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Understanding the Technology Receptivity in Higher Education: Evidence From the UAE

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ABSTRACT

This article seeks to investigate factors that predict students' attitudes and intentions to use technology in higher education in the UAE context. A survey research was conducted on a sample of public and private University students using blackboard learn system and other educational technologies in the UAE. A model was developed, and structural equation modeling was used to ascertain the goodness of fit of the model. Computer literacy, ease of use and usefulness were hypothesized to impact the electronic satisfaction and retention of a student with Blackboard and other technology based educational platforms. Perceived usefulness and perceived computer literacy to e-satisfaction and retention was found to be statistically significant. This paper emphasizes technology implementation and receptivity in higher education students in a developing country context, and makes tentative suggestions and recommendations on how policy makers might respond to current and future technology needs.

KEYWORDS

Higher Education, Students, Technology, Technology Acceptance Model (TAM), United Arab Emirates

INTRODUCTION

In the contemporary world, the learning process is becoming a vital factor in the development of business and in the socioeconomic growth of countries. In this scenario, customary instructional methods are found wanting in their ability to attract and motivate students for better learning. Education can play its role effectively if it is managed properly and is supported by technology. The convenience of using various devices, pooled with wireless implements and background sensitivity, makes them great potential learning tools, both in the traditional classrooms and in informal learning outdoors (Moreira & Ferreira, 2016). The dominant role of such technology is to help improve the process of instruction, learning, and research. In recent years, the world has experienced fast and eye-catching developments in the use of technology in the field of education and this has paved the ground for establishing new potential ways for linking students and classes across nations and institutions. For

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example, mobile learning and various other technologies are being utilized widely in the field of education (Gitsaki, Robby, Priest, Hamdan & Ben-Chabane, 2013). Information and communication technology improves both access to and effectiveness of learning in the form of e-learning systems (Ma & Yuen, 2011). The interactive environment between the instructors and the students has resulted in revolutionizing the traditional idea of the classroom (Akour, 2009). Students feel that exchanges with the instructors are essential in an educational environment as they are perceived by the students as experts in their respective subjects (Small, Dowell & Simmons, 2012).

Technology acceptance can be defined as a user's willingness to employ technology for the tasks it is designed to support. Over the years, researchers (Nair, Ali & Leong, 2015) have become more interested in understanding the factors influencing the adoption of technologies in various settings. Literature shows that much research (Chatzoglou, Vraimaki, Diamantidis & Sarigiannidis, 2010; Ifinedo, 2011; Lin & Chang, 2011) has been done to understand the acceptance of technology in the business context. This is understandable, given the close relationship between the appropriate uses of technology and profit margins. In most acceptance studies, researchers have sought to identify and understand the forces that shape users' acceptance so as to influence the design and implementation process in ways to avoid or minimize resistance or rejection when users interact with technology. In recent years, technology acceptance research has been reported with increasing frequency in education-related journals which explicitly shows its growing importance in the educational research field.

The Technology Landscape in the UAE Higher Education

The United Arab Emirates (UAE) is aggressively promoting higher education through the establishment of many private institutions and full-fledged international branch campuses (Ahmad & Hussain, 2015). The number of licensed higher education institutions has increased sharply during the last two decades and now stands at 71 in number (UAE Ministry of Higher Education, 2014). Over the past decade, dramatic competition and growth in the UAE higher education have driven various public and private universities to strive for continuous quality improvement of teaching and learning. Functioning in such a competitive environment, the development of appropriate strategies to deliver quality educational service to students, in order to obtain a competitive advantage, has become increasingly important (Khan & Matlay, 2009). The integration of new technologies within the educational framework is one of the main objectives of the higher education environment worldwide (Sánchez, Hueros, & Ordaz, 2013), and higher education in the UAE is following the same trend. Teaching quality and variables directly associated with the students' study program had the most significant impact on student satisfaction (Fernandes, Ross & Meraj, 2013). Wilkins and Balakrishnan (2013) reported that the quality of lectures, the availability of resources, and the effective use of technology were the most influential factors in determining student satisfaction in the UAE universities, and were similar to their international counterparts (Garcı´a-Aracil, 2009; Miliszewska & Sztendur, 2010). Hence, technology must be taken advantage of in the modern classroom (Al Khan, 2014), and new pedagogies need to be implemented to improve learning with the aid of technology (Gitsaki et al., 2013).

