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Examining the moderating effect of individual-level cultural values on users' acceptance of E-learning in developing countries: a structural equation modeling of an extended technology acceptance model

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ABSTRACT

In this study, we examine the effects of individual-level culture on the adoption and acceptance of e-learning tools by students in Lebanon using a theoretical framework based on the Technology Acceptance Model (TAM). To overcome possible limitations of using TAM in developing countries, we extend TAM to include *subjective norms* (SN) and *quality of work life* constructs as additional constructs and a number of cultural variables as moderators. The four cultural dimensions of *masculinity/femininity* (MF), *individualism/collectivism*, *power distance* and *uncertainty avoidance* were measured at the individual level to enable them to be integrated into the extended TAM as moderators and a research model was developed based on previous literature. To test the hypothesised model, data were collected from 569 undergraduate and postgraduate students using e-learning tools in Lebanon via questionnaire. The collected data were analysed using the structural equation modelling technique in conjunction with multi-group analysis. As hypothesised, the results of the study revealed *perceived usefulness* (PU), *perceived ease of use* (PEOU), *SN* and *quality of work life* to be significant determinants of students' *behavioural intention* (BI) towards e-learning. The empirical results also demonstrated that the relationship between *SN* and *BI* was particularly sensitive to differences in individual-cultural values, with significant moderating effects observed for all four of the cultural dimensions studied. Some moderating effects of culture were also found for both *PU* and *PEOU*, however, contrary to expectations the effect of *quality of work life* was not found to be moderated by *MF* as some previous authors have predicted. The implications of these results to both theory and practice are explored in the paper.

1. Introduction

E-learning is becoming an increasingly widespread approach in higher education institutions around the world (Brown, 2010; Jenkins, Browne, Walker, & Hewitt, 2011). ICT has the potential to greatly help students in their education, but its effectiveness ultimately depends on the degree of acceptance and use within the target population (Browne, Jenkins, & Walker, 2006; Teo, 2014). Factors, such as users' perception of technology, as well as their knowledge and skills in using computers, have been shown

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to affect acceptance and usage (Al-Gahtani, 2014; Tarhini, Hone, & Liu, 2015; Wong, Teo, & Goh, 2015). Within the Information Systems (IS) literature, models such as the Technology Acceptance Model (TAM) (Davis, 1989) have been used to empirically explore the determinants of technology acceptance. Many studies have supported TAM's explanatory power within the context of IS implementation in general (Venkatesh & Bala, 2008) and a number of studies have successfully extended its application to the context of e-learning (Alshare, Freeze, Lane, & Wen, 2011; Chang & Tung, 2008; Hu & Hui, 2012; Liu, Chen, Sun, Wible, & Kuo, 2010; Park, 2009; Sharma, Chandel, Govindaluri, & Fakhr-ElDin, 2014; Tarhini, Hone, & Liu, 2013c). However, to date the focus of the majority of such studies has been within the context of developed countries (Al-Gahtani, 2014; Tarhini, Hone, & Liu, 2014a; Teo, 2010). While the Internet is a global tool, the efficiency of particular applications should also be measured locally since users usually work in local/national contexts (Li & Kirkup, 2007).

Arab countries, such as Lebanon, are particularly under-researched in relation to their acceptance of e-learning applications. Such countries typically support traditional styles of pedagogy in education, due to a lack of financial resources and appropriately trained staff (Baroud & Abouchedid, 2010; BouJaoude & Abd-El-Khalick, 2004; Dagher & BouJaoude, 2011), so it is especially important to understand the factors that may encourage take up e-learning within these developing contexts. TAM has been criticised for its cultural bias especially when tested in non-Western cultures, for example, see McCoy, Galletta, and King (2007). Some support for TAM has been shown in the Arab world in general, for example (Alshare, Mesak, Grandon, & Badri, 2011) and for e-learning acceptance in Jordan (Abbad, Morris, & De Nahlik, 2009; Al-Adwan & Smedley, 2013). However, in relation to e-learning, questions remain since Abbad et al. (2009) did not seek to define their sample in terms of their specific cultural characteristics.

It has also been suggested that specific cultural differences may affect the strength of some relationships within the TAM model and may help to explain some contradictory findings within the literature (e.g. Sánchez-Franco, Martínez-López, & Martín-Velicia, 2009). This explanation has been explored explicitly in a limited number of studies through the examination of the effects of cultural variables as moderators with TAM. The most widely applied conception of culture used has been that of Hofstede (1980) which categorises countries along the following dimensions:

- Power distance (PD) – this refers to the extent to which individuals expect and accept differences in power between different people.
- Individualism-collectivism – this refers to the extent to which individuals are integrated into groups.
- Masculinity-femininity – this refers to the extent to which traditional gender roles are differentiated.
- Uncertainty avoidance (UA) – this refers to the extent to which ambiguities and uncertainties are tolerated.

While there is evidence that these cultural differences may explain some variations in TAM results, much of the work in this tradition is limited as it uses nationality as a surrogate for culture which may mean that some of the specific cultural variables are confounded. Although few would disagree that cultural factors are important in theory, there is surprisingly little published literature concerning the effect of national cultural aspects of online learning and teaching (Elenurm, 2008; Hannon & D'Netto, 2007; Sánchez-Franco et al., 2009; Ya-Wen Teng, 2009). Most of the literature about cultural effects in IS research is based on the national or organisational level. A typical approach is to use nationality as a surrogate for culture, comparing similar samples of participants from two or more countries and attributing any differences to the assumed cultural dichotomies between the respective countries. This approach is problematic for several reasons. First, researchers often rely on historical findings regarding the cultural characteristics of particular countries or regions (dating from Hofstede's original findings). Research by McCoy, Galletta, & King (2005) suggests that shifts may have occurred over the last 30 years and that assumptions based on Hofstede's work may therefore

no longer be valid. This finding argues for the importance of directly measuring participant cultural values within any new research study. In addition, there are several cultural dichotomies within Hofstede's model and these will covary between different countries. It can therefore be difficult to infer which cultural factor is responsible for differences between samples from different countries (for example, if two countries vary in both UA and collectivism, it may be unclear which of these variables might be having an influence in any observed results). As a result, it can be challenging to find samples that usefully isolate the cultural variables that may be of interest. A third problem is that within the same country, individuals will vary on cultural dimensions. While national culture is a macro-level phenomenon, the acceptance of technology by end-users is an individual-level phenomenon. Individual behaviour cannot be measured or predicted using the national measurement score since there are no means to generalise cultural characteristics about individuals within the same country especially for measuring actual behaviour in the adoption and acceptance of technology (McCoy, Everard, & Jones, 2005; Udo, Bagchi, & Kirs, 2012; Yoon, 2009; Alenezi, Tarhini & Sharma, 2015). Hofstede himself mentioned that his country-level analysis was not able to predict the individual behaviour (Hofstede, 1980).This means that it is problematic to include national culture constructs within individual-level models such as TAM (McCoy, Galletta, & King, 2005).

