleagues and instructors on students' behavioural intention to use the system was found to have a high significance, SN ($\gamma = 0.114^{***}$) supporting H3. Moreover, BI were also influenced by the quality of work life (ß = 0.445^{***}), supporting H4. Furthermore, the results also shows that Actual Usage is influenced by the behavioural intention ($\gamma = 0.583^{***}$) which supports H5.

As can be shown in Table 6, the results of the multi-group analysis have shown that most of hypothesized relationships of the moderating effect of individual differences were supported. Table 6 presents the results of the analysis and a summary of the results is discussed in the next section.

5. Discussion

Our research question of this study focused on the impact of individual differences of students on the acceptance and usage of web-based learning systems in Arab cultures, particularly in Lebanon as a cultural context and Blackboard as a web-based learning system. A conceptual model that extends the TAM to include social norms and quality of work life constructs as main dominants was proposed. This model incorporated a set of individual differences of students as moderators to overcome the limitation of TAM. Not surprisingly, all the direct relationship between PEOU, PU, SN, and QWL with BI were supported with 43.2% of the model variance explained. QWL was found to be the most important factor in predicting intention to use the system. This research is therefore the

Table 4

Q7 Construct reliability, convergent and discriminant validity.

| | CR | AVE | Factor correlation matrix with √AVE on the diagonal | | | | | |
			BI	PU	PEOU	SN	QWL	AU
BI	0.875	0.702	**0.838**					
PU	0.907	0.660	0.541	**0.813**				
PEOU	0.930	0.728	0.535	0.519	**0.853**			
SN	0.805	0.517	0.415	0.337	0.324	**0.719**		
QWL	0.843	0.521	0.687	0.571	0.487	0.425	**0.722**	
AU	0.672	0.511	0.631	0.442	0.390	0.309	0.436	**0.715**

Table 5

Q8 The summary of direct hypothesized results.

H#	Proposed relationship	Effects type	Path coefficient	Study results
H1	PEOU (+) → BI	Direct effect	0.194***	Supported
H2	PU (+) → BI	Direct effect	0.143**	Supported
H3	SN (+) → BI	Direct effect	0.114***	Supported
H4	QWL (+) → BI	Direct effect	0.445***	Supported
H5	BI (+) → AU	Direct effect	0.583***	Supported

* $p < 0.05$.
NS $p > 0.01$.
** $p < 0.01$.
*** $p < 0.001$.

Table 6

The summary of the moderating effect of individual differences.

H#	Proposed relationship	z-Score	Study results
H6	Experience × (PEOU, PU, SN) → BI	PU: 1.789*	Supported
		PEOU: −1.661*	Supported
		SN: −1.892*	Supported
H7	Age × (PEOU, PU, SN, QWL) → BI	PU: 1.081	Not supported
		PEOU: −1.910*	Supported
		SN: −2.480**	Supported
		QWL: 2.306**	Supported
H8	EdLevel × (PEOU, PU, SN, QWL) → BI	PU: −0.912	Not supported
		PEOU: −2.300**	Supported
		SN: −1.692*	Supported
		QWL: 0.979	Not supported
H9	Gender × (PEOU, PU, SN, QWL) → BI	PU: 1.695*	Supported
		PEOU: 1.323	Not supported
		SN: −2.000**	Supported
		QWL: 2.218**	Supported

*** p-value < 0.01.
** p-value < 0.05.
* p-value < 0.10.

first to find empirical support for these relationships in the Lebanese context. While these results are very close to traditional TAM as proposed by Davis (1989) they also suggest that there are more factors to be considered in future research to increase the degree of variance that can be explained. Therefore, from the empirical validity of TAM across cultures perspective, TAM was found to be accepted within the Lebanese culture in the field of e-learning acceptance. Interestingly, based on the relationship with intention to use, the findings in the study show that perceived ease of use has a greater effect on intention to use the Blackboard system, compared to perceived usefulness. This result contradicts with the original TAM model. In light of these results, the management should provide on-line and off-line training to enhance the students' skills in using the system.

Our results also indicate that some of moderating factors were not supported while some others were found to have a significant effect on the relationship between the four determinants and behavioural intention to use the web-based learning system. The results for the moderator's effect are discussed below.

