Differences in Intention to Use Educational RSS Feeds Between Lebanese and British Students: A Multi-Group Analysis Based on the Technology Acceptance Model

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Abstract: Really Simple Syndication (RSS) offers a means for university students to receive timely updates from virtual learning environments. However, despite its utility, only 21% of home students surveyed at a university in Lebanon claim to have ever used the technology. To investigate whether national culture could be an influence on intention to use RSS, the survey was extended to British students in the UK. Using the Technology Adoption Model (TAM) as a research framework, 437 students responded to a questionnaire containing four constructs: behavioural intention to use; attitude towards benefit; perceived usefulness; and perceived ease of use. Principle components analysis and structural equation modelling were used to explore the psychometric qualities and utility of TAM in both contexts. The results show that adoption was significantly higher, but also modest, in the British context at 36%. Configural and metric invariance were fully supported, while scalar and factorial invariance were partially supported. Further analysis shows significant differences between perceived usefulness and perceived ease of use across the two contexts studied. Therefore, it is recommended that faculty demonstrate to students how educational RSS feeds can be used effectively to increase awareness and emphasise usefulness in both contexts.

Keywords: cross-cultural; technology adoption model; developing countries; RSS; virtual learning environments; engagement

1. Introduction

Throughout the last two decades, there has been a profound increase in the use of virtual learning environments, such as Blackboard and Moodle, in higher education institutions to support traditional classroom teaching (Dalal, 2014; Abbasi et al., 2011; Nerantzi, 2012; Padilla-Meléndez et al., 2013) as well as help students meet their educational goals (Clark and Mayer, 2011; Tshabalala et al, 2014). However, a lack of portability and pervasiveness in such systems can negatively influence peer interaction, resource acquirement, and content delivery (Cold, 2006; Lan and Sie, 2010; Ma, 2012). In response to these weaknesses, these web-based learning systems integrate Really Simple Syndication (RSS) to provides learners with a means to promptly receive updates using any Internet-enabled device (West et al., 2006). RSS is an XML format to syndicate and share content on the Web. It is employed for spreading frequently updated and personalized information among users subscribed to the source of content (Samper et al., 2008; Bouras et al., 2010; De La Torre-DíEz et al., 2013). Consequently, enabling learners to be informed about new educational resources in real time, which might include: new teaching materials; reading lists; topics for discussion; the release of feedback; or any other course-related announcements. This has been shown to enhance communication among peers (D'Souza, 2006) and help individuals track topics of conversation (Richardson, 2005). RSS has also been used to improve student research by providing access to updated compilations of relevant research references (Asmus et al., 2005; Liu, Liao and Pratt, 2009). Thus, RSS feeds present a means to provide portability and ubiquity to virtual learning environments in a way that facilitates the dissemination of new information and consequently has an impact on student collaboration.

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However, while RSS feeds are used successfully in many organizations, the use of RSS in educational contexts can be problematic because of students' low level of technology adoption (Cold, 2006). Despite its utility and widespread deployment, a Lebanese institution has encountered a high level of resistance to this technology. So, despite having the potential to enhance learning through student interaction, a low level of acceptance has meant its benefits have not been fully realised (Tarhini, Hone and Liu, 2013c; Teo, 2009; Teo and Noyes, 2011; Sharma and Chandel, 2013). Additionally, previous research has shown that RSS-user adoption and acceptance is still below expected with 11 % among end users in 2008 and 2% in 2005 (Katz, 2008) .It is therefore important for practitioners and policy makers to better understand the acceptance of learning systems in the Lebanese context in order to increase usage, and thereby enhance the learning opportunities available to students in Lebanon. In particular, whether a national influence (culture, socio-economics, etc) influences students' behavioural intention to use RSS feeds.

Various models and theories have been developed to investigate and understand and predict the acceptance of technology. Examples include: the Technology Acceptance Model (TAM) (Davis, 1989; Davis, Bagozzi and Warshaw, 1989); the Theory of Reasoned Action (TRA) (Ajzen and Fishbein, 1980; Fishbein and Ajzen, 1975); Innovation Diffusion Theory (IDT) (Rogers, 1995); the Theory of Planned Behaviour (TPB) (Ajzen, 1991); and the Unified Theory of Acceptance and Use Technology (UTAUT) (Venkatesh et al., 2003). This research employs TAM in order to understand and explain the relationship between individuals' perceptions and behavioural intentions towards RSS. This is because TAM has: been widely used in similar information systems research (Yousafzai, Foxall and Pallister, 2007); has a parsimonious structure and acceptable explanatory power (Venkatesh and Bala, 2008; Chang, 2010; Tarhini, Hone and Liu, 2013a). Furthermore, the validity and reliability of TAM across a number of different technologies and usage contexts have been examined (Teo and Noyes, 2011; Park, 2009; Venkatesh and Davis, 2000).

A criticism of TAM is that it can be affected by biases in cross-cultural contexts and it may not be sufficient to explain the factors affecting the user adoption of new technology because important factors are likely to vary based on the technology, users and context (Straub, Keil and Brenner, 1997; McCoy, Everard and Jones, 2005; Teo, Luan and Sing, 2008; Tarhini el at., 2015a, b). For example, Straub et al. (1997) tested TAM across three different cultures, finding that TAM produces different explanatory power in behavioural intention between Japan and the United States (i.e only 1%), but similar power between the United States and Switzerland (i.e 10%). However, the argument that TAM doesn't serve equally across cultures is inconsistent in the prior literature (McCoy et al., 2005; Zakour, 2004; Srite and Karahanna, 2006; Sharma et al., 2014). Of particular concern, in this case, is whether TAM is suitable for use in the Lebanese context and whether it can be used to compare Lebanon to other nations. This is because TAM has not been widely tested in a number of developing countries (Teo et al., 2008). Consequently, there is a gap in the literature, and so it is important to first test the appropriateness of TAM through exploring the psychometric properties of a research instrument to ensure measurement invariance, as well as adequate reliability and validity.