McCoy et al. (2005) recommend that individual-level versions of Hofstede's instrument (such as that developed by Dorfman & Howell, 1988) should be used with individual-level research models. Srite and Karahanna (2006) followed this approach in two studies of the general acceptance of computing technology (PCs in the first study and PDAs in the second study). They argue that the effect of culture on individuals depends on the degree the individual is willing to get involved and engage with the values of his/her own culture. They therefore used scales derived from the work of Hofstede (1980) and Dorfman and Howell (1988) to measure cultural values at the individual level. The scales were found to have adequate psychometric properties and Srite and Karahanna (2006) were able to successfully integrate them with a model derived from TAM. The research in this paper therefore follows this approach and measures culture at the individual level, enabling the moderating effects of culture within the TAM model to be meaningfully explored. The direct measurement of cultural values within a contemporary Arab sample also allows exploration of whether the shift in cultural values observed over the last 30 years by McCoy et al. (2005) applies to this group.

Moderating factors, including cultural values, may help to account for inconsistencies between TAM studies and may also increase its explanatory power (Sánchez-Franco et al., 2009; Srite & Karahanna, 2006; Tarhini et al., 2015). It is therefore important to explore the moderating effect of cultural variables on the main TAM relationships within the context of e-learning. Further, Dillon and Morris (1996) argued the major theoretical limitation of TAM is the "exclusion of the possibility of influence from institutional, social, and personal control factors." While the inclusion of cultural moderators may address this to some extent, a complementary approach to this problem is the inclusion of additional constructs within the model. Here we include Subjective Norms (SN) and Quality of Working Life (QWL) in order to examine whether the explanatory power of TAM is improved in our research context through the introduction of these additional constructs. SN have been examined in a number of previous studies where they have been shown to be an important determinant of acceptance (e.g. Venkatesh, Morris, Davis, & Davis, 2003). Furthermore, Srite and Karahanna (2006) found that the impact of SN was sensitive to cultural differences, providing a key rationale for the inclusion of this variable here. QWL has also been proposed as a variable that may be a useful, culturally sensitive addition to TAM (e.g. Srite & Karahanna, 2006; Zakour, 2004). However, neither its applicability to the e-learning context, nor the influence that cultural differences have on its effects have been previously examined.

To summarise, this study takes into account the fact that TAM may not be applicable across all cultures and therefore explicitly tests its relevance in the under-researched Arab context. It also accepts that culture may act as a moderator for some of the key TAM relationships and explores these moderating effects through the use of individual-level measurement of cultural values within the sample. Our work also reflects previous researchers' views that TAM alone may not be sufficient to explain intention, extending the model to include additional constructs suggested in the

literature (SN and QWL). Therefore, the main aims of the current study are therefore to empirically validate an extended TAM for e-learning in the Lebanese context and to explicitly investigate the role of individual-level cultural dimensions as moderators within this extended model. There are several novel aspects to this work including: the use of TAM for understanding e-learning adoption in the Lebanese context; the contemporaneous measurement of cultural values within the Lebanese context; the inclusion of the QWL construct in an e-learning context and the examination of learners' individual-level cultural variables as moderators within 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, 4 and 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

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 SN and QWL as additional constructs and through the inclusion of a number of cultural variables as moderators. The overall conceptual model is illustrated in Figure 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

Many researchers have used the TAM to measure students' acceptance of Web-based learning tools (Huang, Liaw, & Lai, 2013; Sharma & Chandel, 2013; Tarhini, Hone, & Liu, 2014b). Sharma and Chandel (2013) found that perceived ease of use (PEOU) has a direct and positive influence and effects on the intention to use the system and his results were supported by other researchers (Chang & Tung, 2008; Liu et al., 2010; Tarhini, Hone, & Liu, 2013a). In contrast, Chesney (2006) concluded that PEOU did not have a direct and significant influence on the intention to use the system.

Reviewing the literature, several studies in the educational context were found to be inconsistent. Some claims that PEOU had a significant influence on the intention to use the system (Liu et al., 2010; Saadé & Galloway, 2005; Tarhini, Hone, & Liu, 2013b; Teo & Noyes, 2014). Another two studies by Saadé and Galloway (2005) and Landry, Griffeth, and Hartman (2006) considered the student's usage of Web-based learning using the TAM; Landry et al. (2006) found out that both PEOU and
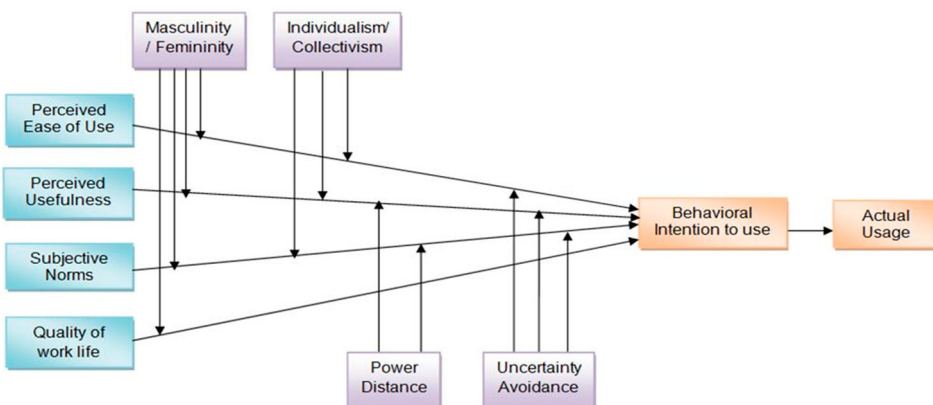
Figure 1. Theoretical framework.

perceived usefulness (PU) are the determinant for the system usage. They suggest that if students perceive an e-learning tool (in this case Blackboard) to be easy to use, they would also perceive the tool to be useful. All the subsequent studies about student perceptions on using technologies support Davis's (1989) model. In addition, PU was found to be the most influential variable in predicting the intention to use the Web-based learning system in TAM (Chang & Tung, 2008; Liu et al., 2010), while Saeed and Abdinnour-Helm (2008) found that PU has an influence on the intention to use but was not the most influential factor. Moreover, literature shows that studies using TAM and models derived from TAM (Davis, 1989; Taylor & Todd, 1995a, 1995b; Venkatesh & Davis, 2000) demonstrated that there is a relationship between PU and PEOU and behavioural intention (BI) in the acceptance and adoption of technology. Therefore, it is hypothesised 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. BIsfor using an e-learning system

The presence of BI in the TAM is one of the major differences with Theory of Reasoned Action (TRA) (for more information, please see Ajzen & Fishbein, 1980). BI is considered to be an immediate antecedent of usage behaviour (UB) 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 influence the UB (Davis, 1989). Many studies have recently supported the relationship between BI and Actual Usage (AU) in the context of e-learning (Chang & Tung, 2008; Liu et al., 2010; Park, 2009; Tarhini et al., 2015; Teo, 2010). 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.

