INVESTIGATING LEARNERS' PERSPECTIVES ON UBIQUITOUS/MOBILE LEARNING AND SATISFACTION IN A HIGHER EDUCATION (HEI) INSTITUTION IN OMAN

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ABSTRACT

Ubiquitous Learning via e-learning systems and smartphones is a major accelerating factor in the popularity of digital learning content among learners. The ease of access, perpetual availability of materials, availability of the content in various formats have assisted in promoting learning and creativity in learners across the institutions where learning systems seamlessly integrate across networks, platforms and devices. In this paper, we investigate the factors that contribute to learner satisfaction while using mobile learning in their day to day learning activities. We propose an integrated model by extending Technology Acceptance Model (TAM) and Information System (IS) Success Model. This proposed model includes factors: Educational Quality (EQ) and Information Quality (IQ) from IS model and Perceived Usefulness (PU) from TAM with incorporation of one more construct, Resource Sharing (RS). In this study, a paper-based survey is used to elicit responses from over 200 students from one of the higher educational institutions (HEIs) in the Middle East.

Keywords: Ubiquitous learning, mobile learning, TAM, IS Success, satisfaction, content sharing, Middle East, HEI.

INTRODUCTION

The unprecedented growth of mobile devices networks and wireless networking technology has given prominence to the emergence of m-learning in personal learning environments (PLEs) and web-based education learning environments around the world. Hummel and Hlavacs (2003), define ubiquitous computing as "a situation in which a multitude of connected and embedded systems and devices work together to form an ambient computing environment..., allowing [users] to user access learning content from anywhere at any time, and to communicate with colleagues or lecturers synchronously and asynchronously much more frequently." Ubiquitous Systems - On the other hand, supports ubiquitous learning, enabling the use of mobile and wireless communication technologies as well as tracking tools for location tracking.

The user experience in ubiquitous learning environments have to be studied and analyzed with clear objectives to understand better about the learning satisfaction and opinions of learners, is very useful for researchers to develop more effective innovative user-friendly ubiquitous learning environments (Liu et al., 2010).

In this paper, we attempt to investigate the factors that contribute to learners' satisfaction while using mobile learning in their day to day learning activities.

LITERATURE REVIEW

*A. **Ubiquitous Learning***

Ubiquitous learning is a blended form of e-learning and mobile learning in an omnipresent and persistent setting allowing students to access learning materials flexibly and seamlessly, any location at any time, both from the physical environment and from the Internet (Hwang et al., 2008; Waller and Johnston, 2009). Learners are self-reliant and motivated in a u-learning environment. When they are situated in a u-learning environment, they are provided with a rich array of information in all possible formats. This makes it effortless for them to complete coursework and tackle problem-solving assignments within a short span of time (Chiou et al., 2010; Waller and Johnston, 2009). The convenience and effectiveness of employing mobile devices in learning activities have captured the imagination of educational stakeholders around the globe (Uzunboylu et al., 2009). Mobile devices and

wireless Internet technology enable learners to access a plethora of digital resources from anywhere in the world at any time. Cheon et al., (2012) investigated that college students'adoption of m-learning, and attitude, subjective norm, and behavioral control positively impacted their intention to adopt mobile learning.

B. *Mobile* devices usage in the Middle East

Our world is developing so rapidly. According to the report by Mobile Economy 2015- Groupe Speciale Mobile Association (GSMA, 2015), the migration to high-speed mobile broadband connections on smartphones and other connected devices has increased rapidly. The report states that "mobile broadband connections will account for almost 70% of the global base by 2020 with the devices now accounting for 60% of connections" and hoped for adding a further 2.9 billion smartphone connections by 2020 (www.gsmamobileeconomy.com). The Middle East is reported with 26% mobile internet subscriber penetration rate in 2014 and 38% by 2020 (GSMA,2015).

C. Mobile learning adoption in the Middle East

A study on mobile learning adoption in the Middle East stated that mobile Learning adoption is affected by national-level initiatives. It can be applied effectively if both public and private organizations come together and take the initiative. The study also revealed that mobile learning in the Middle East requires awareness, training, and motivation of users, Khan et al. (2015). Another study by Seliaman et al. (2012) examined the use of mobile phones and tablets for accessing course materials, searching the web for information related to their discipline, sharing knowledge, conducting assignments among university students in Saudi Arabia. Their research findings indicated that perceived innovativeness has no high positive correlation with perceived usefulness of m-learning. Al Hamdani (2013) conducted the study in one of the private universities in Oman, the study survey showed that 20 students own one mobile phone, 16 students own two mobile phones and 10 students owns three mobile phones. However, m-learning usages are not supported in classroom teaching due to lack of absence of the ability to incorporate mobile learning technologies into teaching. The same study also revealed that students have used their mobile phones for research knowledge, accessing the dictionary, intellectual skills, and collaboration.