The authors hypothesise that national culture could affect technology adoption in Lebanon. As such, the study described in this article compares a sample of Lebanese students to a sample of students from a different country as a first step to explore potential differences. The United Kingdom was selected as an example of a typical developed country that could be used to conduct such a comparison. This country was chosen because, as shown below in Table 1, the United Kingdom and Lebanon represent nearly reverse positions on all of Hofstede's (2005) cultural dimensions. In addition, there is a significant contrast in investment in educational technology as financial constraints in Lebanon tend to encourage more traditional styles of pedagogy (Baroud and Abouchedid, 2010).

Table 1: Cultural Differences between the United Kingdom and Lebanon (Hofstede, 2005)

Country	Power Distance	Masculinity	Individualism	Uncertainty Avoidance
Lebanon	80	53	38	68
United Kingdom	35	66	89	35

Consequently, this study extends the literature by applying TAM in the Lebanese context to examine differences that may affect the acceptance and adoption of RSS feeds among British and Lebanese students. The results of this study would be of interest to the research community since it explores the generalizability and validity of TAM in a new national context. Furthermore, it examines potential differences between national contexts that may influence students' use of RSS feeds. This will help policy makers and practitioners gain a deeper understanding of students' acceptance of e-learning technology and consequently lead to enhancements in technology acceptance and learning.

1.1 The Technology Acceptance Model (TAM)

Davis (1989) developed the technology acceptance model (TAM) through the theoretical foundation for the Theory of Reasoned Action (TRA). TRA is a model pertaining to social psychology concerned with the specifics of intended behaviours (Ajzen and Fishbein, 1980). TRA posits that an individual's behaviour and intent to behave is a function of that individual's attitude toward the behaviour and their perspectives regarding the behaviour. Behavioural intention also is determined via subjective norms, as behaviour results as a function of all attitudes and beliefs (Masrom, 2007; Tarhini et al., 2014a). According to Davis (1989), the aim of TAM is "to provide an explanation of the determinants of computer acceptance that is general, capable of explaining user behaviour across a broad range of end-user computing technologies and user populations, while at the same time being both parsimonious and theoretically justified" (P.985). According to Venkatesh et al (2003), TAM presumes that behavioural intention (BI) is usually formed as a result of conscious decision making processes. This involves three key variables (see Figure 1): perceived usefulness (PU); perceived ease of use (PEOU); and attitude towards using (ATT) (Davis, 1989; Davis et al., 1989). The TAM postulates that PEOU and PU predict ATT, behavioural intention (BI) is predicted by the user's attitude (ATT), and the actual use of the system is predicted by BI. Furthermore, the PEOU has a significant influence on PU.

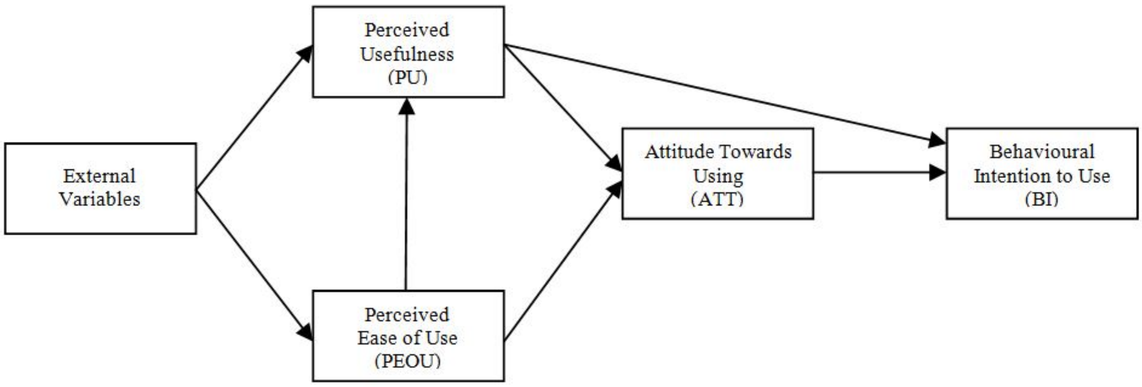

Figure 1: The Technology Acceptance Model (Adapted from Venkatesh et al, 2003)

The main foundation of our research is based on TAM and drawing from previous literature that used TAM in an educational context in order to reflect the usage and acceptance of RSS in education. The overall conceptual model is illustrated above in Figure 1 and the sections which follow explain and justify each of the predicted relationships in light of previous findings from the literature.

1.2 Perceived Ease of Use (PEOU) and Perceived Usefulness (PU)

Perceived usefulness (PU) is a predictor that measures individuals' beliefs regarding whether the use of a particular technology system will improve her or his performance (Davis et al., 1989). Perceived usefulness was used in this study to investigate students' beliefs about obtaining benefits regarding the use of Blackboard's system as well as to predict students' beliefs of using RSS on the Blackboard system. The selection of this factor in the research model was due to the direct and significant influence on user's attitude to use the technology and also behavioural intention to use the system, which comes from the previous studies (e.g., Teo et al., 2008, Hsu, 2014). Perceived ease of use (PEOU) is a predictor that measures an individual's beliefs regarding the use of a particular technology system free of effort (Davis, 1989). The PEOU construct was selected in order to investigate students' attitudes regarding using Blackboard's system free of effort, as well as to predict students' intentions of using RSS on the Blackboard system.

TAM posits that PEOU and PU predict the user's attitude towards the system (ATT). As such, it is expected that users with high level of PU are more likely to have positive attitudes about using the technology. Similarly users with high level of PEOU are also expected to induce positive attitudes. Furthermore, according to Davis (1989), PU was found to mediate the effect of PEOU on attitude. In another words, PEOU indirectly has an impact on attitudes through PU.

1.3 Attitude Toward Using (ATT)

Attitude toward using (ATT) is a predictor that investigates individuals' beliefs regarding using a particular technology. The casual relationship between PU, PEOU and ATT towards using the technology is supported considerable number of studies e.g. (Cheng, Lam and Yeung, 2006; Yu et al., 2005; Tarhini, Hone and Liu, 2013b). Furthermore, Gao (2005) indicated in his study 'Educational Hypermedia' that attitude toward using had a direct and significant effect on intention to use. More recently, Teo and Noyes (2014) claimed in their study that attitude toward using had a direct and significant effect on intention to use.