5.1. Experience

Experience was found to moderate the relationships between PU_BI, PEOU_BI and SN_BI (see Table 6). The relationship between PU and BI was stronger for experienced users, supporting previous findings of Venkatesh et al. (2003) and Taylor and Todd (1995b). On the other hand the relationship between PEOU and BI was stronger for less experienced users. Again this is consistent with previous studies (e.g. Venkatesh & Davis, 2000; Venkatesh & Morris, 2000). The relationship between SN and BI was also stronger for less experienced users, supporting the previous findings of other researchers (e.g. Venkatesh & Davis, 2000; Venkatesh & Morris, 2000; Venkatesh et al., 2003). Our findings suggest that less experienced students are more likely to use the system if it easy to use and if they believe others think they should use the system. On the contrary, experienced users will form their perception towards using a new technology based on their previous knowledge that they gained from using similar technologies in the past (Morris & Venkatesh, 2000) and will be less influenced by the views of others or the perceived ease of use of the system.

5.2. Age

As expected, age was found to moderate the relationships between PEOU_BI, SN_BI and QWL_BI. These results indicate that there still exist significant generational gaps despite the rapid growth in internet use among older users. In particular, the relationship between QWL_BI was stronger for younger students. This suggests that QWL is a more salient factor for the younger users. On the other hand, the relationships between SN_BI and PEOU_BI were stronger for older students. These results indicate that older students are driven by the ease of use of the web-based learning system and also highly influenced by other's opinions (Venkatesh et al., 2003) compared to younger students. This may be due to the fact that older users have lower computer self-efficacy than younger users and also affiliation needs increase with age e.g. (Morris & Venkatesh, 2000); (Burton-Jones & Hubona, 2006). In contrast, younger students are less driven by ease of use and less influenced by other's opinions. Contrary to previous research and our hypotheses, no moderating role of age was found on the relationship between PU_BI, which means that no matter what age group a student belonged to, those who have are higher on PU will have better intention to use the e-learning system.

5.3. Educational level

Table 6 shows the moderating impact of educational level on our research model. Consistent with the previous research (Burton-Jones & Hubona, 2006; Morris, Venkatesh, & Ackerman, 2005), educational level was found to have a significant influence on the relationship between SN_BI and PEOU_BI, where the relationship was stronger for users with lower educational level. The results suggest that SN and PEOU had less effect on postgraduate students compared to undergraduate students. These results were

expected since less educated people would find the technology hard to use and thus would rely on other's opinion regarding the adoption and usage of web-based learning system. Conversely, higher educational level will negatively affect the social influence on behaviour as both education and experience will empower the users (Burton-Jones & Hubona, 2006; Lymperopoulos & Chaniotakis, 2005). Furthermore, previous research have shown that when the education level of users increases, their intention to use web-based learning systems increases (Calisir et al., 2009). However, contrary to our hypotheses and previous research e.g. (Burton-Jones & Hubona, 2006; Venkatesh et al., 2000), no moderating effect of educational level was found on the relationship between PU_BI and QWL_BI. This effect may be due to having a study population who are all at a very similar educational level.

5.4. Gender

The results (Table 6) showed that gender moderates the relationships between PU_BI, SN_BI, and QWL_BI. In terms of the moderating effect of gender on both PU_BI and QWL_BI, our results indicate that the relationships were stronger for male users. Our results are consistent with literature in social psychology, which emphasizes that men are more "pragmatic" compared to women and highly task-oriented (Minton et al., 1980) and usually have a greater emphasis on earnings and motivated by achievement needs (Hoffmann, 1980; Hofstede & Hofstede, 2005; Terzis & Economides, 2011) which is directly related to usefulness perceptions.

In addition, gender was also found to moderate the relationship between SN and BI with the relationship between SN_BI stronger for females. This result is consistent with the majority of previous studies (He & Freeman, 2010; Hu, Al-Gahtani, & Hu, 2010; Venkatesh & Morris, 2000; Wang et al., 2009) which report that men are less likely to accept behaviour even if it is confirmed by a majority of people. This might be because women rely more than men on others' opinion (Hofstede & Hofstede, 2005; Venkatesh & Morris, 2000) as they have a greater awareness of others' feelings compared to men and therefore more easily motivated by social pressure and affiliation needs than men (Venkatesh & Morris, 2000).

Contrary to our hypotheses and previous research in IS e.g. (Venkatesh & Morris, 2000); (Venkatesh et al., 2003), no moderating effect of gender were found on the relationship between PEOU and BI. This means that no matter what gender an individual belonged to, those who found the system easy to use had a better perception towards e-learning technologies. Our results are in line with other research findings such as Wang et al. (2009) who did not find any moderating impact of gender on the relationship between effort expectancy (similar to PEOU) and BI.