D. Model-based studies on mobile learning adoption

There are several studies in the past which validated and proposed different models to analyze mobile learning adoption in academics. All these models and theories are based on the conceptual framework that helps researchers to explain the possible use of mobile learning in educational institutions (Pachler et al., 2010). Some commonly used models are- technology adoption model-TAM (Davis, 1989), IS success model (DeLone et al., 2003), diffusion of innovation theory (Rogers, 2003) and the unified theory of acceptance and use of technology-UTAUT (Venkatesh at al., 2003).

TAM focuses on two major determinants- perceived usefulness (PU) and perceived ease of use (PEOU) to predict technology acceptance and its adoption. In addition, Information System (I/S) Success Model suggests six key determinants- system quality, information quality, use, user satisfaction, individual impact and organizational impact.

Researchers examined users' intention to use e-learning in academics and found various determinants such as service quality, course quality, perceived usefulness, perceived ease of use, and self-efficacy directly effects on users' intention towards e-learning (Park et al., 2011; Chen and Tseng, 2012; Arteaga et al., 2013). These studies focused on university students' intention to use mobile learning and revealed that perceived ease of use has an indirect influence on acceptance of mobile learning. Wang et al. (2009) in their study, using UTAUT model, identified that performance expectancy, effort expectancy, social influence, perceived playfulness, and self-management of learning where all have a significant influence on a behavioral intention of m-learning acceptance. Therefore, to discover the students' perceptions on m-learning are of great significance to researchers, because it may allow policymakers at academic institutions in Oman to get a real advantage by permitting improved understanding of major determinants that effect students' satisfaction in mobile learning adoption

RESEARCH HYPOTHESES

In this section, the research variables and hypotheses are presented.

A. Educational quality - Educational quality can be defined as the extent to which an IS system managed to provide a conducive learning environment for learners in terms of collaborative learning. As Hassanzadeh et al. (2012) concluded in their study, educational quality positively affects individuals' satisfaction which is also confirmed by Kim et al. (2012) who found that instructional quality have a significant positive effect on user satisfaction.

Educational quality, therefore, is assumed to have a positive effect on individuals' satisfaction; however, it is assumed to have a positive effect on intention to use as well.

H1: Education Quality (EQ) has the significant effect on students' satisfaction.

B. Content and information quality -The success dimension content and information quality represents the desirable characteristics of an IS's output (Petter & McLean, 2009). An example would be the information that the system and student can generate using the e-learning system. Thus, it includes measures focusing on the quality of the information that the system generates and its usefulness for the user. Information quality is often seen as a key antecedent for user satisfaction (Hassanzadeh et al., 2012; Kim et al., 2012), and for intention to use e-learning system (Chang, 2012). In this study, therefore, content and information quality is assumed to have a positive impact on both individuals' satisfaction and their intentions to use.

H2: Information quality (Content) has a significant effect on students' satisfaction.

C. Resource sharing – Exchange of educational resources by networked communications enable mobile learners to enjoy rich learning experiences. Enhanced learning material allows learners to connect with peers and experts to discuss and acquire know-how, ideas on dynamically information sources (L.Sunil Prakash et al.,2010). The speed of response makes it possible for learners to accelerate their pace of learning and collaboration. E-learning platforms help students to gain and share knowledge, different cultures, values, customs and traditions with each other (Sharma et al., 2016; Ainin et al., 2015; Milosevic et al., 2015).

H3: Resource sharing has significant effect on students' satisfaction.

D. Perceived usefulness (PU) - PU is a key determinant of intention, which encourages the 21st century, IS users to adopt more innovative and user-friendly technologies that give them greater freedom Pikkarainen et al., (2004). PU has been found to have a significant positive effect on usage intention towards the use of e-learning services (Chen and Tseng, 2012; Li et al., 2012; Liu et al., 2010). As a consequence, the greater the perceived usefulness of e-learning system, the more positive is the intention towards its usage; thus greater the likelihood that it will be used.

H4: Perceived Usefulness (P U) has a significant effect on student's satisfaction.

RESEARCH METHODOLOGY

A. Design- A questionnaire was developed and pre-tested on a small group after testing a paper-based survey was conducted in 6 groups totaling of 250 students, in the Faculty of Computing and IT at the HEI. Sample -220 samples were collected, out of which 39% were males and 61% were females. 97% of the respondents belonged from 20-30 years and 3% were above 30 years. Less than 53% of the respondents were engaged in m-learning applications for less than 30 minutes per visit. 42% of the respondents were engaged in m-learning applications for less than 30-90 minutes per visit. 3% used mobile devices for 0 - 1 time in a day. 72% respondents used mobile devices 2-5 times per day and 25% used these devices for more than 5 times.

