A CONCEPTUAL FRAMEWORK FOR MEASURING THE ACCEPTANCE OF PERVASIVE LEARNING

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ABSTRACT. The technological innovation and advancements in smart phones and wireless communication have reformed learning techniques such as Pervasive Learning (P-learning), Mobile Learning (m-learning) and Electronic Learning (e-learning). P-learning is the new form of innovative technologies for learning that occurs at the user's will at anywhere, anytime and with any mobile or handheld devices. Students using P-learning can overcome the obstacles such as poor facilities in the classroom, gender, cultural and religious barriers, hectic personal and professional lives by providing flexibility and more than one medium for learning. This research is intended to study the specific factors influencing students as to whether accept and use these new technologies (P-learning). This study extends the existing research on Technology Acceptance Model (TAM) and will develop an integrated model of P-learning acceptance. It is also expected that this research study will help provide strategies for educators in the development and implementation of courses designed to integrate technology. This study employs mixed research methods for triangulation to get the desired research results. The data for this research is collected through focus group and a cross sectional questionnaire survey.

Keywords: P-learning, TAM, wireless communication, technological innovation

INTRODUCTION

"*There is a time and place for learning; it should be a learner's time and place*"(Thomas, 2005).

Latest development and innovation in Information and communication technologies (ICT) have changed the way of conventional learning method in education. Students now have the advantage of learning being enjoyable with access to vast amount of knowledge (Dooly, 2009). Pervasive learning (P-learning) integrates new technologies to enhance the educational environments by making it highly intelligent and take user location, preferences, and interests into account. It provides the ability to acquire knowledge and makes it available to everyone at all times in a secure, timely, efficient and complete manner (Graf et al., 2008). P-learning eliminates the need for the traditional classrooms. The system communicates with mobile devices embedded in the environment to support student learning on the go. As a result of the flexibility the system provides, students have the improved ability for time management between their educational and professional lives. It eliminates the need for a physical commute to and from a classroom and significantly cuts the cost associated with travel and acquiring necessary educational materials. The student's chosen device will enable learning from any-

where at any time. Tapscott addresses education in social context by pointing out that people between ages of eleven to thirty-one "show signs of learning differently" (Tapscott, 2012) - p.10). Palfrey and Gasser focus on people born after 1980 and claim that "major aspects of their lives – social interactions, friendships, civic activities – are mediated by digital technologies" (Gasser, 2012).

Modern mobile devices have been equipped with "six senses" (Dede et al., 2011). These senses are: (1) Determining location, (2) Connecting to and interacting with other networks, (3) Locating local content and services, (4) Acquiring relevant information, (5) Enhancing the immediate surroundings with acquired information and simulated examples, and (6) Taking notes of the user's specific interests and learning preferences.

Most commonly accepted educational system in Pakistan is face-to-face personal interaction with students in a classroom. Students are required to physically present themselves in class in order to learn. There exist certain disadvantages to the traditional model despite it being widely accepted. These disadvantages include the strict guidelines required for the classroom; many people are prevented from furthering their education due to inevitable circumstances such as physical disabilities, cultural or religious barriers, or employment demands. Distance learning was introduced to remedy these issues and make learning available to more groups of people. ICT tools, like audio and video lectures, and written and electronic correspondence, are used in distance learning system. Web-based learning was established with the advancements of the internet. Web-based learning allows students to access their educational materials at all times with Internet access, irrespective of their location. Educational system is continually changing in today's world with constant advancements in wireless technology. Student engagement and the flexibility of the learning environment is due to advancements in wireless technology (Chen & Lambert, 2012).

Figure 1.

Source: (Koondhar, Rind, & Chandio, 2015)

Developments in technology, in itself, cannot ensure that P-learning and technology in education will be universally accepted by students. Therefore, it is important to understand and study the reasons for acceptance or rejection of technology or systems (Davis, 1989). Information Systems and Information Technology have repeatedly studied the level of technological acceptance among users. P-learning, in higher education settings, is dependent on the students' "acceptance of the technology." Early studies showed that mobile, wireless devices and ICT learning services were widely used and accepted in environments of higher education. This study uses TAM (Technology Acceptance Model) to develop a conceptual framework in order to learn the critical factors of acceptance from the student point of view to use P-learning educational system in Pakistan. There are many studies regarding use and acceptance of technology in educational settings, and this study seeks to simply add to the acquired knowledge. In addition, it seeks to provide developers and teachers of educational material with the necessary knowledge and tools to correctly implement technology in the learning process.