2.3. SN impact UB

SN have been adopted and included in previous work using the TAM model, in order to overcome the limitation of TAM in measuring the influence of social environments (Venkatesh & Davis, 2000). SN is defined as the 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 has been characterised in some research as an antecedent of BI and in other studies as an antecedent PU. However, as mentioned by Venkatesh et al. (2003), the influence of SN is very complex. Therefore, there was some inconsistency in the literature about the influence of SN on the intention to use the technology. Many researchers found a significant impact of SN on BI (Abbasi, Tarhini, Elyas, & Shah, 2015; Van Raaij & Schepers, 2008; Venkatesh & Davis, 2000; Venkatesh et al., 2003), while a number of others failed to find any impact (Chau & Hu, 2002; Lewis, Agarwal, & Sambamurthy, 2003). Building on Venkatesh and Davis's (2000) research, this study will consider only the direct impact of SN on BI. SN will be measured by the influence of other colleagues and instructors on students' perception to use the Web-based learning system. This research extended the TAM model to include the SN factor; we believe that it is important to integrate the SN in the TAM model as we assume that the effect of SN on BI is crucial in multi-religious, multi-ethnic countries like Lebanon. It is expected that SN will have a positive impact on BI in the context of this study as PD is very high and it is expected that the students will use the technology if their superior or colleagues asked them to do so even if they are not certain about its usefulness. Thus, we propose the following hypothesis:

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

2.4. Quality of work life

QWL was included in our model based on a number of suggestions in the IS literature that this extension may improve the TAM model (Kripanont, 2007; Srite & Karahanna, 2000; Zakour, 2004). This has

not previously been considered within an educational context and the current paper 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 colleagues. Generally speaking, a mismatch between students and the impact of technology on their lives can be disadvantageous for both students and institutions and which in turn affect their BI to use the e-learning systems. Thus, the emphasis is given to QWL construct 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. It is hypothesised that:

H4: QWL will have a positive influence on student's BI to use the Web-based learning system.

2.5. The moderating effects of individual-cultural dimensions on technology acceptance

Previous studies have proposed and identified a number of moderating effects of cultural variables, as defined according to Hofstede's work, within TAM. These findings are discussed in more details below and used to justify the research hypotheses that were explored in the current research.

2.5.1. Power distance

PD determines the extent to which individuals expect and accept differences in power between different people (Hofstede, 1980). A number of authors have suggested that PD might be expected to moderate the relationship between SN and BI (e.g. Dinev, Goo, Hu, & Nam, 2009; Li, Hess, McNab, & Yu, 2009; McCoy, Everard, & Jones, 2005; Srite & Karahanna, 2006; Zakour, 2004).The general prediction is that users with higher PD values would be more likely to be dependent on referent power in decision-making, that is, they would be more influenced by the views of others, particularly superiors, in deciding whether to adopt technologies. While this argument appears logical, evidence in support of it has been ambiguous at best. Dinev et al. (2009) compared samples from South Korea and the USA in the context of adoption of protective (e.g. anti-virus) software. They found that the relationship between SN and BI was significant for the South Korean sample (a high PD culture) but not for the US sample (low PD). While this finding is in line with the discussion above, several other cultural factors co-varied between the two sample groups and Dinev et al. (2009) attribute the result to a cumulative effect of individualism, masculinity, PD and UA. This illustrates the problem discussed above of isolating the effects due to specific cultural values when looking at culture at the country-level only. McCoy et al (2005) compared email users in Uruguay and the USA, predicting that the relationship between SN and BI would be stronger for the Uruguay sample based on a number of cultural differences including PD; however, they found no significant effect of SN on BI in either sample. Li et al. (2009) compared China and the USA in the context of adoption of a web portal. While they measured culture at the individual level, they found no moderating effects. Srite and Karahanna (2006) also measured culture at the individual level. In one part of their study, they found that PD was a significant moderator of the relationship between SN and BI, this was in the opposite direction to that predicted. The second part of their study found no significant effect of PD. The effect of PD in the context of educational technology adoption does not appear to have been explored directly in past research. We therefore address this and make the following hypothesis based on the arguments of previous authors described above:

H6a: PD moderates the relationship between SN and BI, such that the relationship will be stronger for high PD users.

McCoy et al. (2005) additionally predicted that PD would moderate the relationship between PU and BI, such that the relationship would be stronger for low PD samples. While the justification for this is not clearly articulated, it could be hypothesised that this would be the case because in low PD

cultures users might feel free to use their own intention judgements based on usefulness, rather than rely heavily on the views of those with higher perceived power. McCoy et al. (2005) were not able to demonstrate the predicted effect in their work, with both the US and Uruguay samples showing similar strength in PU->BI relationships. However, since the samples co-varied on a number of other cultural factors, it is difficult to interpret the result. Our study provides the opportunity to explore this in more detail with individual-level cultural values data. We hypothesise that:

H6b: PD moderates the relationship between Perceived Usefulness and BI.

2.5.2. Masculinity/femininity

According to Hofstede's (1980, 1991, 2001) definition of the masculinity/femininity (MF) cultural dimension, a high masculinity culture (low femininity) will emphasise work goals, such as earning and promotions. On the other hand, low masculinity individuals (high on femininity) are encouraged to follow more traditional, tender and modest roles.

Those holding high femininity cultural values are characterised as being more people-oriented than those with high masculinity values. For this reason, they would be expected to be more influenced by interpersonal contact and a number of authors have therefore predicted a moderating effect of SN on BI, such that the relationship will be stronger for more feminine samples (Dinev et al., 2009; Li et al., 2009; Srite & Karahanna, 2006; Yoon, 2009). Srite and Karahanna (2006) found support for this hypothesis in one study using individual measures of culture, but a non-significant effect in their second study. Dinev et al. (2009) showed the predicted effect in a cross-country sample, with the relationship between SN and BI stronger for South Korea (more feminine culture) than the USA (more masculine culture), though a number of other cultural differences between the samples could also contribute to this result. Other studies were unable to show the predicted effect (e.g. Li et al., 2009; McCoy, Everard, & Jones, 2005). Here we predict that in an educational context, the relationship between SN and BI will be moderated by MF, such that it will be stronger for those espousing more feminine values (see hypothesis H7a).

Conversely, those high in masculinity would be expected to focus more on instrumental values and so would be expected to be more influenced by features that enhance the achievement of work goals compared to those high on femininity. A moderating relationship between PU and BI would therefore be predicted, with the relationship expected to be stronger for those with more masculine values. Srite and Karahanna (2006) hypothesised this effect but failed to find a significant result. Srite (2006) found an effect in the opposite direct to that expected, with a significant effect of PU on BI for a US sample (more feminine) but no significant effect for a Chinese sample (more masculine). The relationship has not been explicitly explored in relation to e-learning technology acceptance; we predict that in this context, the relationship will be stronger for high masculinity individuals (see hypothesis H7b).