Research (Al-hawari & Mouakket, 2010; Fernandes et al., 2013; Wilkins & Balakrishnan, 2013; Gitsaki et al., 2013) related to technology acceptance in higher education in the UAE context is limited. This study adopts the Technology Acceptance Model (TAM) to investigate the acceptance and perception of the use of technology amongst the local and expatriate students in the UAE context. The study aimed to understand the nature of the relationships between the independent variables of TAM factors, namely perceived ease of use (PEOU), perceived e-literacy and perceived usefulness (PU) and the dependent variables, namely students' e-satisfaction and retention.

The structure of the paper is as follows: we begin with a brief literature review that deals with the main constructs. Next, we probe into the methodology and follow it up with the research results and findings. The findings are discussed with regard to their theoretical and contextual implications.

LITERATURE REVIEW AND THEORETICAL FOUNDATIONS

Use of ICT in Higher Education

Educationally progressive nations have developed robust policies and strategies to address the scholastic needs of the 21st century. These nations are the pioneers in securing the benefits of technology in the teaching-learning process (TLP) (Moreira & Ferreira, 2016). The new information and communication technologies (ICTs) have been seamlessly assimilated into university teaching, mainly at the behest of specific groups of motivated academics (Sánchez et al., 2013). With the increasing use of technology, the past two decades have seen a substantial increase in the development of new and different approaches to education that have created a global impact (Chow, 2013). Making use of this technology stimulates the interest of students in learning the taught content (Baran, 2014) and encourages their integration in the classroom (Moreira, Ferreira, Pereira, & Durão, 2016). Internet technology in higher education has now become a means to disseminate course material, communicate and evaluate course work and improve the educational processes that support collaborative learning (Augustsson, 2010; Lee & Stoel, 2003; Xiao, 2010). Collaborative learning with mobile devices is a learning innovation and will engage students in building their own knowledge. In a collaborative learning environment, the learning is student-centered, and the students have a critical apprehension of contents that goes beyond the classroom (Moreira et al., 2016). In another study, Moreira and Ferreira (2016) proposed a model of public domain free tools (accessible and easy to use anywhere and anytime) that helps students in their daily lives both inside and outside of the higher education institutions to solve problems collaboratively.

In order to learn in the academic environment as well as to perform well later in the workplace, students need the skills to acquire and absorb knowledge efficiently and effectively (Saadé, Morin & Thomas, 2012). Learning environments have the potential to foster a greater sense of immediacy, interactivity, and authenticity due to their built-in flexibility, and learner self-efficacy and learning autonomy which can be increased by fostering self-regulated learning (Kukulska-Hulme, Sharples, Milrad, Arnedillo-Sanchez & Vavoula, 2011; Traxler, 2009; Wankel & Blessinger, 2015). Nair et al. (2015) reported that performance expectancy, effort expectancy, social influence, facilitating conditions, price–value, hedonic motivation and habit have significant influence on students' technology acceptance and usage.

Technology Acceptance Model: Previous Researches

Technology acceptance model (TAM) is an information systems theory that models how users come to accept and use a computer-based technology (Davis, 1989). TAM is built on the theory of reasoned action, which proposes that a person's behavioral intention initiates his or her performance to carry out a specified activity (Joo & Sang, 2013). TAM is simple and robust enough as a model (Ahmad, Madarsha, Zainuddin, Ismail & Nordin, 2010). Since the introduction of the TAM model by Davis (1989), it has been generally used for predicting acceptance, adoption, and use of information systems (Armenteros, Liaw, Fernandez, Diaz & Sanchez, 2013; Au & Zafar, 2008; Autry, Grawe, Daugherty & Richey, 2010; Chen & Tan, 2004; Chow, Herold, Choo & Chan, 2012; Lee & Lehto, 2012; Yeh & Teng, 2012). TAM has been used by researchers (Ervasti & Helaakoski, 2010; Zhou, Dai & Zhang, 2007) worldwide to understand the acceptance of different types of information systems.