However, attitude toward using has varying degrees of effectiveness based on the field of study, sample, or techniques used for analysis. On the other hand, Masrom (2007), found in her study of 'learning online' that attitude toward using did not have a direct and significant effect on intention to use. There are differences in significant and insignificant effects of the intention to use based on the field or sample of the study. This is because the term 'attitude' can be interpreted quite broadly and could be directed towards many different facets of using a system, such as 'attitude towards features', 'attitude towards purpose' or 'attitude towards benefit'; of which, the latter is the focus in this article.

1.4 Behavioural Intention (BI)

The presence of behavioural intention (BI) in the TAM is one of the major differences with TRA. Behavioural intention 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 influence the usage behaviour (Davis, 1989). There is significant supports in the literature for the relationship between PU, PEOU and ATT on behavioural intention (Venkatesh and Davis, 2000; Taylor and Todd, 1995b; Davis et al., 1989), particularly in the context of e-learning studies (Zhang, Zhao and Tan, 2008; Yi-Cheng et al., 2007; Park, 2009; Saeed and Abdinnour-Helm, 2008; Liu et al., 2010). It is worth noting, however, that actual usage (AU) of the system was excluded from this study because it was found to be challenging to track individual users based on the available server system logs. This is because RSS feeds are available without requiring a login, to facilitate ease of access. Thus, it was impossible to distinguish individual users, or even distinguish between individual mobile devices, with the data available. Therefore, it was deemed appropriate to only measure behavioural intention.

1.5 Aims of the Study

The overall aim of this study was to explore the appropriateness of applying TAM in the Lebanese context through investigating any potential differences between predictors of behavioural intention technology acceptance between British and Lebanese students. As such, the first five hypotheses are based on the relationships in TAM as shown below in Figure 1:

H1: Students' perceived ease of using RSS feeds (PEOU) will significantly influence the perceived usefulness of RSS feeds (PU) in both the Lebanese and British contexts, equally.

H2a: Students' perceived usefulness of RSS feeds (PU) will significantly influence attitude towards the benefits of using RSS (ATT) in both the Lebanese and British contexts, equally.

H2b: Students' perceived ease of using RSS feeds (PEOU) will significantly influence attitude towards the benefits of using RSS (ATT) in both the Lebanese and British contexts, equally.

H3a: Students' perceived usefulness of RSS feeds (PU) will significantly influence intention to use RSS feeds available on Blackboard Learn (BI) in both the Lebanese and British contexts, equally.

H3b: Students' attitude towards the benefits of using RSS (ATT) will significantly influence intention to use RSS feeds available on Blackboard Learn (BI) in both the Lebanese and British contexts, equally.

Further to these hypotheses, it follows that there may be differences between the Lebanese and British students due to external variables that influence PU and PEOU, as shown in Figure 1. Therefore, the following hypotheses are also examined:

H4a: The British students will report a higher perceived usefulness (PU) of RSS feeds, compared to the Lebanese students.

H4b: The British students will report a higher perceived ease of use (PEOU) for RSS feeds, compared to the Lebanese students.

H4c: The British students will report a more positive attitude towards using (ATT) RSS feeds, compared to the Lebanese students.

H4d: The British students will report a higher behavioural intention (BI) to use RSS feeds, compared to the Lebanese students.

H5: There will be a greater proportion of British students using RSS, compared to Lebanese students.

2. Methodology

Consistent with previous empirical research in technology acceptance e.g. (Venkatesh and Bala, 2008; Venkatesh et al., 2003) and similar work within the e-learning context e.g. (Zhang et al., 2008; Liaw, 2008; Cronjé, 2011), a quantitative approach was adopted. A 25-item questionnaire was administered to students at an institution in the United Kingdom and an institution in Lebanon, by a process of convenience sampling. The questionnaire contained at least five items for each of the proposed constructs in the TAM model (PU, PEOU, ATT and BI). These items were adapted for the context of using new RSS feeds that had been introduced within the virtual learning environment, Blackboard Learn. Data collected from this survey were analysed using principle components analysis (PCA) in SPSS 20.0.0 and structural equation modelling (SEM) using AMOS 18.0.1. The PCA technique was applied to cull the larger set of items down to a smaller, more parsimonious scale containing items that were likely to be invariant across the two samples, while also ensuring that the proposed factor structure was appropriate for the items included in the scale. The SEM technique was then applied to ensure that adequate construct validity was present in the data and to verify the level of measurement invariance those items achieved in more detail. As Straub (1997) points out, it is important that any hypothesised latent constructs are measured in an appropriate manner. Researchers must ensure that they are actually measuring what they believe to be measuring by ensuring that an appropriate level of construct validity is found. Hair et al (2010) show that if adequate face validity, convergent validity and discriminant validity are found, then together these present sufficient evidence for construct validity. That is, participants understand the meaning of every item in the scale (face validity), a set of items expected to measure a particular latent factor converge on that factor with strong factor loadings (convergent validity), and the extent to which constructs differ by not sharing variance can be established (discriminant validity).

As the two samples are based on two two groups with distinct differences (such as culture), assumptions of measurement invariance need to first be verified. This is because, based on a review of the literature, Vandenberg and Lance (2000) emphasise that at least some configural, metric, scalar and factorial invariance should be established. Such tests of measurement and structural invariance generally fall into one of five questions about how participants interpret items in an instrument (Byrne, 2006): (1) do the items that comprise an instrument operate in a similar fashion across groups; (2) are the constructs and factor structure equivalent across groups; (3) is the causal structure of the constructs the same across groups; (4) are the means of the factor scores invariant across the two groups; and (5) does the factorial structure of an instrument replicate across different independent samples of the same population? Once such questions have been answered, researchers can have confidence that the meaning of responses to particular items in a scale do not differ significantly across multiple groups and are reliable within-groups. Thus, as recommended by Vandenberg and Lance (2000), tests were performed to ensure that the configuration of factors were the same across the two cultures (configural invariance), rating scales were interpreted similarly (metric invariance), the quantifiable meanings of the scales meant the same to participants from both cultures (scalar invariance), and factor variances are homogenous indicating the equality of relationships between the latent factors (factorial invariance).