B. Measures- The survey tool included measures related to user satisfaction in mobile learning environments, Education Quality, Perceived Usefulness and Resource Sharing. Sub items within each level were averaged resulting in composite scales.

C. V*ariables* -Educational Quality, perceived usefulness and information quality were taken as Independent Variables (IV). The students were asked to respond to a variety of 5 point Likert scale (5 strongly agree, 1 strongly disagree). Scale items from each IV was checked for reliability analysis and made sure that Cronbach's alpha value was above 0.7. Learner's satisfaction was taken as Dependent Variables (DV) which consists of the six scale items, all of which were measured using 5 point Likert scales ranging from strongly agree to strongly disagree.

PROPOSED WORK

On the various properties or attributes of learning content, this research proposes an integrated model by extending TAM and IS Model. The proposed Model includes:

- Educational Quality, Information Quality from IS Model.
- Perceived Usefulness from TAM with an incorporation of one more construct Resource Sharing (RS).

The Hypothesized research model for user satisfaction in mobile learning is illustrated in Figure 1.

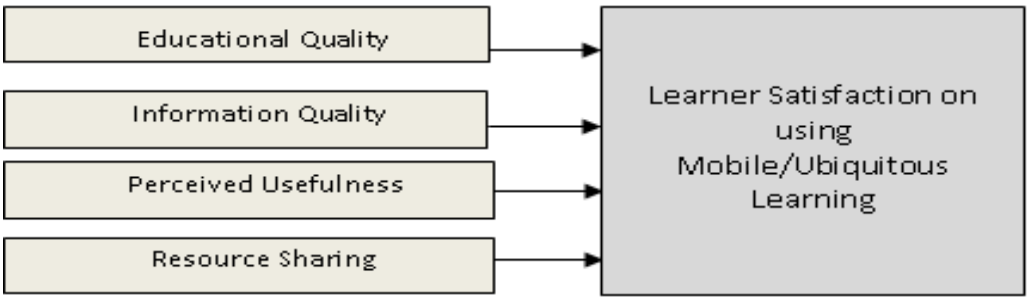

Figure1: Hypothesized Research Model

FINDINGS

To test the hypothèses (H1 to H4) a multiple regression analysis was conducted using IBM SPSS Statistics v23 software. The overall model was significant and 48.3 % of the response variables variation is explained by the regression model. The result indicated that Educational Quality (B=.275, $p < 0.05$), Resource Sharing (B=0.355, $p < 0.01$) had significant relationship with Learners' satisfaction (See Table1). However, findings show that Perceived Usefulness and Information Quality has no significant relation with the Learner Satisfaction.

Table 1

Regression Analysis

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.444	.609		2.371	.024
	EQ	.275	.133	.310	2.068	.047
	PU	-.111	.131	-.126	-.850	.402
	RS	.355	.091	.554	3.914	.000
	IQ	.105	.114	.130	.933	.358

a. Dependent Variable: Satisfaction

CONCLUSION

Results show that the Information Quality had no positive correlation with Learners Satisfaction. This indicates that in Quality/Instructional Quality needs to be enhanced by instructional designers and course leaders. The respondents were satisfied with the resource sharing and educational Quality capabilities of mobile leaning. Hence there is a positive impact on learner satisfaction with the existing Mobile learning system used by the Department for its teaching and learning purposes.

REFERENCES

Al Hamdani, D. S. (2013). Mobile learning: a good practice, *Procedia-Social and Behavioral Sciences*, *103*, 665-674.

Ainin, S., Naqshbandi, M. M., Moghavvemi, S., & Jaafar, N. I. (2015). Facebook usage, socialization and academic performance, *Computers & Education*, *83*, 64-73.

Arteaga Sánchez, R., Duarte Hueros, A., & García Ordaz, M. (2013). E-learning and the University of Huelva: a study of WebCT and the technological acceptance model, *Campus-Wide Information Systems*, *30*(2), 135-160.

Chang, C. C., Yan, C. F., & Tseng, J. S. (2012). Perceived convenience in an extended technology acceptance model: Mobile technology and English learning for college students, *Australasian Journal of Educational Technology*, *28*(5).

Cheon, J., Lee, S., Crooks, S. M., & Song, J. (2012). An investigation of mobile learning readiness in higher education based on the theory of planned behavior, *Computers & Education*, *59*(3), 1054-1064.