TAM predicts that user acceptance of technology is determined by three factors: (a) perceived usefulness, (b) perceived ease of use, and (c) behavioral intentions. Previous scholars (Joo & Sang, 2013; Wallace & Sheetz, 2014) have recommended the use of the TAM model with the use of PEOU and PU as metrics. The role of PEOU in TAM remains debatable; however, some studies show that PEOU has a direct and equal (Adams, Nelson & Todd, 1992; Agarwal & Prasad, 1997), or a stronger effect than PU (Igbaria, Zinatelli, Cragg & Cavay, 1997; Karahanna & Limayem, 2000) on technology adoption. Although TAM has been proved as a robust model with high-predictive validity, results from a variety of studies suggest that in some circumstances the model does not provide a complete

understanding of the phenomenon studied. The TAM emphasizes the importance of PU (over PEOU) as the key determinant of acceptance (Yousafzai, Foxall & Pallister, 2007).

Different studies have used the construct PEOU as an antecedent of e-satisfaction (Jeong & Lambert, 2001; Madu & Madu, 2002). In an e-learning context, students that perceive the system to be easy to use develop better attitudes toward e-learning (Saade´ & Kira, 2009). Usefulness has also been used by different researchers (Yang, Peterson & Cai, 2003) as predictors of e-satisfaction within the online context. The PEOU and usefulness of e-learning among learners are important factors that affect the effectiveness of e-learning (Lim, Lee & Nam, 2007). Armenteros et al. (2013) reported that perceived usefulness followed by perceived enjoyment, perceived ease of use and quality of the multimedia instruction marked the instructors' behavioral intentions. Lee and Lehto (2012) highlighted the motives for using YouTube in learning tasks and found that behavioral intention was significantly influenced by perceived usefulness and user satisfaction. Shittu, Basha, AbdulRahman and Ahmad (2011) revealed that perceived usefulness, subjective norm, and perceived ease of use predict the attitude of Malaysian students toward social software adoption. Perceived ease of use and perceived enjoyment were positively related to the intention to use video podcasts, whereas perceived usefulness did not emerge as a strong prognostic indicator of user acceptance in the Greek context (Zacharis, 2012). Perceived usefulness has a direct and positive relationship with UAE students' e-satisfaction and e-retention while perceived ease of use has only a direct relationship with students' e-retention (Al-hawari & Mouakket, 2010).

RESEARCH METHODOLOGY

The methodology used in this research is quantitative in nature and is designed to gain insight into students' overall attitudes, beliefs, motivations and behavior towards the Blackboard Learn™ Platform usage. A questionnaire survey was distributed to 300 students registered in 2 public and 2 private universities based in Abu Dhabi and Dubai, the major educational hubs of the United Arab Emirates. The students were selected based on their cumulative grades (3.0 and above). The researchers first contacted the university administrations to obtain their approval to participate in this research. Once the approval was received, through the selected faculties, each respondent was given a survey monkey web link (https://www.surveymonkey.com/s/8TDMXNM) through the university intranet email, along with a covering letter inviting students to participate in the survey, describing the purpose of the study, and explaining the confidentiality of their responses. Out of 300 questionnaires, 236 were completed, resulting in a response rate of 78.6%. A total of 95 male students (40.3 percent) and 141 female students, representing 59.7 percent, participated in the study, of which 83 were nationals and 153 were expatriate students. The questionnaire was gleaned from previous research (Al-hawari & Mouakket, 2010) and comprised of 32 items. All parts of the questionnaire, except the one which contained demographic data about the students (gender, academic year, college, and frequency of Blackboard and other technology usage), were measured using a five-point Likert scale, ranging from 1 – strongly agree to 5 – strongly disagree, with the mid-point (3) representing the state of being unsure or neutral.

Proposed Hypotheses

H1: Perceived computer literacy has a positive impact on student's e-satisfaction/e-retention.
H2: PEOU has a positive impact on student's e-satisfaction/ e-retention.
H3: PU has a positive impact on student's e-satisfaction/ e-retention.