Once invariance has been established in the measurement model, the structural model can be tested to examine the relationships between the constructs. The differences between the model structure in the Lebanese and British samples (H1 to H3) were compared using z-tests on the correlation coefficients between pairs of constructs. Estimated factor scores were then generated using the regression method of data imputation within AMOS. The resulting data from Lebanon and the UK were subsequently compared using independent sample t-tests in SPSS (H4). Additionally, the proportion of students reporting to have previously used RSS to support their studies were compared using a chi-squared difference test (H5).

2.1 Participants and Sampling

The participants in this study comprised of 202 British students attending a university in the United Kingdom and 235 Lebanese students attending a university in Lebanon. All participants were studying in an English-language setting. The institutions were purposively selected based on: offering similar courses, with both institutions predominantly running courses in engineering and technology; similar infrastructure, based on both institutions being founded in the 1900's and having similar levels of infrastructure development; and similar use of web-based learning environments, with both institutions making extensive use of Blackboard Learn and deploying versions of Blackboard that integrate RSS feeds at a similar time.

Table 2: Demographic Information of Participants

Country	Age		Gender		Education		Use RSS Feeds	
	M	*SD*	*Male*	*Female*	*Undergraduate*	*Graduate*	*Yes*	*No*
Lebanon	22.6	4.4	121	114	102	133	51	184
United Kingdom	21.8	4.9	91	111	101	101	74	128
Differences	*t*	1.688	χ^2	1.804	χ^2	1.900	χ^2	11.859
	p	.072	*p*	.179	*p*	.168	*p*	.001

Notes: M = mean; SD = standard deviation.

Details of the participants are shown above in Table 2. Due to ethical constraints based on defining a sampling frame based on nationality, the sample was collected using a self-selection method and should therefore be considered a convenience sample. The survey was conducted in-person across a period of 3-weeks by two researchers moving to multiple locations within each institution, namely the libraries, computer suites and study areas. No course credit or other rewards were given to participants in this study. Prior to completing the questionnaire, all participants were briefed on the purpose of the work, and their right to choose not to participate. On average, each participant took no more than 10 minutes to complete the questionnaire.

2.2 Instrument Presentation

The instrument was administered in English to all of the students who volunteered to participate. The questionnaire was first pre-tested for content and face validity in both settings. Apart from providing their demographic information, they responded to 25 items, adapted from the work of Davis (1989) and related works, including: perceived usefulness of the RSS feeds (PU) (5 items); perceived ease of using RSS feeds (PEOU) (6 items); attitude towards the benefits of using RSS (ATT) (8 items); and intention to use particular RSS feeds on Blackboard Learn (BI) (6 items). These items were measured using a 5-point Likert scale ranged from strongly disagree to strongly agree.

3. Results

The results initially focus on how the research instrument was refined, based on the results of a principle components analysis and matrix independence tests using Fisher's method. Following this, the results of a series of measurement invariance tests based on structural equation modelling techniques are shown; determining whether the two samples can be meaningfully compared using the proposed model and associated instrument. Subsequently, a series of t-tests and z-tests test whether the data supports or does not support the hypotheses presented.

3.1 Instrument Development and Refinement

The instrument was refined based on a principle component analysis of the original 25 items included in the survey. Items with low loadings (< .4) on their theorised component, significant cross loadings (> .4 in a different component), and items belonging to undefined components were removed. An analysis using Fisher's method on these items showed that the two rotated component loading matrices (for Lebanon and the United Kingdom) were significantly different from each other (X2 = 303.79, df = 190, p < .001) and so items with significant z-scores were also removed, maintaining at least three items per factor, until an adequate solution was found (X2 = 105.81, df = 96, p = .231), as shown in Table 3. This refined scale contained 12 of the original 25 items, with a KMO of .763 and a significant Bartlett's indicating adequate factorability. Both Catell's scree plot criterion and Kaiser's eigenvvalue criterion indicated the 4 component solution, as hypothesised, were appropriate. The overall variance explained for the two models were 73% and 71%, for the British and Lebanese samples respectively.

Table 3: Principle Component Analysis and Fisher's Test of Independence

	British Sample (*n* = 202)				Lebanese Sample (*n* = 235)				z-Tests			
	BI	PEOU	PU	ATT	BI	PEOU	PU	ATT	BI	PEOU	PU	ATT
BI1	.892	.151	.064	.171	.844	.070	.044	.178	2.02	0.84	0.20	-0.06
BI2	.900	.059	.145	.210	.862	.000	.133	.103	1.75	0.60	0.12	1.14
BI3	.898	.057	.116	.113	.758	.004	.126	.238	4.88^{**}	0.54	-0.10	-1.33
PEOU1	.101	.797	.181	.183	.162	.811	.025	.033	-0.64	-0.40	1.64	1.56
PEOU2	.074	.888	-.026	.047	.003	.859	.000	.079	0.73	1.25	-0.27	-0.33
PEOU4	.067	.783	.214	.004	-.083	.772	.073	.006	1.54	0.27	1.49	-0.02
PU1	.116	.059	.796	.201	.092	.004	.858	.112	0.26	0.56	-2.07	0.94
PU2	.093	.085	.868	.112	.152	-.024	.890	.073	-0.62	1.13	-1.01	0.41
PU3	.086	.206	.708	.113	.047	.112	.689	.128	0.40	1.00	0.38	-0.16
ATT6	.214	-.025	.106	.738	.187	-.001	.184	.798	0.29	-0.25	-0.82	-1.52
ATT7	.084	.207	.119	.864	.302	.038	.077	.839	-2.35^{*}	1.78	0.43	0.92
ATT8	.153	.059	.202	.728	.073	.090	.092	.847	0.83	-0.32	1.16	-3.34^{**}
Eigenvalue	4.13	1.85	1.54	1.22	3.63	1.96	1.65	1.29			Fishers X^2	105.81
% VE	.344	.157	.128	.101	.302	.163	.137	.107			*p*	0.231

Notes: Factor loadings have been rotated using a varimax rotation with Kaiser normalization; %VE = percentage of variance extracted. * $p < .05$, ** $p < .01$

Following this stage of item refinement, the following 12 items were included in subsequent analyses, as described below in Table 4.