In contrast to PU (an instrumental variable), PEOU captures the hedonic experience of using a technology. Authors such as Srite and Karahanna (2006) argue that such experiences will be more important for users who espouse feminine values since feminine cultures tend to emphasise the creation of more pleasant work environments. A number of authors found evidence to suggest that the relationship between PEOU and BI is stronger for those with more feminine values (e.g. McCoy et al., 2007; Srite, 2006; Srite & Karahanna, 2006). We therefore predict the same effect in an educational context (see hypothesis H7c).

QWL has been suggested by several authors as a potentially relevant factor when considering the impact of masculinity-femininity on technology acceptance, for example (Srite, 2006; Srite & Karahanna, 2006; Zakour, 2004); however, none of these studies directly considered QWL. QWL is generally valued more within feminine cultures, so would be expected to be a more important predictor of technology acceptance for users with more feminine values. In an educational context, we hypothesise that QWL will be a stronger predictor of BI for those expressing more feminine cultural values (see hypothesis H7d).

Based on previous discussion, we hypothesise the following:

H7a, b, c, d: The relationship between (SN, PU, PEOU, QWL) and BI to use is moderated by the MF value.

2.5.3. Uncertainty avoidance

According to Hofstede (1980), UA refers to the extent to which ambiguities and uncertainties are tolerated. Actually, the level of stress and anxiety for individuals with high UA increases more when uncertain situation occurs compared to individuals with low UA (Udo et al., 2012). In the literature, some authors have proposed a direct effect of UA on technological adoption, with high UA cultures hypothesised to be less accepting of technological change (Zakour, 2004). UA has also been hypothesised to play a moderating role in a number of TAM relationships and these have been explored with mixed results as described below.

Several authors propose a moderating effect of UA in the relationship between SN and BI (Dinev et al., 2009; Li et al., 2009; Srite & Karahanna, 2006; Zakour, 2004). The prediction is that SN will be more important in a high UA context because the opinions of referent groups provide a useful means for people to reduce the uncertainty associated with the uptake of new technology. Support for this hypothesis comes from the work of Srite and Karahanna (2006) and Dinev et al. (2009), while Li et al. (2009) were unable to show a moderating effect of UA in their study. In an educational context, we predict the relationship between SN and BI will be higher for those espousing high UA values (see hypothesis H8a).

In an educational context, Sánchez-Franco et al. (2009) predicted that UA would have a moderating effect on the relationships between both PU and PEOU on BI, arguing that these factors would help to resolve unclear situations and that this information would have a relatively greater influence on the behaviour of high UA samples. They conducted a comparison of samples of educators from Nordic (high individualism, low UA) and Mediterranean (low individualism, high UA) cultural settings. The results supported a moderating effect of PEOU on BI, with PEOU more likely to encourage uptake among the Mediterranean e-learning system users (where UA was higher). However, the results with respect to PU were counter-intuitive, with PU having a bigger effect on BI for Nordic users (the lower UA group). This may be due to the confounding impact of individualism (which was expected, and found, to influence the effect of PU, such that it played a greater role in the more individualist Nordic culture). This study again illustrates the difficulties of inference from studies that examine culture at the group, rather than individual level. McCoy et al. (2007) found that the PU->BI and PEOU->BI paths in TAM were only significant in high UA settings, not in lower UA settings, supporting the moderating relationship of these two variables. However, in an earlier study they failed to find the predicted difference between Uruguay (high UA) and US (low UA) samples for either PU or PEOU (McCoy, Everard, & Jones, 2005). The current study re-examines the moderating impact of UA on PU and PEOU effects in an e-learning context with culture measured at the individual level, predicting that both factors will play a bigger role for those espousing higher UA values (see hypotheses H7b and H7c).

Thus, we posit the following hypotheses in line with the discussion above:

H8a, b, c: The relationship between SN, PU and PEOU, and BI to use is moderated by the UA value.

2.5.4. Individualism/collectivism

According to Hofstede (1980), the terms individualism/collectivism (IC) refer to the extent to which individuals are integrated into groups. In individualistic societies, individuals focus on their own achievements and personal goals rather than on the group they belong to, while in collectivistic societies, people prefer loyalty and group success on their individual gain.

A number of authors have hypothesised that the relationship between SN and BI would be stronger in more collectivist cultures due to the views of others in-group members being considered as more important within such cultures (e.g. Dinev et al., 2009; Li et al., 2009; McCoy,

Everard, & Jones, 2005; Srite & Karahanna, 2006; Zakour, 2004). Srite and Karahanna (2006), for instance, argue that normative influences may be a more important determinant of intended behaviour for those who espouse collectivist values. Unfortunately, their empirical data did not support the predicted relationship. Other researchers who predicted this moderating effect of IC but failed to find support from their data include McCoy et al. (2005) using a cross-country comparison and Li et al. (2009) using individual-level cultural data. On the other hand, Srite (2006) found that while SN was a significant predictor of BI in a Chinese sample (collectivist culture), there was no significant effect of SN on BI in the USA (individualistic culture), a result they attribute as potentially due to the moderating effect of individualism. Dinev et al. (2009)'s finding that the relationship was significant for South Koreans (collectivist) but not for a US sample is also in line with the proposed moderating effect, but (as discussed above) this particular cultural comparison confounded a number of cultural differences and the authors attribute the result to a cumulative effect of these differences. Therefore, evidence is limited to support the moderating role of individualism on the effect of SN in technology acceptance and does not appear to have been investigated explicitly in relation to e-learning adoption. We predict that those espousing more collectivist values will be more likely to be guided by SN in their decision to adopt e-learning technology (see hypothesis H9a).

Some authors have also suggested that IC may play a role in other TAM relationships. Lee, Choi, Kim, and Hong (2007) predicted and found that Individualism has a direct positive effect on both PU and PEOU. Other authors have hypothesised a moderating role of IC on the relationship between PU and BI (McCoy, Everard, & Jones, 2005; Sánchez-Franco et al., 2009). Individualistic cultures are characterised by an emphasis on the achievement of individual goals, so PU would appear to be a highly relevant factor for technology adoption in such settings, relating as it does to technology as a means for the achievement of specific goals. In an educational context, Sánchez-Franco et al. (2009) predicted that the relationship between PU and BI would be higher for individualistic users. Their results support this in that they showed that Nordic (individualist culture) users' intentions were more influenced by PU than those of Mediterranean users (collectivist culture). On the other hand, McCoy et al. (2005) failed to find the predicted difference in a comparison of Uruguay and US samples. We re-examine this potential moderating effect in an educational setting, using individual-level measures of IC, predicting a stronger relationship for those expressing individualist values (see hypothesis H9b). Fewer authors have considered whether the effect of PEOU might be moderated by IC. McCoy et al. (2005) explicitly state that they expect no influence of IC here. However, McCoy et al. (2007) found that the path from PEOU and BI was impaired in collectivist settings and speculate that people within these settings may be more willing to endure poor usability so long as they are achieving goals that are valued by the wider group. We therefore also consider in the current work whether this may be the case (see hypothesis H9c).

Based on the discussion above, we postulate the following hypotheses: H9a, b, c: the relationship between SN, PU and PEOU, and BI to use is moderated by the individualism/collectivism value.