PROBLEM STATEMENT

British Council evaluated and documented complaints and concerns of the next generation higher education students in Pakistan (British Council, 2009). It revealed that 92% students expressed that Pakistan's educational system should be improved and 50% lacked confidence in their education and abilities to gain necessary skills. Pakistan has numerous obstacles in the success of higher education including poor facilities, low quality of education, low funding for research and development of appropriate curriculum, high enrolment numbers, outdated and inaccurate curriculum, religious and cultural barriers, and lack of equal opportunities to students in both rural and urban environments. Therefore, a large number of the students graduating from higher education programs lacked the necessary technical and social skills to succeed in the job market. As a result, today's higher education students in Pakistan are interested in alternative learning techniques.

A variety of research has been conducted in the past few years in order to consider alternatives to traditional education. With alternatives considered, P-learning is shown to be desirable in higher education. Student acceptance of new technology is amongst the most important factors influencing success (Teo, 2013). PTA, Annual Report, (2014) showing that a vast grouping of people in Pakistan use technology to gain information and communicate with one another. Smart phones, tablets, PDA, and laptops are amongst the many devices being used for gaming and communication purposes. The general population has familiarized itself with the use of new technology and has expressed particular interest in using this technology for educational purposes.

This study seeks key factors involved in determining individual acceptance and continued use of P-learning in the higher educational environment. It attempts to answer the question, whether or not the P-learning is an effective, easy to use, and cost efficient method of education in Pakistan. It also answers what information students need to acquire in order to properly implement P-learning. Additionally, it determines the characteristics and necessary designs that will properly support a P-learning environment.

TECHNOLOGY ACCEPTANCE MODEL

One of the most popular models for use and acceptance of new technology is TAM (Technology Acceptance Model). This model was created and initially tested in the 1980s (Davis, 1989; Davis et al., 1989). Additionally, several researchers have validated and extended the model in many different settings (Davis, Bagozzi, & Warshaw, 1989; Chandio, et al., 2013a; Hussain Chandio, et al., 2013b; Venkatesh & Davis, 2000; Venkatesh, Morris, Davis, & Davis, 2003). Perceived usefulness (PU) is a comprehensive overview of the potential impact a system will have on one's ability to properly perform his/her job duties. Perceived Ease of Use (PEOU) is more specific in that it refers only to the areas of performance that are impacting by using the system. TAM is the foundation for the study of how external variables affect an individual's belief, attitude, and intention to use a system. To summarize, the four factors illustrated in following Figure 2 (PU, PEOU, A, and BI) are utilized in TAM.

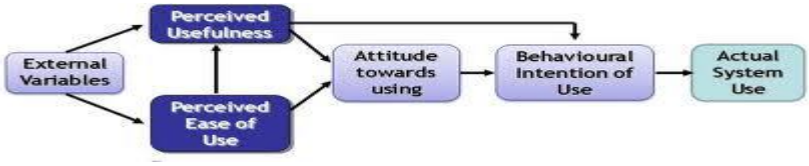

Figure 2. Technology Acceptance Model (TAM) Source: Davis et al. (1989)

Stoel & Lee, (2003) point out prior research that suggests that TAM can be used over time to determine student acceptance of technology in education. (Lu & Viehland, 2008) studied the acceptance of M-learning in New Zealand higher learning institutions by using TAM. TAM is arguably the most effective predictor of user acceptance of new technology (Khasawneh, & Ibrahim, 2008).

Once all TAM factors have been evaluated, it becomes clear that it is the most influential and widely used model when determining acceptance of Information Systems and Information Technology.