Table 4: List of Constructs and Corresponding Items in Final Scale for Further Analysis

Construct	Item	Description
Perceived Usefulness of RSS Feeds (PU)	PU1	I would like to be informed about any activities on Blackboard
	PU2	I would like to receive updates on Blackboard as soon as published
	PU3	I would like to receive course information daily
Perceived Ease of Using RSS Feeds (PEOU)	PEOU1	I find using RSS feeds on Blackboard Learn easy to use
	PEOU2	I find it easy to check for information regarding my courses with RSS
	PEOU4	I find it easy to look up all recently uploaded materials using RSS
Attitude Towards Potential Benefit (ATT)	ATT6	I could improve my learning performance by receiving new information
	ATT7	I could enhance my learning skills
	ATT8	I could increase my interaction with Blackboard
Behavioural Intention to use RSS Feeds (BI)	BI1	I intend to receive information through the "course content" feed
	BI2	I intend to receive information through the "announcement" feed
	BI3	I intend to receive information through the "discussion" feed

The descriptive statistics presented below in Table 5 indicate a somewhat positive disposition towards RSS feeds. All means were greater than the midpoint (2.5) for both samples, ranging from 3.51 to 4.09. While the standard deviation (SD) values ranged from .685 to 1.113 for the Lebanese sample, indicating greater variability compared to .836 and .973 in the British sample, these values could still be considered a narrow spread around the mean. However, to ensure adequate multivariate normality in the sample, several cases were removed as outliers based on having a Mahalanobis distance greater than 35 from the centroid.

Table 5: Mean, Standard Deviation, Skewness and Kurtosis of Scale Items

	Pooled Sample (*n* = 437)				British Sample (*n* = 202)				Lebanese Sample (*n* = 235)			
	M	*SD*	*Sk*	*K*	*M*	*SD*	*Sk*	*K*	*M*	*SD*	*Sk*	*K*
BI1	3.73	.989	-.742	.398	3.70	.973	-.848	.421	3.75	1.00	-.742	.398
BI2	3.69	.979	-.652	.159	3.75	.947	-.719	.406	3.64	1.00	-.652	.159
BI3	3.46	1.00	-.183	-.183	3.73	.946	-.817	.480	3.23	1.00	-.183	-.183
PEOU1	4.09	.895	-.753	-.250	3.75	.987	-.490	-.477	4.39	.685	-.753	-.250
PEOU2	3.93	.910	-.636	-.303	3.72	.942	-.428	-.344	4.11	.843	-.636	-.303
PEOU4	3.97	.849	-.596	.061	3.69	.906	-.367	-.227	4.20	.721	-.596	.061
PU1	3.89	.826	-.361	.075	3.82	.885	-.772	.839	3.94	.769	-.361	.075
PU2	3.76	.805	-.184	-.070	3.76	.836	-.559	.411	3.75	.780	-.184	-.070
PU3	3.51	.877	-.276	.245	3.61	.864	-.287	-.089	3.43	.881	-.276	.245
ATT6	3.66	.977	-.362	-.527	3.75	.869	-.141	-.727	3.58	1.05	-.362	-.527
ATT7	3.94	.980	-.673	-.141	4.12	.856	-.809	.335	3.79	1.05	-.673	-.141
ATT8	3.57	1.04	-.219	-.722	3.73	.936	-.314	-.586	3.44	1.11	-.219	-.722

Notes: M = mean; SD = standard deviation; Sk = skewness; k = kurtosis; n = sample size, after removing outliers and invalid responses

As the maximum-likelihood estimation method was applied during the evaluation of the structural equation model, it is important that the distribution of the data does not significantly depart from a multivariate normal distribution. This can be verified through examination of the univariate distribution index values, with skew indices greater than 3.0 and kurtosis indices greater than 10 indicative of severe non-normality (Kline, 2005). Since the values of the variables for both samples fall well within the guidelines, therefore the data in this study were considered to be normal.

3.2 Examination of Reliability, Convergent Validity and Discriminant Validity

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. As advocated by Hair et al (2010), this can be established in terms of composite reliability (CR), average variance extracted (AVE). The results are shown below in Tables 6a and 6b below.

Table 6a: Convergent and Discriminant Validities

	Pooled Sample (*n* = 437)					British Sample (*n* = 202)					Lebanese Sample (*n* = 235)				
	FL	CR	AVE	MSV	ASV	FL	CR	AVE	MSV	ASV	FL	CR	AVE	MSV	ASV
PU1	.756					.736					.792				
PU2	.885	.780	.551	.105	.078	.832	.771	.533	.179	.133	.930	.796	.579	.092	.056
PU3	.545					.603					.503				
PEOU1	.770					.780					.697				
PEOU2	.804	.801	.575	.034	.023	.778	.796	.566	.118	.098	.844	.759	.518	.018	.010
PEOU4	.696					.697					.596				
ATT6	.694					.617					.723				
ATT7	.891	.807	.586	.224	.116	.866	.758	.517	.179	.154	.910	.759	.616	.279	.123
ATT8	.695					.649					.706				
BI1	.812					.865					.792				
BI2	.870	.853	.660	.224	.112	.932	.913	.779	.167	.110	.797	.809	.586	.279	.123
BI3	.750					.848					.705				

Notes: FL= factor loading; CR = composite reliability; AVE = average variance explained; MSV = maximum shared variance; ASV = average shared variance; PU = perceived usefulness; BI = behavioural intention to use; PEOU = perceived ease of use; PU = perceived usefulness, [a] Values on the diagonal of correlation matrices represents √AVE