FINDINGS AND DISCUSSION

Respondents' Profile

The study sample consisted of males (40.3%) and females (59.7%). The percentage of students aged between 17-20 years was 45.7%, while most of the respondents (54.6%) were aged 21 years and above. The respondent profile breakdown by nationality was: UAE nationals: 35.2% and expatriates: 64.8%. The majority of the respondents (89.8%) were enrolled in undergraduate degree programs. The distribution of students attending the colleges was as follows: 63.1% of them were students of the College of Business Administration and 28.4% of them were those of the College of Engineering (Table 1).

Table 1. Profile of respondents (students)

	Frequency	Percentage
Age		
17 – 20	107	45.3%
21 – 24	81	34.3%
25 and above	48	20.3%
Total	236	100%
Gender		
Male	95	40.3%
Female	141	59.7%
Total	236	100%
Nationality		
Emirati	83	35.2%
Non-Emirati	153	64.8%
Total	236	100%
Year of Study		
1st Year	77	32.6%
2nd Year	75	31.8%
3rd Year	46	19.5%
4th Year	38	16.1%
Total	236	100%
Enrolled in		
College of Business Administration	149	63.1%
College of Arts and Sciences	16	6.8%
College of Engineering	67	28.4%
Foundation Bridge Program	4	1.7%
Total	236	100%
Program of Study		
Undergraduate	212	89.8%
Post Graduate	24	10.2%
Total	236	100%

Validity and Reliability Testing

The degree of consistency of a measure is referred to as its reliability. The reliability coefficient, Cronbach's α (Cronbach, 1951), is generally used to test the reliability of a scale. α values of 0.70 or greater are deemed to be indicative of good scale reliability (O'Leary-Kelly & Vokurka, 1998). This reliability test was, therefore, applied to the data collected from the 236 surveys. As can be seen from the results of Table 2, the Cronbach's α for the four latent variables of technology acceptance model range from 0.748 to 0.869. These results suggest that the theoretical constructs exhibit good psychometric properties.

Unidimensionality

Unidimensionality measures the extent to which the items in a scale measure the same construct (Venkatraman, 1989). CFA is used to assess how well the observed variables, i.e., measurement items, reflect unobserved or latent variables in the studied construct. A CFA was conducted for each of the four constructs to determine whether the 16 indicators have adequately measured the construct they were allocated to. Empirical evidence in CFA is generally assessed using criteria such as the comparative fit index (CFI), squared multiple correlations (R^2), the significance of parameter estimates (factor loading), and goodness-of-fit statistic (GFI). Table 3 summarizes the results of these tests.

CFI compares a proposed model with the null model assuming that there are no relationships between the measures. A CFI value that is greater than 0.90 indicates an acceptable fit to the data (Bentler, 1992). It can be seen from the results of Table 3 that CFI values for four latent variables range from 0.95 to 1.00, which suggests very good model fitness.

Squared multiple correlations (R^2) indicate the percentage of variance in an indicator explained by a factor. Table 3 shows that the relevant squared multiple correlations (R^2) are adequately large, ranging from 0.10 to 0.69. This confirms that a significant degree of variance is provided by its latent construct.

Table 3 also confirms that the factors loading (from 0.32 to 0.84), which are the standardized regression weights, are satisfactorily high and statistically significant.

GFI calculates the proportion of variance that is accounted for by the estimated population covariance (Tabachnick & Fidell, 2012). A cut-off point of 0.90 has been recommended for the GFI (Miles & Shevlin, 1998). The obtained GFI values are acceptable as they range from 0.96 to 1.00. Hence, all of the four constructs have good fit and thus are *unidimensional.*

Convergent Validity

Convergent validity can be evaluated by the use of the Bentler-Bonett's Normed Fit Index (NFI). This index provides the degree to which the different approaches to measure a construct generatethe same results (Ahire, Golhar & Waller, 1996). According to a generally accepted principle, the NFI values of 0.90 or above are considered as a satisfactory fit index (Bentler, 1992). An examination of Table 6 shows that the values of NFI are greater than 0.90, and, therefore, signify a strong convergent validity of constructs. This provides evidence that items are related to the same construct.