3. Research methodology

3.1. Sampling and survey administration

The strengths of a survey have been identified (Bryman & Bell, 2011), and consequently used to test hypothesised relationships within the context of technology acceptance in an objective manner where the researcher is isolated from the aim of the study. Additionally, the constructs and their relationships used within the conceptual model were developed and validated thoroughly in the theories and models about the adoption and technology acceptance (see the background section). Furthermore, this study uses the structural equation modelling (SEM)

technique in order to test hypotheses and moderators and to perform a number of tests such as group comparisons which require a large number of participants. Therefore, using the survey as a data collection method is appropriate from the ontological, epistemological and methodological point of view.

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, and the number of returned questionnaires was 640 indicating a 64% response rate. We 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 UB, measured using 4 and 2 items, respectively, were adapted from the empirical work of Ajzen and Fishbein (1980). The QWL was measured using a five-item scale and was adapted from the work of Kripanont (2007) and Srite and Karahanna (2000). In addition, the four cultural constructs were measured with six items each and were adapted from the work of Srite and Karahanna (2006) who in turn developed their measures based on the work of Dorfman and Howell (1988) and Hofstede (1980).

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 1–7 (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 assess the frequency and of using Web-based learning system and (1 = Almost never and 6 = more than 3 hours) to measure the average of daily usage per hour. In addition, the demographics were measured on a nominal scale (see the Appendix).

All participants were studying in an English-language setting. Therefore, the instrument was administered in English to all of the students who volunteered to participate. It is important to note that the questionnaire items used in this research were taken from previous research sharing a similar context of the current one. All of the items were used as part of questionnaires in studies investigating how culture at national or individual level affect individual's technology acceptance and behaviour in the context of technology acceptance. The fact that the items were developed for and tested within similar contexts to the current study supports their applicability here. It was also essential to pilot test the questionnaire prior to its use within this study to ensure the validity and reliability of the questionnaire items in Lebanon. Therefore, a pilot study was conducted in Lebanon before the actual questionnaires were distributed. The results from pilot study indicate that although some of the measurement scales for some constructs were valid, they were not relevant in the current study. For example, we removed the Voluntariness construct as most of the participants believe that it is mandatory to use the system during their learning process. We also excluded all the students who participated in the pilot study from our sample frame.

4. Results

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 sample's 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 comes as a surprise as the previous literature suggests that Web-based learning system in Lebanon is still in its infancy (Baroud & Abouchedid, 2010; UNDP, 2007).

The sample showed high UA with a mean of (5.4/7). Also, the sample was found to be masculinity in orientation (3.2/7) and with collectivistic characteristics (4.93/7). These results confirm Hofstede's (1980, 2001) about the Arab countries characteristics but at the individual-level. This also supports that the sample characteristics satisfied the cultural criteria of the overall population. On the other hand, contrary to Hofstede's earlier findings, the sample was found to be lower in PD at the individual-level (3.24/7).

In order to test the effect of cultural constructs within this study, a median-split method was used to categorise and divide each cultural variable into two groups (High, Low). Compared with Mean-split, this method is more resistant by the presence of extreme values or outliers; it is also more useful when comparing sets of data.

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
Blackboard experience	No experience	57	10
	Some experience	220	38.7
	Experienced	292	51.3
Internet and computer experience	Novice	89	15.6
	Moderate	254	44.6
	Expert	226	39.7
Number of courses using blackboard for the current academic year	1–2	217	38.1
	3–5	249	43.8
	>5	103	18.1

Table 2. Descriptive statistics of the constructs.

Construct	Mean	Standard deviation	Cronbach alpha
Perceived Ease of Use (PEOU)	5.26	1.06	.90
Perceived Usefulness (PU)	5.17	1.10	.90
Social Norms (SN)	4.96	1.17	.76
Quality of Work Life (QWL)	5.20	1.00	.83
Behavioural Intention (BI)	4.78	1.13	.87
Actual Usage (AU)	4.28	1.01	.66
Power Distance (PD)	3.24	1.29	.89
Masculinity/Femininity (MF)	3.20	1.24	.90
Uncertainty Avoidance (UA)	5.40	1.00	.89
Individualism/Collectivism (IC)	4.93	1.02	.85

The results indicate a low PD (Mean = 3.24, with Mean = 2.24 for the lower group, and Mean = 4.41 for the Higher group), a Masculine society (Total Mean = 3.2, with Mean = 2.26 for the lower group, and Mean = 4.15 for the Higher group), high UA (Total Mean = 5.4, with Mean = 4.6 for the lower group, and Mean = 6.22 for the Higher group) and a collectivism population (Total Mean = 4.93, with Mean = 4.09 for the lower group, and Mean = 5.74 for the Higher group).

4.2. Testing the normality assumption

According to Hair, Black, Babin, Anderson, and Tatham (2010), testing the presence of normality is essential in multivariate analysis. In other words, if the data are not normally distributed, then it may affect the validity and reliability of the results. In the current study, we employed Jarque-Bera (skewness-kurtosis) test to check whether the data are normally distributed or not. The skewness value indicates the symmetry of the distribution (Pallant, 2010). A negative skew indicates that the distribution is shifted to the right, whereas positive skew indicates a shift to the left. Kurtosis provides information about the height of the distribution (Pallant, 2010). The positive kurtosis value indicates a peaked distribution, whereas a negative value indicates a flatter distribution. According to Tabachnick and Fidell (2007), the normal range for skewness-kurtosis value is ±2.58. Following this recommendation, all the items in the dataset were found to be normally distributed (i.e. <±2.58). More specifically, the skewness and kurtosis value in each case was in the range of ±1 which is considered negligible.

4.3. Model testing

4.3.1. The measurement model analysis

4.3.1.1. Item reliability. Although all items used in this study were drawn from the literature, where they are reported to be reliable, the AMOS measurement scale reliability was also checked using (standardised regression weights), by examining the loading of each item, and by assessing the correlation between each item and its corresponding construct. According to Hair et al. (2010), the items' loading and item-construct correlation should be at least 0.60; scores of at least 0.5 might be acceptable if some other items measuring the same construct have high scores. All items had loadings above 0.5 and most items had loading exceeding 0.7. Furthermore, all item–construct correlations exceeded 0.7. Accordingly, it could be concluded that the items measuring all constructs had adequate reliability.

4.3.1.2. Construct reliability. The reliability of the constructs was checked by Cronbach's alpha. Cronbach's alpha measures how well a set of items measures a single unidirectional latent construct. Different reliabilities values were considered satisfactory by different researchers. For instance, it should be at least 0.7 according to DeVellis (2003) and Robinson, Wrightsman, and Andrews (1991) or 0.6 is considered satisfactory while a value of 0.8 or higher is preferred according to Nunnally (1970). Given that all constructs had composite reliability scores above 0.8 and had average variance extracted (AVE) scores exceeding 0.5 and Cronbach's alpha scores exceeded 0.6 (see Table 2 and Table 3), this suggests that the constructs had adequate reliability.