6. Contributions to theory and practice

This study draws several implications for theory, methodology and practice. From the theoretical point of view, the core outcomes of this research is to develop a conceptual research model that allow a better understanding of the factors that affect the acceptance of e-learning technology in Lebanon, and to study the impact of a set of moderators; namely individual characteristics; on the relationship between those factors and behavioural intention to use the technology. Therefore, this study adds to the few studies that take into account a set of individual factors (age, experience, gender and educational level) and highlight their important role in user technology acceptance (Venkatesh et al., 2003). This study concludes that age, gender, experience and educational level play an important role between the key determinants and users'

intentions towards using the web-based learning systems in the Lebanese context. Specially, this study replicated the findings of previous research e.g. (Morris et al., 2005; Venkatesh et al., 2003; Wang et al., 2009) but in the Lebanese context regarding the relationship between PU, PEOU, SN and BI. However, there is inconclusive evidence in previous research of whether it actually affects the relationship between the QWL and BI. Our results suggest that the relationship was found to be stronger users who are younger in age, males in gender, and more experienced in using computers and internet. Our result differs from those of Kriponant (2007) and Srite and Karahanna (2000) who failed to support these relationships. Therefore, this study is one of the first that succeeded to support the moderating role of those individual differences on the relationship between QWL and BI.

In contrast to the majority of studies that consider behaviour in western societies, our study supports TAM's reliability and validity in an educational context in the developing world and more specifically in Lebanon. TAM has been criticised for showing bias in a cross-cultural context e.g. (McCoy et al., 2005; Straub et al., 1997). Furthermore, many TAM studies focus on Western/developed countries, while TAM has not been widely tested within non-Western/developing countries (Teo et al., 2008). Consequently, Teo (2008) emphasizes on the importance of testing TAM in different cultures as it is argued that when Davis developed the TAM (Davis, 1989), he did not take into consideration the un-biased reliability of TAM in cross-cultural settings. Our results revealed that e-learning is well accepted in Lebanon despite potential problems mentioned earlier. Additionally, our results indicate that the TAM holds across cultures, therefore other Lebanese researchers can apply findings from previous research to local studies.

Our research extends the TAM to examine the impact of social influence and perceived quality of work life on the acceptance of technology and added a further step to the studies that take into account the social factors in technology acceptance and adoption.

A significant contribution of this work is to demonstrate the relevance of quality of work life as an antecedent to behavioural intention within the context of e-learning adoption. This variable has previously been suggested as potentially important but had not been included in empirical work on TAM, nor had it been investigated in relation to e-learning acceptance in Lebanon. The results of our study validate and confirm that quality of work life is an important consideration in the study of e-learning adoption.

From a practical point of view, QWL has been found to be the most important construct in explaining the causal process in the model. Therefore, for e-learning this construct is more relevant than the traditional PU and PEOU conceptualizations. The demonstration that quality of work life is important in the e-learning context also suggests that system designers should pay attention to providing systems that address this concern and that educators should explain the benefits of e-learning in terms that relate to this construct. Additionally, this finding should inspire not only organizations but also the government in promoting the importance of introducing a new technology on the quality of work life.

In terms of behavioural beliefs (PEOU and PU), the results shows that PEOU contributed the most to behavioural intention compared to the PU. These findings are noticed more within respondents who are females, less-skilled in using technology, lower in educational level. In this context, it is therefore believed that students who find the system useful in their learning process and also find the system easy to use are more likely to adopt the system. The results also suggest that training is crucial for individuals who belong to the first segment mentioned above; however it is not necessary for the other one, since those users will form their perceptions about using the web-based learning system on the ease of use of the system no matter how useful the system is. Therefore, in order to attract more users of e-learning, instructors should improve the

content quality of their web-based learning systems by providing sufficient, up-to-date content that can fit the students' needs. In order to promote the ease of use of such systems, system designers should provide a system which promotes ease of use.

We have also found that subjective norm is a significant determinant on behavioural intention to use e-learning. The impact of this construct has been highly observed within users that are female, less experienced, and lower in educational level. It is therefore advisable for management and instructors in particular to target this segment of students. In this context, the instructor should announce to the students that using the system is mandatory and it is also advised that practitioners should persuade users who are familiar with the system to help in promoting it to other users. This emphasises the need to consider implementation strategies that develop buy-in from those within the wider social environment.