Table 2. Reliability test

	No. of Items	Cronbach's Alpha
Perceived Computer Literacy	3	0.748
Perceived Ease of Use	3	0.803
Perceived Usefulness	5	0.836
E–Satisfaction and Retention	6	0.869

Table 3. Goodness-of-fit statistics for confirmatory factor analysis

Factors and Indicators	CFI	Factor Loading	R^2	GFI
A. Perceived Computer Literacy	1.00			1.00
PCL1: I have a reasonable computer literacy		0.351	0.123	
PCL2: I have prior experience of using a similar e-learning platform		0.319	0.102	
PCL3: Blackboard is a significant addition to my university		0.445	0.198	
B. Perceived Ease of Use	1.00			1.00
PEOU1: Learning Blackboard is easy		0.748	0.560	
PEOU2: Blackboard has got understandable functions		0.735	0.540	
PEOU3: Blackboard is a significant addition to my university		0.839	0.705	
C. Perceived Usefulness	0.96			0.96
PU1: Blackboard is useful in my courses		0.828	0.685	
PU2: Blackboard saves my time		0.787	0.620	
PU3: Blackboard is informative		0.691	0.478	
PU4: Blackboard is useful for my degree program		0.774	0.599	
PU5: Blackboard improves my grades		0.562	0.316	
D. e–Satisfaction and Retention	0.99			0.98
eSAT_RET1: I am satisfied with the services offered on Blackboard		0.781	0.611	
eSAT_RET2: I intend to continue using Blackboard		0.832	0.692	
eSAT_RET3: I encourage others to use Blackboard		0.826	0.682	
eSAT_RET4: I speak positively about Blackboard		0.489	0.240	
eSAT_RET5: I will continue using Blackboard in future		0.765	0.585	
eSAT_RET6: Overall, I am satisfied with the Blackboard learning platform		0.650	0.422	

Discriminant Validity

Discriminant validity is the degree to which different latent constructs and their indicators can be distinguished from the other constructs and their indicators (Bagozzi, Yi & Phillips, 1991). For calculating the discriminant validity, we can have a comparison of the Cronbach's alpha of a latent construct to its mean correlations with other model latent variables. If the alpha value of a latent construct is adequately higher than the mean of its correlations with other variables, then there is a signal of discriminant validity (Ghiselli, Campbell & Zedeck, 1981). Table 4 shows that the difference between the Cronbach's alpha value of every latent scale and the mean correlation of each latent

Table 4. Scale validity analysis

Factor	Convergent Validity	Discriminant Validity
Perceived Computer Literacy	1.00	0.45
Perceived Ease of Use	1.00	0.29
Perceived Usefulness	0.95	0.26
e–Satisfaction & Retention	0.98	0.32

scale with the other scales is sufficiently high and this provides the evidence that the scale does not correlate with other conceptually distinct constructs.

Latent Variables and Model Analysis

AMOS 16 software has been used to develop a *First-Order CFA Model* and to examine the relationship among these four factors. The proposed latent variable model is shown in Figure 1. The path coefficients connecting the items to the factors in Figure 1 represent the *factor loadings* and may also be interpreted as standardized regression coefficients. A summary of goodness-of-fit indices for this model is displayed in Table 5. The table shows that all the goodness-of-fit statistics are in the acceptable range.

Computer literacy, ease of use and usefulness were hypothesized to impact the e-satisfaction of a student with Blackboard and his/her retention (H1, H2, H3 in Table 6). In other words, the level of satisfaction and retention among students was expected to be related to the three exogenous variables. These hypotheses were directly tested by assessing the statistical significances of paths β_1, β_2 and β_3

Figure 1. Proposed research model (derived from TAM framework [Davis, 1989])