Chen, H. R., & Tseng, H. F. (2012). Factors that influence acceptance of web-based e-learning systems for the in-service education of junior high school teachers in Taiwan, *Evaluation and program planning*, *35*(3), 398-406.

Chiou, C. K., Tseng, J. C., Hwang, G. J., & Heller, S. (2010). An adaptive navigation support system for conducting context-aware ubiquitous learning in museums, *Computers & Education*, *55*(2), 834-845.

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS quarterly*, 319-340.

Delone, W. H., & McLean, E. R. (2003). The DeLone and McLean model of information systems success: a ten-year update, *Journal of management information systems*, *19*(4), 9-30.

Intelligence, G. S. M. A. (2015). Global data. *GSMA Intelligence*.

Hassanzadeh, A., Kanaani, F., & Elahi, S. (2012). A model for measuring e-learning systems success in universities, *Expert Systems with Applications*, *39*(12), 10959-10966.

Hummel, K. A., & Hlavacs, H. (2003, January). Anytime, anywhere learning behavior using a web-based platform for a university lecture, In *Proceedings of the SSGRR 2003 Winter Conference, L'Aquila, Italy*.

Hwang, G. J., Chin-Chung, T., & Yang, S. J. (2008). Criteria, strategies and research issues of context-aware ubiquitous learning, *Journal of Educational Technology & Society*, *11*(2).

Khan, A. I., Al-Shihi, H., Al-Khanjari, Z. A., & Sarrab, M. (2015). Mobile Learning (M-Learning) adoption in the Middle East: Lessons learned from the educationally advanced countries, *Telematics and Informatics*, *32*(4), 909-920.

Kim, K., Trimi, S., Park, H., & Rhee, S. (2012). The impact of CMS quality on the outcomes of e-learning systems in higher education: an empirical study, *Decision Sciences Journal of Innovative Education*, *10*(4), 575-587.

Liu, Y., Li, H., & Carlsson, C. (2010). Factors driving the adoption of m-learning: An empirical study, *Computers & Education*, *55*(3), 1211-1219.

Li, Y., Duan, Y., Fu, Z., & Alford, P. (2012). An empirical study on behavioural intention to reuse e-learning systems in rural China, *British Journal of Educational Technology*, *43*(6), 933-948.

Milošević, I., Živković, D., Arsić, S., & Manasijević, D. (2015). Facebook as virtual classroom–Social networking in learning and teaching among Serbian students, *Telematics and Informatics*, *32*(4), 576-585.

Pachler, N., Bachmair, B., & Cook, J. (2009). Mobile learning: structures, agency, practices, *Springer Science & Business Media*.

Park, S. Y., Nam, M. W., & Cha, S. B. (2012). University students' behavioral intention to use mobile learning: Evaluating the technology acceptance model, *British Journal of Educational Technology*, *43*(4), 592-605.

Pikkarainen, T., Pikkarainen, K., Karjaluoto, H., & Pahnila, S. (2004). Consumer acceptance of online banking: an extension of the technology acceptance model, *Internet research*, *14*(3), 224-235.

Petter, S., & McLean, E. R. (2009). A meta-analytic assessment of the DeLone and McLean IS success model: An examination of IS success at the individual level, *Information & Management*, *46*(3), 159-166.

Rogers, E. M. (2004). A prospective and retrospective look at the diffusion model, *Journal of health communication*, *9*(S1), 13-19.

Seliaman, M. E., & Al-Turki, M. S. (2012). Mobile learning adoption in Saudi Arabia. *World Academy of Science, Engineering and Technology*, *69*(9), 391-293.

Sharma, S. K., Joshi, A., & Sharma, H. (2016). A multi-analytical approach to predict the Facebook usage in higher education, *Computers in Human Behavior*, *55*, 340-353.

Sunil Prakash, L., Kutti, N. S., & Sajeev, A. S. M. (2010, November). Review of challenges in content extraction in web based personalized learning content management systems, In *Proceedings of the 12th International Conference on Information Integration and Web-based Applications & Services* , 829-832.

Uzunboylu, H., Cavus, N., & Ercag, E. (2009). Using mobile learning to increase environmental awareness, *Computers & Education*, *52*(2), 381-389.

Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view, *MIS quarterly*, 425-478.

Waller, V., & Johnston, R. B. (2009). Making ubiquitous computing available, *Communications of the ACM*, *52*(10), 127-130.

Wang, Y. S., Wu, M. C., & Wang, H. Y. (2009). Investigating the determinants and age and gender differences in the acceptance of mobile learning, *British journal of educational technology*, *40*(1), 92-118.