The findings of this research also have practical implications to the higher educational institutions and universities in Lebanon. Although the government is investing in e-learning technology, it should be noticed that students will not accept and use the technology only because it is useful. As previously mentioned, students' perceptions towards using the web-based learning system are formed through individual, social and organizational beliefs, in addition to cultural values and other demographic differences. In this context, all the major and different individual factors should be considered simultaneously; this will help in understanding the complete picture of problem under investigation. In other words, it is futile to facilitate a technology which is implemented in a Western country or for specific group of users and then apply it in non-western countries that have substantial cultural differences without taking into consideration the cultural values. Therefore, policy makers should not consider the strategies related to content, design and structure in one country and simply apply it to another as it will be doomed to fail in other contexts. Additionally, it is recommended that educational authorities should decide on the best approach that fits their students before implementing any new technology.

The final theoretical contribution of this study is the development and validation of a survey instrument. It is essential to modify and validate the new measures in a situation where the theory is being formatted, but no prior validation in the same context (Straub, Boudreau, & Gefen, 2004). This study adopts the constructs' items from many different contexts and applies it to the context of e-learning, for example, the quality of work life construct has never been used and validated in the context of this study (e-learning). Therefore, the modifications and validating measures of this construct is considered as an important contribution to theory.

From the methodological perceptive, this research illustrates the power of quantitative method in verifying and confirming the research model. Thus, this study contributes to the trends of IS research which uses the structural equation technique to test the measurement and structural models. Specifically, this research uses two-step approach (confirmatory factor analysis and structural equation modeling). Therefore, this research is one of the few studies to use SEM statistical methods in Lebanon. There is a lack of studies in the Arab world and specifically in Lebanon with applying SEM technique as a method of analysis. Therefore, this study provides a clear example to other researchers of how AMOS and structural equation modeling can be used as a technique of analysis.

7. Limitations and future work

As with any research, our study has some potential limitations that need to be identified and discussed. Firstly, our sample frame was based on convenience sampling technique and included participants studying at two private universities and their views may differ from those who study at other universities. Thus, generalizability of the findings should be treated with caution. Additionally the age range of the sample is somewhat limited but that is representative of higher education.

Secondly, our study investigated the impact of moderating factors in a mandatory environment within one context. Future research should investigate the impact of moderating factors in voluntary environment as it has been found that this variable can be a major influence on students' perception towards using technology (Venkatesh et al., 2003). Further work could also consider different user groups (e.g., students with disability, children) and/or different organizational contexts (e.g., High schools or public institutions) to explore the validity of the model in different contexts.

Thirdly, future research may extend our study to integrate other potential constructs of interest to the education community such as university and government support, or self-efficacy (Venkatesh & Davis, 2000) in order to increase the explained variance of TAM. In addition, further research could consider another set of individual differences such as culture and more specifically individual-level cultural variables since acceptance of technology by end-users is an individual-level concern (Srite & Karahanna, 2006) only then a more complete picture of the dynamic nature of individual technology may begin to emerge.

8. Conclusion

The main objective of this study is to examine how a set of individual differences (e.g., age, gender, educational level and experience) of users can affect users' perceptions about adopting e-learning tools in Lebanon. All the individual differences variables were integrated as moderators into an extended TAM. This study has successfully supported, both theoretically and empirically, the ability of TAM to be a useful theoretical framework for better understanding the student's acceptance of e-learning technology within the Lebanese context.

While we found support for the traditional TAM constructs of PU and PEOU in predicting BI towards using web-based learning system, we found that QWL was a stronger predictor than either of these in this educational context. Furthermore, we found that social norms and quality of work life are two important factors in determining the acceptance of e-learning.

With respect to the individual differences, the empirical results showed a statistically significant effect of these moderators in the relationship between the main determinates and BI. However, the moderating role of age and educational level on the relationship between PU and BI was not found. Similarly, Gender was not found to affect the relationship between PEOU and BI. These significant findings of the individual factors provide an important insight. All the major and different individual factors should be considered simultaneously only then a more complete picture of the dynamic nature of individual technology may begin to emerge.

Although TAM and other user acceptance models have been validated empirically, research continues to add social factors to increase the explanatory power of such models. This study moves in that direction. By including social norms and quality of work life as main determinants in addition to a set of individual differences, we can describe and understand how the students make their decisions about using and adopting web-based learning systems. We hope that future research can build on the findings of this research and offer greater insights on the social and individual factors rather than simply the technological solution.

9. Uncited reference

Q6   Baron and Kenny (1986).

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