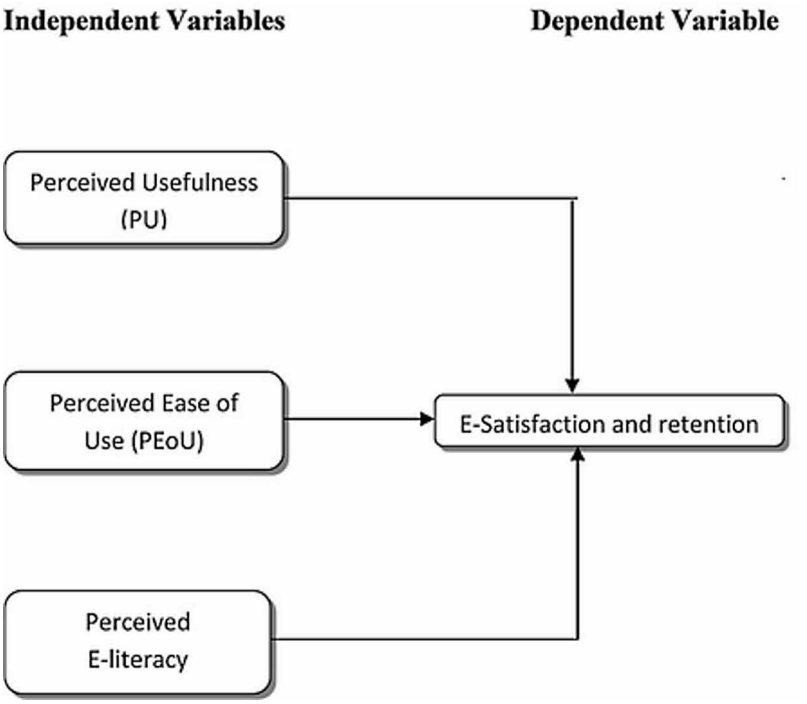


Table 5. Summary statistics of model fitness indices

Fit Index	Suggested Values	Observed Values
Chi-square/degrees of freedom	≤3.00	1.46
GFI	≥0.90	0.92
AGFI	≥0.80	0.89
NFI	≥0.90	0.92
CFI	≥0.90	0.97

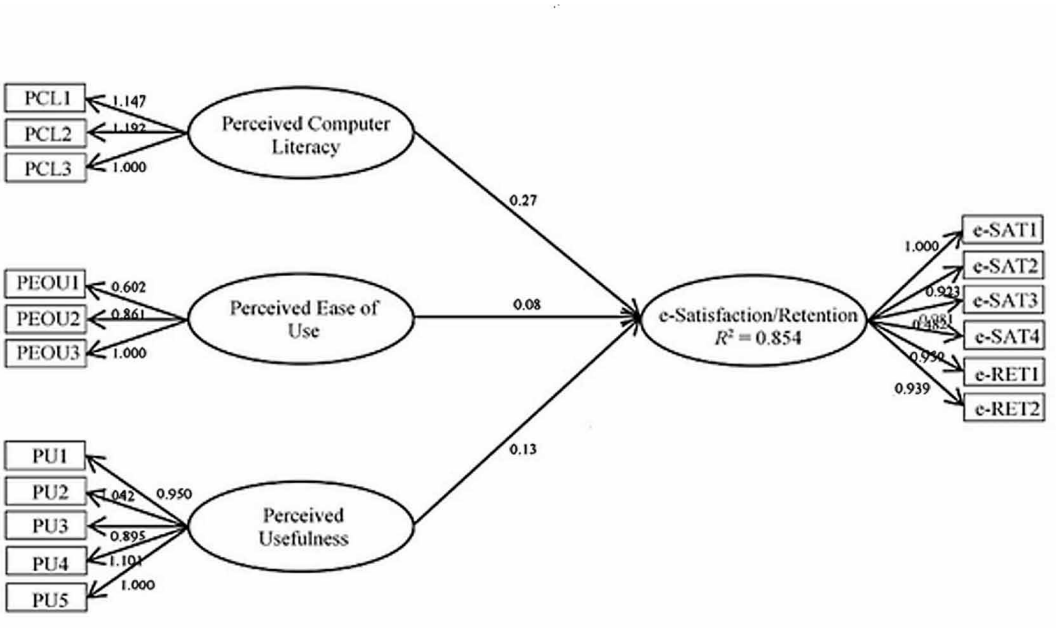
Table 6. Statistical significance of path coefficients for the latent variable model