Table 6b: Convergent and Discriminant Validities[a]

	PU	BI	PEOU	ATT	PU	BI	PEOU	ATT	PU	BI	PEOU	ATT
PU	(.742)				(.730)				(.761)			
BI	.307	(.812)			.319	(.882)			.303	(.766)		
PEOU	.184	.135	(.758)		.343	.248	(.753)		.046	.096	(.720)	
ATT	.324	.473	.134	(.766)	.423	.409	.339	(.719)	.271	.528	.133	(.785)

Notes: PU = perceived usefulness; BI = behavioural intention to use; PEOU = perceived ease of use; PU = perceived usefulness
[a] Values on the diagonal of correlation matrices represents √AVE

Composite reliability and average variance extracted were used to estimate the reliability and convergent validity of the factors. 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 6, the average variance extracted (AVE) within the British sample were all above 0.533 and above 0.758 for CR, whereas within the Lebanese sample, the AVE was above 0.518 and 0.759 for CR. Therefore, all factors have adequate reliability and convergent validity. Additionally, the total AVE of the average value of variables used for the research model for both samples is larger than their correlation value (Fornell and Larcker, 1981); therefore discriminant validity was also established for both samples.

3.3 Measurement Invariance

Measurement invariance is established using the approach taken by Teo et al (2009), which involves producing a configurally invariant model during multi-group analysis in AMOS and incrementally introducing stricter constraints. When good model fit is achieved, despite the increasing number of constraints, the model is deemed to be invariant across the two groups. However, there is not much disciplinary consensus about which values for which fit indices indicate adequate fit. Traditionally, fit would be determined using the minimum fit function χ^2. However, the χ^2 may not be appropriate at large sample sizes because it can be overly sensitive to small differences (Hu and Bentler, 1999). The ratio of the χ^2 static to its degree of freedom (χ^2/df) is often used, where the value should be less than 3 to indicate a good fit of the data (Carmines and McIver, 1981). Many researchers have also suggested other fit indices to indicate acceptable fit (Hair et al., 2010; Anderson and Gerbing, 1988; Steenkamp and Baumgartner, 1998). This study used the Non-Normed Fit Index (NNFI); Root Mean Square Residuals (RMSR); Comparative Fit Index (CFI); and the Root Mean Square Error of Approximation (RMSEA) to evaluate the model fit of the both model. The Akaike Information Criterion (AIC) is also listed to provide readers with a relative indication of comparative model quality. As can be shown blow in Tables 7 and 8, and the following sections, the questionnaire items achieve partial measurement invariance in both the Lebanese and British contexts.

Table 7: Fit Indices for Invariance Tests

Invariance Test	χ^2	*df*	χ^2 / df	*p*	NNFI	CFI	SRMR	RMSEA	AIC
British Sample	99.363	48	2.070	.000	.932	.950	.0550	.073 (.053, .093)	159.363
Lebanese Sample	58.456	48	1.218	.143	.985	.989	.0453	.031 (.000, .055)	252.243
Baseline Model (Pooled)	86.133	48	1.794	.001	.973	.981	.0419	.043 (.028, .057)	146.133
Full Configural Invariance	157.837	96	1.644	.000	.958	.969	.0453	.038 (.027, .049)	277.837
Full Metric Invariance	167.513	104	1.611	.000	.960	.968	.0448	.037 (.027, .048)	271.513
Full Scalar Invariance	246.915	112	2.205	.000	.921	.933	.0470	.053 (.044, .062)	382.915
Partial Scalar Invariance	174.578	108	1.616	.000	.960	.967	.0450	.038 (.027, .048)	318.915
Full Factorial Invariance	198.394	112	1.771	.000	.949	.957	.0505	.042 (.032, .052)	334.394
Partial Factorial Invariance	175.932	110	1.599	.000	.961	.967	.0454	.037 (.027, .047)	315.932
Final Structural Model	176.019	110	1.600	.000	.961	.967	.0451	.037 (.027, .047)	316.019

Notes: df = degrees of freedom, NNFI = non-normed fit index; CFI = comparative fit index; SRMR = standardised root mean square residual; RMSEA = root mean square error of approximation; AIC = akaike information criterion

Table 8: Results of χ^2 Difference Tests

Model Comparison	$\Delta\chi^2$	Δ *df*	*p*	Δ CFI	Decision

Test for Full Metric Invariance (M1 + M2)	9.676	8	.289	-.001	Supported
Test for Full Scalar Invariance (M2 + M3)	79.402	8	.000	-.035	Reject
Test for Partial Scalar Invariance (M2 + M4)	7.065	4	.132	-.001	Supported
Fest for Full Factorial Invariance (M4 + M5)	23.816	4	.000	-.010	Reject
Test for Partial Factorial Invariance (M4 + M6)	1.353	2	.508	.000	Supported

Notes: Δ χ^2 = difference in chi-square values; Δ *df* = difference in degrees of freedom; Δ CFI = difference in comparative fit index value.

3.3.1 Configural Invariance

Configural invariance is satisfied when the basic model structure, such as the relationships between indicators and latent factors, is invariant across the groups. This initial baseline has no between-group invariance constraints, so differences may still exist in factor loadings, intercepts and variances, but it provides a basis for comparison as such constraints are added. It is, however, a critical step because if the data does not support identical patterns of fixed and non-fixed parameters, then the data will not support more restrictive models (Bollen, 1989).

3.3.2 Metric Invariance

Metric invariance supposes that the distance between item-responses (e.g. agree, strongly agree) in a scale represent an equal level of change in latent factor true score across independent samples. To test whether metric invariance is supported by the data, the model in AMOS was constrained, such that the factor loadings (also called the factor loading coefficients) were equal for both groups. Since the constrained model is nested within the model that tested for configural invariance, the results of a χ^2 difference test were examined. A model that achieves metric invariance would have both, good fit to the data in addition to a non-significant difference to the previous model. However, while χ^2 is widely used, researchers suggest that other fit indices, such as CFI, should also be used to evaluate model fit where a difference greater than 0.1 indicates a significant difference (Anderson and Gerbing, 1988; Steenkamp and Baumgartner, 1998; Hair et al., 2010). As can be seen in Table 8 above, the non-significant χ^2 difference (p = .289) and CFI difference (ΔCFI = -.010) indicates that full metric invariance has been achieved.