4.3.1.3. Construct validity. Construct validity can be assessed through convergent validity and discriminant validity. No discriminant validity at the item or construct level were found since the AVE of each construct (see Table 3) was higher than the corresponding squared inter-construct correlation (Tabachnick & Fidell, 2007). Additionally, AVE was also used to examine the convergent validity. According to Hair et al. (2010), the criteria are to be above 0.5 in order to establish convergent validity. As can be shown in Table 3, apart from AU construct, the results show that the AVE for all other constructs is above 0.5. This means that this construct is causing convergent validity. However, since it is measured by two items only, deleting one of the variables might cause un-identification problems.

Table 3. Construct reliability and validity.

Factor	CR	AVE	BI	PU	PEOU	SN	QWL	AU
BI	0.875	0.702	**0.838**					
PU	0.907	0.660	0.541	**0.813**				
PEU	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**

Note: Factor correlation matrix with the square root of AVE on the diagonal.

4.3.2. The structural model analysis

The relationships between constructs were tested after supporting the validity and reliability of the measurement model. SEM was used to test all hypothesised relationships, the moderating effects of the cultural and individual variables (see Figure 2).

There are some fit indices that should be considered in order to assess the model fit in SEM (Hair et al., 2010). These are the Goodness of Fit (GFI), Normed Fit Index (NFI), Parsimony normed fit index (PNFI), Root mean square residuals (RMSR), the Comparative Fit Index (CFI), Adjusted Goodness-of-fit index (AGFI) and Root mean square error of approximation (RMSEA). 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 4). This is clear from the table that all values were in the recommended range.

4.3.2.1. The hypothesis testing.
As can be shown in Table 5, all the direct hypotheses were supported. PU ($\beta = 0.14^{**}$, $p < .01$) and PEOU ($\beta = 0.19$; $p < .001$) were found to have a significance positive influence on BI to use Web-based learning system, supporting H1 and H2. The influence of colleagues and instructors on students' BI to use the system was found to have a high significance, SN ($\beta = 0.11$; $p < .001$) supporting H3. Moreover, BI were also influenced by the quality of work life ($\beta = 0.46$; $p < .001$), supporting H4. Furthermore, the results also shows that AU is influenced by the BI ($\beta = 0.58$; $p < .001$) which supports H5.

As can be shown in Table 6, a number of the hypothesised relationships of the moderating effect of cultural dimensions were supported. A summary of the results is discussed in the next section.
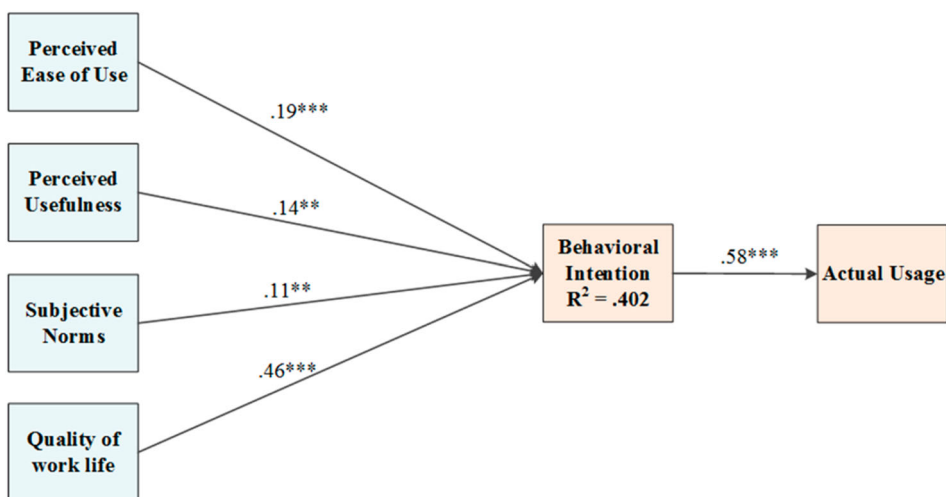
Figure 2. Structural model.

Table 4. Model fit summary for the final measurement and structural model.

Fit index	Recommended value Hair et al., 2010	Measurement model	Structural model
χ^2	Non-significant at $p < .05$	639.150	648.493
Degrees of freedom (df)	n/a	237	241
χ^2/df	<5 preferable <3	2.697	2.691
Goodness-of-fit index (GFI)	>0.90	.909	.908
Adjusted Goodness-of-fit index (AGFI)	>0.80	.885	.886
Comparative fit index (CFI)	>0.90	.951	.950
Root mean square residuals (RMSR)	<0.10	.077	.079
Root mean square error of approximation (RMSEA)	<0.08	.055	.055
Normed fit index (NFI)	>0.90	.924	.923
Parsimony normed fit index (PNFI)	>0.60	.793	.806

Table 5. The summary of direct hypothesised results (intention and AU prediction).

H#	Proposed relationship	Effects type	Path coefficient	Study results
H1	PEOU (+) intention	Direct effect	0.19***	Supported
H2	PU (+) intention	Direct effect	0.14**	Supported
H3	SN (+) intention	Direct effect	0.11**	Supported
H4	QWL (+) intention	Direct effect	0.46***	Supported
H5	BI (+) usage	Direct effect	0.58***	Supported

**p < .01.
***p < .001.

5. Discussion

Our research question addressed the impact of culture on acceptance and usage of Web-based learning systems. Considering Lebanon as a cultural setting, we first explored whether an extended TAM holds for e-learning acceptance in this context.

The Lebanese student sample in our study was found to be relatively high in UA, and relatively masculine and collectivist in outlook. These findings were in line with expectations from previous research (Individualism = 38, Masculinity = 53, UA index = 68) (Hofstede, 1980, 2001). However, contrary to expectation, the sample was found to be lower in PD than suggested by Hofstede's earlier work (PD = 80). This may reflect shifts in cultural patterns over time as noted by McCoy et al. (2005) or it may be that Arab counties are not as homogeneous as Hofstede assumed. This result illustrates the importance of measuring culture contemporaneously in any study where cultural impacts are of possible significance. Previous work has suggested caution in using TAM in countries with high masculinity and high collectivism (McCoy et al., 2007). While these cultural characteristics were found in our Lebanese sample, we nevertheless were able to show support for the main predictions of TAM.

Table 6. The summary of the moderating effect of cultural.

H#	Proposed relationship	z-Score	Study results
H6a	PD × SN → BI	1.80*	Supported
H6b	PD × PU → BI	2.30**	Supported
H7a	MF × SN → BI	2.00**	Supported
H7b	MF × PU → BI	0.48	Not supported
H7c	MF × PEOU → BI	1.85*	Supported
H7d	MF × QWL → BI	0.12	Not supported
H8a	UA × SN → BI	1.73*	Supported
H8b	UA × PU → BI	1.81*	Supported
H8c	UA × PEOU → BI	1.44	Not supported
H9a	IC × SN → BI	2.25**	Supported
H9b	IC × PU → BI	1.25	Not supported
H9c	IC × PEOU → BI	0.45	Not supported

*p-value < .10.
**p-value < .05.