Path	Significance
H1 – Perceived Computer Literacy → e–Satisfaction & Retention	Significant
H2 – Perceived Ease of Use → e–Satisfaction & Retention	Non-significant
H3 – Perceived Usefulness → e–Satisfaction & Retention	Significant

in Figure 2. The standard path coefficient from perceived computer literacy to e-satisfaction/retention ($\beta_1 = 0.27$) was statistically significant and therefore H1 is supported. The standard path coefficient from perceived ease of use to e-satisfaction/retention ($\beta_2 = 0.08$) was statistically insignificant and therefore H2 is not supported. On the other hand, the standard path coefficient from perceived usefulness to e-satisfaction/retention ($\beta_3 = 0.13$) was statistically significant and therefore H3 is supported. The findings are in alignment with the previous researches (Al-hawari & Mouakket, 2010; Sanchez et al., 2013; Yousafzai et al., 2007) which confirmed that the use of technology and its acceptance are directly influenced by perceived usefulness and indirectly by perceived ease of use. This highlights the importance of support and personal assistance to student's attitude as they are more motivated and keen to learn when provided with various educational technologies. The results affirm the findings of previous researchers (Al-Mushasha, 2013; Sanchez et al., 2013) who suggested that perceived usefulness, perceived ease of use, university support, and computer self-efficacy are important determinants of e-learning acceptance in the higher education environment. The insignificant relation of the perceived ease of use is consistent with other studies (Sanchez et al., 2013; Wu & Wang, 2005).

This study fills a void that has remained largely unfilled by preceding studies in the context of developing countries. The results indicate that perceived usefulness and computer literacy were regarded as the most important and significant factors for students' e-satisfaction and retention among

Figure 2. Latent model



higher education institutions in the UAE. Blackboard and other technology-based educational platforms turned out to be convenient for students in many ways, such as (*a*) their course material is readily accessible even on their handheld devices, (*b*) they can discuss the problems, issues, assignments and projects openly/privately, (*c*) they can communicate with instructors more effectively, (*d*) their contribution towards a task is easily tracked and graded, and (*e*) there is no risk of their work being lost. The correlation of computer literacy to e-satisfaction/retention was found to be statistically significant. The rationale for this fact is that most students are usually equipped with basic skills to operate smart gadgets, and they do not need much training to use simple softwares such as Blackboard and People Soft. Nowadays, the current students belong to generation Y, and they are more flexible in learning. As technology is influencing human lives in general, Blackboard and other web-based technologies are believed to become a vital part of the educational systems in future.

It was also noticed that nationality does not impact students' satisfaction with technology. It can be said that though these students may have their roots in different countries, most of them have been actually brought up and taught in the UAE and thus have a similar attitude towards technology. A similarity of findings was evident in the case of gender, where female and male students reflected the same degree of satisfaction towards instructional technologies. The reasons for this may be many and varied, such as the UAE Government's initiative to empower females in all the sectors, including education, and the fact that females are more literate, since the e UAE female population is more educated and enrolled in higher education programs.

CONCLUSION

This study aimed to investigate the factors that influence technology acceptance among the higher education students in the UAE. Perceived usefulness and computer literacy were found to be the significant factors associated with student's e-satisfaction and retention. The findings in this study have implications for the educators and policy makers that intend to use technology to attain sustained competitive advantage in the longer run. It is imperative to mention that most of the educational institutions in the UAE are in the nascent stage of using online / blended learning. This study would highlight to the policy makers and educational institutions the importance of blended learning as one of the new approaches in effective learning.

As the UAE is a collectivistic society that avoids high uncertainty, it is suggested that technical support sessions and training courses be extended to students to enhance the perceived ease of use of technology amongst them. Students' perception about the usefulness of this software is the most important factor that plays a major role in their satisfaction. It would be interesting to study the differences in the attitudes of students from schools in different countries towards this software. Also, the significance level of the perceived usefulness variable in technology acceptance exhibits that educators are the decisive factors as they act as role models and are in direct contact with the students. Hence, the study will stress the need for commitment from educators in using and acquiring the relevant skills to use a variety of educational technologies in the teaching-learning process and also to motivate the students to use this tool more efficiently and effectively.

It is very important to recommend a deeper and more elaborate survey with larger samples across a larger number of universities, and a thorough analysis of Blackboard and other technology initiatives to stand on firmer ground when making decisions and improvements. That being said, the sample surveyed has provided some light on issues that can affect the implementation of the initiative, and would, if addressed, enhance its reception and implementation.

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