3.3.3 Scalar Invariance

Even though items may be metrically invariant, they may not be scalar invariant. This means that the intercept value (as in regression) may be different across the two groups. Such a result would suggest that a member of one group who responds with ‘agree’ may actually be indicating a different level of agreement compared to a member of another group who also responds with ‘agree’. As can be seen in Table 8 above, the significant χ^2 difference ($p < .001$) and CFI difference (ΔCFI = -.350) indicates that full scalar invariance was not achieved. However, while some items were not invariant, at least one item on each factor was scalar invariant. Testing the model with fewer constraints, therefore, suggests that partial scalar invariance was established (χ^2 (4) = 7.065, p = .132, ΔCFI = -.001).

3.3.4 Factorial Invariance

Factorial invariance suggests that the two groups are homogenous in terms of factor structure; therefore, the variance for each factor should be identical across the two groups. As can be seen in the tables 7 and 8, full factorial invariance was not achieved (χ^2 (4) = 23.816, p = .000, ΔCFI = .010), but partial invariance was achieved (χ^2 (2) = 1.353, p = .508, ΔCFI = .000). This suggests that some factors were invariant across the two samples, suggesting there would be no significant differences, however there were likely to be differences in some of the factors.

3.4 Hypothesis Testing

Several hypotheses were stated in section 1.3, which are addressed here. As stated in the methodology, a series of z-tests were used to examine the causal relationships in the structural model in order to identify statistically significant differences between the British and Lebanese samples, as shown in Table 9.

Table 9: Hypothesis Testing Results for Applicability of the Technology Acceptance Model

		British Sample		Lebanese Sample		z-Tests		
		r	*p*	*r*	*p*	*z*	*p*	Result
H1	PU <--- PEOU	0.372	.000	0.095	.296	2.449	.039	Not Supported
H2a	ATT <--- PU	0.342	.000	0.338	.000	0.049	.796	Supported
H2b	ATT <--- PEOU	0.198	.000	0.220	.024	-0.191	.783	Supported
H3a	BI <--- PU	0.210	.017	0.203	.000	0.062	.796	Supported
H3b	BI <--- ATT	0.577	.000	0.521	.000	0.476	.712	Supported

The results support H2a, H2b, H3a and H3b. All of the expected paths were significant and the results of z-tests comparing the correlation coefficients for differences were non-significant. However, H1 was not supported. The result of the z-test comparing the PU -> PEOU path loading was statically significant, indicating a difference. Examining the path loadings show the relationship is not significant in the Lebanese sample. This suggests that Lebanese students do not perceive an overlap between usefulness and ease of use in the same way as British students.

Table 10: Mean Differences between British and Lebanese Samples

		British Sample		Lebanese Sample		t-Tests				
		M	SD	M	SD	*t*	$z_{(\Delta M)}$	*p*	*d*	Result
H4a	ATT	3.104	0.539	2.910	0.671	-3.390	-0.311	. 001	-0.32	Supported
H4b	PU	3.141	0.590	3.135	0.550	-0.101	-0.010	.920	n.s	Not Supported
H4c	PEOU	3.066	0.622	3.410	0.486	6.556	0.608	.000	0.62	Not Supported
H4d	BI	3.512	0.753	3.358	0.728	-2.196	-0.207	.029	-0.21	Supported

Notes: M = mean; SD = standard deviation; $z_{(\Delta x)}$ = standardised (z-)score difference; d = cohen's d statistic

The data support H4a, and H4d. The independent sample t-tests showed that the means for ATT and BI were significantly larger in the British sample. These differences are "small" as described in Cohen's conventions on effect size (Cohen, 1992). However, H4b was not supported. There was no significant difference between each sample in terms of PU, with both means being larger than 3 indicating agreement. This suggests that the use of educational technology is believed to be useful by Lebanese students, much in the same manner as by British students. Unexpectedly, however, H4c was not supported. A significant different was found, however the Lebanese sample had a much higher mean for PEOU, with "medium" effect. This suggests that Lebanese students believe that that they can easily use, or learn to use, RSS feeds more readily than British students.

Note that the descriptive statistics in support of H4 are shown in section 2.1 in Table 2. A Pearson's chi-squared statistic shows that 36% of students in the British sample had used RSS, as opposed to just 21% in the Lebanese sample ($\chi2$ = 11.859, df = 1, p = .001). This suggests that British students, however the practical difference is marginal with a difference of 15% which could be explained through differences between the samples.

4. Discussion

The overall aims of this study was to determine the appropriateness of TAM in the Lebanese context and to investigate whether there are differences between British and Lebanese students that influence their intention to use the RSS feeds provided through Blackboard to support their studies. Our result supports the ability of TAM to be a useful theoretical framework for better understanding the student's behavioural intention to use RSS feeds in education in both Lebanon and the United Kingdom. Overall, the proposed structural model showed a reasonably good fit with the collected data, with the squared multiple correlation indicating that the model explained 39% of the variance in BI for the Lebanese sample and 24% for the British sample. The results showed that all the predictors (PEOU, PU, ATT) were found to be significant determinants of behavioural intentions to use RSS feeds for both samples. However, further exploration indicated that the differences between the Lebanese and British students are greater than the similarities. More specifically, significant differences were detected in the means of ATT, PEOU and BI, whereas no differences were detected in terms of PU. Furthermore, the relationship between PU and PEOU was significantly different between the two samples. This study further confirms that course materials that use RSS feeds can promote higher user acceptance through stimulating a higher PU.

4.1 Research Implications

Several insightful results could be summarized from our research study, and these are presented below in two categories: contribution to theory and implications for practice.