Thus, the direct relationships between PEOU and BI and between PU and BI were both supported. These results are similar to the original TAM work (Davis, 1989). Students were also found to be highly influenced by their colleagues and instructors (SN). In addition, we found support for the relevance of quality of work life in predicting acceptance. Overall with these four antecedents, the model was able to explain 40.2% of the variance in BI. Finally, BI was found to be the most significant predictor within the study of the actual use of the system.

The inclusion of individual-level cultural value measurement in our study also allowed us to explore the role of individual-level cultural values as moderators of the key relationships within an extended TAM. The findings are discussed below in relation to the four Hofstede cultural dimensions included in the study.

5.1. Power distance

PD was found to moderate the relationship between SN and BI (*z*-score 1.8*, *p*-value < .10) supporting hypothesis H6a. The relationship between SN and BI was stronger for students with high PD. While a number of authors have previously suggested this should be the case (e.g. Dinev et al., 2009; Li et al., 2009; Srite & Karahanna, 2006; Zakour, 2004), empirical evidence for this hypothesis had previously been ambiguous at best.

As predicted in H6b, the relationship between PU and BI to use the technology was also moderated by PD (*z*-score 2.30**, *p*-value < .05). The findings indicate that the relationship was stronger for individuals with low PD cultural values which confirm the predictions of McCoy et al. (2005). Again, this has not previously been explicitly demonstrated in the literature.

5.2. Masculinity/femininity

The relationship between SN (*z*-score 2.00**, *p*-value < .05) and BI was moderated by MF such that the relationship was stronger for feminine group. This result confirms that of previous work by (Dinev et al., 2009; Li et al., 2009; McCoy, Everard, & Jones, 2005; Srite & Karahanna, 2006; Zakour, 2004) and demonstrates its applicability in the e-learning domain.

MF did not have any significant moderating effect on the relationship between PU and BI to use the system. While in line with some previous empirical work (e.g. Srite & Karahanna, 2006), these results do not support our hypothesis as we expected the relationship to be stronger for those with more masculine values due to their likely emphasis on the instrumental effects of technology.

The relationship between PEOU (*z*-score 1.85*, *p*-value < .10) and BI to adopt and use technology was moderated by MF (see Table 6). The relationship was stronger for students with feminine cultural values. This result supports the findings of a number of previous studies (McCoy et al., 2007; Srite, 2006; Srite & Karahanna, 2006) and generalises the result to the context of e-learning.

QWL was included on this study based on suggestions from previous authors (Kripanont, 2007; Srite & Karahanna, 2000; Zakour, 2004). However, contrary to expectations the results did not support the hypothesis that QWL would be a relatively more important factor for more feminine users, with the results suggesting it was important for both groups. This may be a result of the educational setting of the current study (as the quality of the experience may be more highly valued by all users in this context than it necessarily would in a purely work setting) or it may be that the measurement of QWL itself is ambiguous with respect to the relative emphasis on hedonic vs. instrumental features.

5.3. Uncertainty avoidance

The results in Table 6 shows that the relationship between PU (*z*-score 1.81*, *p*-value < .10) and BI to adopt and use technology was moderated by UA. The relationship was stronger for students with high UA. This supports the earlier findings of McCoy et al. (2007) and the predictions of Sánchez-Franco et al. (2009). The fact that we examined culture at the individual level allowed our research

to untangle the impact of several cultural variables and this may explain why we were able to demonstrate an impact of UA on the PU->BI relationship where Sánchez-Franco et al. (2009) failed. On the other hand, UA did not moderate the relationship between PEOU and BI. This comes as a surprise as previous research considered UA a relevant mediator between PEOU and intention to use (Sánchez-Franco et al., 2009).

The relationship between SN (z-score 1.73*, p-value < .10) and BI was also moderated by UA such that the relationship was stronger for students with high UA. In other words, students with high UA will be highly influenced by their colleagues, peers and even their instructors to use the system as they are more likely to be cautious towards technology and the views of others provide useful information that reduces uncertainty. Again, these results confirm some of the previous research (Dinev et al., 2009; Srite & Karahanna, 2006; Yoon, 2009).

5.4. Individualism/collectivism

As hypothesised, the IC cultural value moderates the relationship between SN (z-score 2.25**, p-value < .05) and BI to use the system. The relationship is stronger for users with high collectivistic cultural values. Thus, our result suggests that within the high collectivist group, the students were highly influenced by the opinion of colleagues and instructors when establishing their intentions to accept technology. Our result was expected, since individuals in a collectivist society give higher priority to obedience, respect, and more agreeable towards social relationships and the well-being of others (Hofstede, 1980). This effect had been predicted by a number of authors, but previously support for it was limited to a few studies that compared samples across countries where there may have been other variables at work (e.g. Dinev et al., 2009; Srite & Karahanna, 2006).

On the other hand, the IC cultural value did not have any significant moderating influence on the relationship between PU and BI to use the system. This result is in contrast to Sánchez-Franco et al.'s (2009) earlier finding in an educational setting, but since they compared educators across broad cultural groups that differed along a number of Hofstede's dimensions, it is unclear whether their reported result is in fact solely due to Individualism. Neither did we find support for the hypothesis that IC moderates the relationship between PEOU and intention to use. McCoy et al. (2007) had previously speculated that more collectivist users might be more accepting of usability problems so long as the system helps them to achieve goals that are valued by their in-group. This suggests that their hypothesis would only apply when particular conditions are met (i.e. the system supports in-group values). Interpreting the null result here is therefore problematic.

5.5. Summary of moderating effects

Our results suggest that cultural moderators are particularly relevant for understanding the relationship between SN and BI in technology acceptance. All four of Hofstede's (1980) main cultural dimensions (PD, MF, UA and IC) were found to be significant moderators of this relationship. This result illustrates and supports the point made by Srite and Karahanna (2006) that the social environment is a significant mechanism via which culture affects individual behaviour. Results were more mixed for the moderating effect of culture in relation to the main TAM variables of perceived usefulness and PEOU. The effect of PU was found to be moderated by both PD and UA, but not MF or IC as hypothesised. Only MF was found to moderate the effect of PEOU. QWL was included as a construct in our model because several authors had suggested it might be a variable that could be sensitive to MF cultural differences (Kripanont, 2007; Srite & Karahanna, 2000; Zakour, 2004), but our results failed to find support for such a moderating effect.

6. Contributions to theory and practice

This study presents several implications for theory and practice. From the theoretical point of view, the first contribution is to confirm that TAM is applicable to e-learning acceptance within the Arab

culture, exemplified here in Lebanon. Abbad et al. (2009) had previously demonstrated support for an extended TAM in Jordan in the context of e-learning, but their study did not seek to characterise the Jordanian sample according to Hofstede's cultural dimensions. The current work therefore provides an additional contribution by clarifying the specific pattern of cultural responses for which TAM has been shown to apply.