PROPOSED P-LEARNING ACCEPTANCE MODEL AND HYPOTHESIS

There are a many theories and models that determine the acceptance of new technology including DOI, TRA, TPB, TAM, and UTAUT. TAM in its original form takes into account internal beliefs, attitudes, and user intent when considering technological acceptance. Its simplicity, strength, and self-serving characteristics are likely the main reasons for its widespread use (Abbasi, et al., 2011; Cho, et al., 2009; Mathieson, et al., 2001). Perceived usefulness (PU) and perceived ease of use (PEOU) are the main factors outlined in TAM that influence user acceptance of a particular system. This study uses TAM as its base model.

A theoretical model awaiting testing and analyzing is presented in Figure 3. There are five categories into which variables that relate to behavioral intention towards information technology and its use can be grouped: application, individual, technological, system, social, pervasiveness. This study seeks to expand on TAM and use it in the context of P-learning and the likelihood of acceptance in a developing country (i.e. Pakistan).

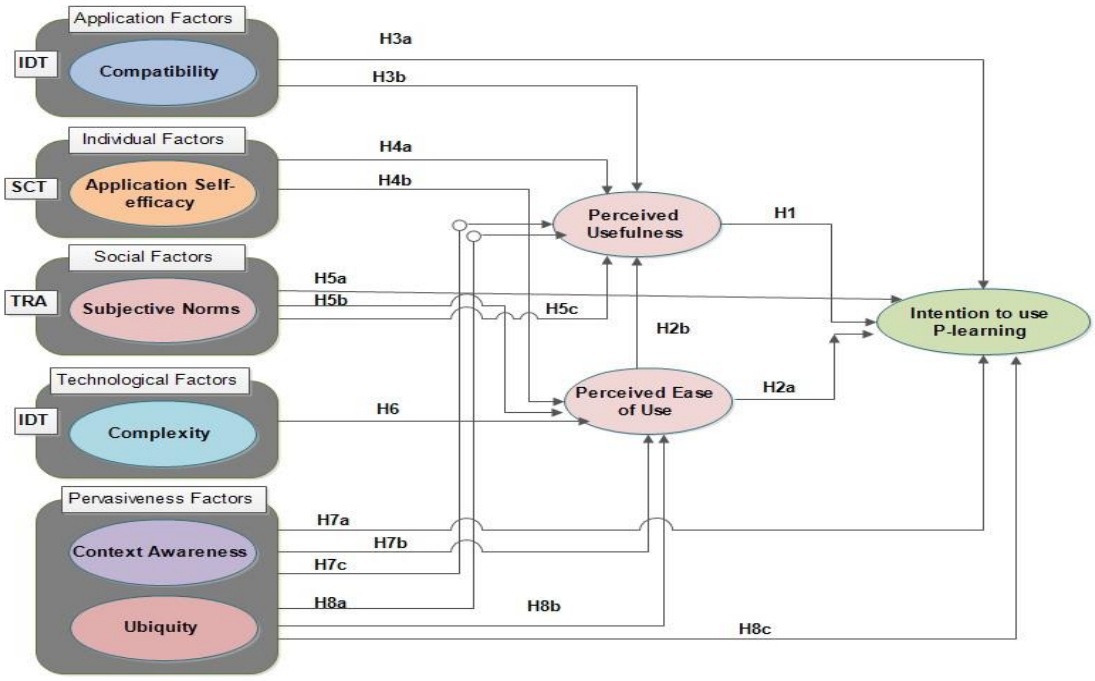

Figure 3. Proposed P-Learning Acceptance Model

Below are dimensions presented by the P-learning acceptance model and the hypotheses related to it. Examining the belief factors determines a person's perspective regarding the system and its ability to properly function according to user needs and whether or not the

person believes that use of said system will positively or negatively affect his job or day to day life (Karaiskos, 2009). These factors measure the effect of elements such as task effectiveness and efficiency on the user's perception and the ability to complete tasks quickly with very little effort (Karaiskos, 2009). PU and PEOU are used in this context to determine the system's utility effects, user perception, and intent to use the system. Behavioral intention towards technological adoption and use is primarily influenced by PU and PEOU. Past research holds that PU and PEOU are directly related to intent to utilize technology. Therefore, the hypotheses directly related to this study and PU and PEOU as key factors are as follows:

Hypotheses-1: Perceived Usefulness will have a positive effect on Intention to use P-learning.
Hypotheses-2a: Perceived Ease of Use will have a positive effect on Intention to use P-learning.
Hypotheses-2b: Perceived Ease of Use will have a positive effect on Perceived Usefulness.
Application Factors: The effects of system characteristics on user intent are examined under this notion. Compatibility (CMP) uses application characteristics to determine the way user satisfaction affects the relationship between characteristics of the system and student needs related to their intent to use the technology. The effects of user needs, experiences, and personal values regarding P-learning use are examined through CMP. CMP-related hypotheses are as follows:
Hypothesis-3a: Compatibility will have a positive effect on Intention to use P-learning.
Hypothesis-3b: Compatibility will have a positive effect on Perceived Usefulness.
Individual Factors: These are the defining personal traits creating the framework for individual assessments and perception (Karaiskos, 2009). Individual Factors assess the Effects of Application Self-Efficacy (ASE) in order to determine the individual characteristics behind intent to use a particular system.
Hypothesis-4a: Application Self Efficacy will have a positive effect on Perceived Usefulness.
Hypothesis-4b: Application Self Efficacy will have a positive effect on Perceived Ease of Use.
Social Factors: These take into account the effects of environment through individual attitude, intent, and social norms. Subjective Norm (SN) is included in order to determine what effect the opinions of peers and authority figures have on student decisions regarding technology.
Hypothesis-5a: Subjective Norm will have a positive effect on Intention to use P-learning.
Hypothesis-5b: Subjective Norm will have a positive effect on Perceived Ease of Use.
Hypothesis-5c: Subjective Norm will have a positive effect on Perceived Usefulness.
Technological Factors: These factors assess technological characteristics. The study includes complexity in order to learn how specific characteristics of technology affect user perception. Technological Complexity (TC) is a part of technological factors and is used to determine the ways in which perception affects student intent to use new technology. The definition of TC is "the degree to which technology is perceived as relatively difficult to understand and use" (Thompson, R. L., Higgins, C. A., & Howell, 1991). The TC hypothesis is as follows:
Hypothesis-6: Technological Complexity will have a negative effect on Perceived Ease of Use.
Pervasiveness factors: These refer to specific characteristics of pervasive technology that affect the ability to properly use a system. Pervasiveness factors are clustered under the perspective of P-learning technology and are shown through ubiquity, context awareness and unobtrusiveness.
Context Awareness:- "The system's capability of perceiving contextual information regarding the user, the system, the environment and thereby to dynamically and proactively adapt its functionality".

Hypothesis-7a: Context Awareness will have a positive effect on Intention to use P-learning.
Hypothesis-7b: Context Awareness will have a positive effect on Perceived Ease of Use.
Hypothesis-7c: Context Awareness will have a positive effect on Perceived Usefulness.
Ubiquity:- "The system's capability to provide users with continuous access to information resources irrespective of their location within the system's boundaries".
Hypothesis-8a: Ubiquity will have a positive effect on Perceived Usefulness.
Hypothesis-8b: Ubiquity will have a positive effect on Perceived Ease of Use.
Hypothesis-8c: Ubiquity will have a positive effect on Intention to use P-learning.

CONCLUSION

The goal of this research is to develop a sustainable P-learning model to benefit the work of academicians, ICT policy experts, government and non-government agencies, other researchers, and higher education institutions in developing countries to improve overall education process. This research provides P-learning concepts and contributions that can be applied in the practical and theoretical sense regarding student acceptance. The future development of P-learning acceptance in the higher educational environment will greatly benefit from the results of this study. Acceptance of P-learning in Pakistani Universities will be greatly influenced by the factors addressed in this study. Therefore, the results of this study have a practical application in the sense that student acceptance of P-learning directly affects its implementation. P-learning relies on a web-based model and can potentially improve students' educational performance and their overall attitudes towards their education. Furthermore, it investigates the role of TAM in predicting acceptance of P-learning as it applies to a developing, non-western culture (Pakistan). In future work we will validate the proposed p-learning model.

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