4.1.1 Contribution to Theory

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; Fayyoumi, Mohammad, and Faris 2013; Tarhini et al., 2014b). Consequently, Teo et al. (2008) and Tarhini et al. (2014c) 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. That is why Davis (1989) proclaimed that studies examining and enhancing the generalizability and validity of TAM in various technology contexts are demanded. Additionally, the applicability of TAM is limited in the educational settings as much of the research has been carried out in non-educational contexts. Therefore, the first theoretical contribution of this study is to empirically confirm the validity and generalizability of TAM in the context of e-learning adoption in developing countries, exemplified by the Lebanon, and in the developed world exemplified by the UK. As postulated in TAM studies, the belief-attitude-intention stream is still effective in predicting the users' perception of technology acceptance.

Furthermore, since the findings from technology acceptance models in one country may not be applicable to another country, this study is also beneficial for understanding the importance of cross-cultural studies between the two countries in terms of technology acceptance. Therefore, this study is considered a useful guide for other researchers to understand whether the acceptance of technology is mainly affected by the individuals' cultural background or whether the acceptance is mainly based on the key determinants of technology itself (behavioural beliefs).

4.1.2 Implication for Practice

In terms of behavioural beliefs (perceived ease of use and perceived usefulness), the results shows that perceived usefulness (PU) contributed the most to users' attitudes towards using the technology compared to the perceived ease of use (PEOU) in the Lebanese and British setting. It is therefore believed that students who find the RSS feeds on e-learning system useful in their learning process and also find the system easy to use are more likely to adopt the system. Therefore, it is suggested that training is not necessary for individuals who have experience in using computers and e-learning; however it is crucial for the other group, since those users will form their perceptions about using the RSS feeds on Blackboard system on the ease of use of the system rather than its usefulness. Thus, by providing training to unexperienced users, those users will be able to learn about the benefits of using the system. This, in turn, will influence their decision to adopt the system. Additionally, instructors should inform the learners about new educational resources such as new teaching materials; reading lists; topics for discussion; or any other course-related announcements in a real time, and they should provide up-to-date content that can fit the students' needs such as access to updated compilations of relevant research references. This will help educate potential users about the benefits of using RSS on Blackboard since such services are quite new to many users in Lebanon and the UK. In addition, in order to promote the ease of use of e-learning, system developers should provide more user-friendly, simple, and informative interfaces for potential adopters. This will increase the users' familiarity with the system which in turn upsurge their intention to adopt and accept it.

Despite the above mentioned differences between the two samples, the results indicate that both Lebanese and British students would most likely use RSS feeds in their learning process and considered it a fairly new addition to e-learning, but reports from the data collection suggested many students were not aware of the feature was available in the virtual learning environment until being presented the questionnaire or don't understand what it is.. It might be also that the influence of using RSS feeds on the attitude differs depending upon the user's current stage of technology adoption. RSS adoption can result in first-mover disadvantage instead of advantage. Under certain conditions, the beneficiary of the new technology adoption is not the first adopter, but rather its competitor. Therefore, it is recommend that educators spread awareness of the feature, emphasise the usefulness of the feature and how it can be used to benefit learning in order to encourage intention for use. Adopting suitable information delivery such as RSS technique to support the corresponding learning activities of e-learning systems will help achieve the goal of learning anytime and anywhere. It is also advised that policy makers and instructors should use various message delivery methods (e.g., SMS and Email) to effectively communicates with the students especially when there is a need for immediate information delivery such as notifying or reminding of some time-sensitive matters. More important to acceptance is the proper connecting of the technology (RSS feeds) to the student's required tasks. Thus learners using different level of communication technique might adopt different acceptance behaviours.

It is also suggested that system developers and designers should provide more personalized summarization system based on a more filtering techniques and algorithms that provide a unique information filtering framework to the target users. The instructors should not only have to locate the new articles and learning materials that the students are interested in reading, but they also have to present information in such a way that the learner will be able to read the most desired and representative parts of it.

The findings of this research also have practical implications to the higher educational institutions and universities in Lebanon and the UK. Although the government of these two countries are investing in technology, it should be noticed that students will not accept and use the technology only because it is useful. Since the students' perceptions towards using the technology are formed through individual, social and cultural contexts. In this context, 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. 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.

4.2 Limitations

As with any research, this study has some limitations. Firstly, this study did not integrate cultural variables into TAM and assumed Hofstede's (2005) findings to be true. As such, it is not appropriate to conclude that the differences found can be attributed to a difference of culture. Further investigation to explore potential moderators is, therefore, appropriate. For example, incorporating a framework to examine cultural differences and other potential influences such as national characteristics and socio-economic status. Secondly, data were collected from students using a convenience sampling technique and thus should not necessarily be considered representative of the population. Therefore, generalization of these findings should be treated with caution. Nevertheless, as a practice, it is acceptable as a first step for further exploration because it is the position of the authors that, from a measurement perspective, a scale found to be variant and have problems using a non-probability sample from a small local sampling frame is unlikely to be invariant using a probability sample in a national sampling frame.

5. Conclusion

In conclusion, the results suggest that models for e-learning adoption should take the nature of the technology into account, as not all perceptions may be salient for all technologies. In other words, It is not clear whether educational technology that has been developed in one location will be perceived in a similar way in a different location. This is due to a range of potential cultural, socio-economic and national differences that may influence behavioural intention to use a technology to support learning. As such, when investigating the adoption of educational technologies in developing nations, it is important to establish the cross-national validity of an evaluative model such as the Technology Acceptance Model (TAM). This research study applied this principle to an investigation of students' use of Really Simple Syndication (RSS) at a Lebanese higher education institution, making a comparison with British students at an institution in the United Kingdom. Structural equation modelling showed that TAM had a good fit to the data provided by Lebanese students and thereby TAM represent a useful means for understanding technology acceptance in Lebanon. However, differences were found in terms of perceived ease of use, attitudes towards use, behavioural intention, and reported use, despite no differences in terms of perceived usefulness. Furthermore, the relationship between perceived usefulness and perceived ease of use was also significantly different. As such, future research should examine potential moderators which may influence these variables and their relationships. Additionally, further work to explore the validity of the model in other learning contexts is appropriate.

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