A second significant contribution of this work is to demonstrate the relevance of quality of work life as an antecedent to BI within the context 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 or in an Arab cultural context. The results of our study confirm that quality of work life is an important consideration in the study of e-learning adoption. However, we were not able to demonstrate the predicted cultural effect, so the applicability of this attribute may be relevant beyond the specific cultural focus of this study. Further work on this issue would be helpful.

Our work also contributes to the growing body of evidence with regard to the moderating impact of culture within TAM and is one of relatively few studies that have been able to elucidate the impact of culture at the individual level. Our work should therefore help towards building a clearer picture of precisely what moderating roles culture might play within extended TAM models. Our work has particularly emphasised the role of multiple cultural variables in moderating the effect of SN in technology acceptance, providing evidence for several relationships that have previously been hypothesised but for which supportive evidence was ambiguous at best.

From a practical point of view, our findings confirm the importance of the main TAM constructs of PEOU and PU. Therefore, education providers need to ensure that selected systems adequately address these issues. 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. Our results also confirmed the importance of SN in addition to the qualities of the technology itself. This emphasises the need to consider implementation strategies that develop buy-in from those within the wider social environment. The identified moderating effects of culture also suggest that educators may need to consider the balance of attributes (instrumental, hedonic or social) that they emphasise to encourage technology uptake, depending on the dominant local cultural values.

7. Limitations and future work

As with any research, our study has some potential limitations that need to be identified and discussed. First, our sample included participants studying at two private universities and their views may differ from those who study at public universities. Thus, it does leave open the question of whether the results will generalise to other Lebanese public universities. Although there are some exceptions (Min, Li, & Ji, 2009), it was more typical to investigate if cultural effects of our sample may hold for different nationalities. Therefore, future research could replicate our study among mono-and-multi-cultural samples.

Second, 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 was found that this variable has a big influence on students' perception towards using technology (Venkatesh et al., 2003), or with different user groups (e.g. students with disability, children) and/or different organisational contexts (e.g. high schools or public institutions) to explore their validity in different contexts.

Third, 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 addition, further research could consider whether individual-level cultural variables also have a direct effect within the current research model or other competing models such as TRA and TPB, only then a more complete picture of the dynamic nature of individual technology may begin to emerge.

Fourth, the current work is only limited to Web-based e-learning management systems (such as Moodle/Blackboard). Therefore, future research may replicate the study using different e-learning tools or platforms (e.g. mobile learning, IPAD and digital TV).

Finally, the SN construct that we included in this research combined the influence of both instructors and colleagues. Previous researchers have suggested that the different norm groups should be split and studied separately (e.g. Srite & Karahanna, 2006). While we note that in this study we were able to demonstrate significant interactions with cultural values and SN without separating the different referent groups, future work could usefully examine the relative importance of these groups for the different cultural effects observed.

8. Conclusion

To overcome the difficulties associated with the acceptance of TAM models in developing countries, in this paper we have extended existing TAM models by including SN and Quality of Work Life (QWL) constructs as additional constructs and a number of cultural variables as moderators, and examined such a model in the Lebanese context. The results showed support the extended TAM model and the role of cultural constructs (measured at the individual level) in moderating the relationships within the model, particularly in relation to the impact of SN.

Although TAM and other user acceptance models have been validated empirically, research continues to add social factors to overcome the limited explanatory power of such models. This study moves in that direction. By including SN and QWL in addition to a set of individual differences in cultural values, we can better understand the factors that may facilitate or hinder the adoption of Web-based learning systems. Our study emphasised that e-learning implementation should focus on the social and cultural contexts rather than just the technological solution.

Disclosure statement

No potential conflict of interest was reported by the authors.

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Appendix

PU about using Web-based learning systems
Using the Web-based learning system will

- allow me to accomplish learning tasks more quickly
- improve my learning performance
- make it easier to learn course content
- increase my learning productivity
- enhance my effectiveness in learning

PEOU about using the Web-based learning system

- Learning to operate the Web-based learning system is easy for me
- I find it easy to get the Web-based learning system to do what I want it to do
- My interaction with Web-based learning system is clear and understandable
- It is easy for me to become skilful at using the Web-based learning system
- I find the Web-based learning system easy to use

Social Norms

- My Instructors think that I should participate in the e-learning activities
- Other students think that I should participate in the e-learning activities
- Management of my university thinks that I should use the e-learning activities
- Generally speaking, I would do what my instructor thinks I should do

Perceived Quality of work life

- The freedom to get the course information any time of the day will helps me to have more time for a creative thinking and leisure.
- Using the free resources such as Web-based learning system and e-libraries helped me to save money and effort.
- Using the Web-based learning system provide more opportunities to participate in the class.
- Using emails to communicate with other student groups help me to save my expense and effort.
- Overall, using the Web-based learning help improve my QWL.

Behavioural Intention

- I intend to use the Web-based learning system for preparing for the exam and course work.
- Given the chance, I intend to use the Web-based learning system to do different things, from downloading lecture notes and participating in chat rooms to learning on the Web.
- I predict I would use Web-based learning system in the next semester.
- In general, I plan to use Web-based learning system frequently for my coursework and other activities in the next semester.

Actual Usage
42. On average, how **frequently** do you use the Web-based system?
(1) Less than once a month   (2) once a month   (3) a few times a month
(4) a few times a week   (5) about once a day   (6) several times a day

43. On the average working **day**, how much time do you spend on the Web-based learning system?

(1) Almost never   (2) less than 30 min   (3) from 30 min to 1 h
(4) From 1 to 2 h   (5) from 2 to 3 h   (6) more than 3 h

Power Distance

- Instructors should make most decisions without consulting students.
- Instructors should not ask the opinions of students too frequently.
- Instructors should avoid social interaction with students.
- Instructors should not delegate important tasks to students.
- Students should not disagree with decisions made by instructors and university management.
- It is frequently necessary for instructors to use authority and power when dealing with students.

Masculinity/Femininity

- It is preferable to have a male in high-level position rather than a female
- There are some majors in which a male student can always do better than a female student
- It is more important for a male student to have a professional career than it is for a female student to have a professional career
- Female student do not value outstanding academic achievement in their studies as much as male student
- Male students usually solve problems with logical analysis, female students usually solve problems with intuition
- Male students are more determined and competitive focusing on achievement and material success, while female students are modest and humble focusing on relationships and quality of life

Individualism/Collectivism

- Individuals should sacrifice self-interest for the group that they belong to
- Individuals should stick with the group even through difficulties
- Group welfare is more important than individual rewards
- Group success is more important than individual success
- Group loyalty should be encouraged even if individual goals suffer
- Being accepted as a member of a group is more important than having autonomy and independence

Uncertainty Avoidance

- Rules and regulations are important because they inform students what the university is expected of them
- It is important to have specific requirements and instructions spelled out in detail so that I always know what I am expected to do
- It is important to closely follow instructions and procedures related to their learning
- Standardised work procedures are helpful for my learning
- Instructions for operations are important for my learning.