Factors influencing the adoption of E-learning in Tabriz University of Medical Sciences

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Abstract

Background: Electronic Learning (E-learning), is the use of electronic technology in education via computer and the internet. Despite its slow adoption by faculty members, e-learning provides several benefits to individuals and organizations. This study was conducted to determine the factors influencing the adoption of e-learning by faculty members in Tabriz University of Medical Sciences.

Methods: This was a cross- sectional study, in which a sample of 190 faculty members of Tabriz University of Medical Sciences was randomly selected, using stratified sampling. A Conceptual Path Model of Unified Theory of Acceptance and Use of Technology (UTAUT) was applied to assess the faculty members' attitude towards e-learning. The collected data were analyzed by SPSS16, using descriptive statistics and regression analysis. The model was tested by structural equation modeling (SEM) and was finally represented by Analysis of Moment Structures.

Results: The results evidenced that UTAUT model explains about 56% of the variance for adoption of e-learning. The findings also revealed that performance expectancy, effort expectancy, social influences and behavior indentation had direct and significant effects on faculty members' behavior towards the use of e-learning. However, facilitated condition had no significant effects on the use of e-learning.

Conclusion: The authorized model provides considerable insight for perception and anticipation of faculty members' behaviors in adopting e-learning. The survey clearly identified significant and non-significant factors that may affect the adoption of e-learning. The results of this study could help the policy makers when successful adoption of e-learning is in their agenda.

Keywords: E-learning, Unified Theory of Acceptance and Use of Technology (UTAUT), Structural Equation Modeling (SEM).

Introduction

E-learning, sometimes called Web-Based Training, refers to the delivery of training as a whole or as a part by technology and often over the internet (1). Unlike many challenges such as time and space limitations faced in traditional training methods, in e-learning, learners have great opportunities to access the training and materials anywhere at any time (2).

Recently, organizations have shown a remarkable tendency to offer e-learning courses due to the substantial potential of e-learning to provide services in the form of synchronous and asynchronous classes and blended learning to a large number of learners, who are directed towards life-long learning. In fact, developing autonomous learners who are able to learn on their own and improve their knowledge and skills re-

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gardless of their geographical locations, age, time limitations and learning strategies has become the ultimate goal of many educational organizations (3).

Despite its noticeable progress in modern education, e-learning has not reached a high level of adoption by users, particularly in traditional learning environments. E-learning has received serious criticism from the advocates of traditional educational systems; for example, instructors believe that e-learning does not cover all aspects of teaching, nor does it support all features of learning (4). Unfamiliarity with e-learning principles and theoretical foundations, technophobia and technical glitches are some of the challenges faced when unwilling instructors use e-learning (5,6). Successful adoption of any new system is facilitated by analyzing, elucidating and anticipating the users' perception and behavior via acceptance and adoption models such as Unified Theory of Acceptance and Use of Technology (UTAUT) (7).

To the knowledge of the researchers, no study has evaluated the perception of e-learning users by UTAUT in Iran. This study aimed at examining faculty members' perception of e-learning and identifying the factors influencing their perception at Tabriz University of Medical Sciences. Additionally, this study attempted to analyze the relationship between perceptions and actual behaviors of the faculty members and evaluate the applicability of UTAUT model to explain faculty members' perception towards adoption of e-learning.

When adopting a new technology, like e-learning, is considered by organizations, a wide variety of theoretical and analytical models is recommended to explain and elucidate the factors that may affect this adoption. Nevertheless, presenting a complete and suitable framework to help adopt a new technology is challenging (8).

Theory of Planned Behavior (TPB) (9), the Unified Theory of Acceptance and Use of Technology (UTAUT) (10) and the Technology Acceptance Model (TAM) (11) are only some of the frameworks for understandings of the adoption of new technologies. It seems that the success and failure of new technologies like e-learning tools could be explained by using the above theories (7,12,13). For example, UTAUT has been applied to better understand the users' acceptance behavior of the picture archiving and communication system (PACS) in a radiology setting.

UTAUT, initially hypothesized and empirically supported by Venkatsh et al. (2003), contains "three direct determinants of intention to use (performance expectancy, effort expectancy, and social influence) and two indirect determinants of behavior (intention and facilitating condition)"(15). UTAUT is based on eight related models such as Technology Acceptance Model (TAM) and Diffusion Theory (DT), bearing a significant potential to elucidate the user behavior in adopting a new technology. UTAUT has been shown to be accurate at estimating the users' acceptance of new technology by approximately 70% (16,17). In this study, UTAUT model has been applied to identify factors that may affect faculty members' perceptions about e-learning adoption.

UTAUT is based on four independent and two dependent variables. However, four variables taken into consideration in this study are as follows: Performance Expectancy (PE), Effort Expectancy (EE), Social Influence (SI), and Facilitating Conditions (FC) (Fig. 1).

In this study, five hypotheses were considered, which are as follows:

1. PE will have a direct effect on the faculties' perception to use e-learning.

2. EE will have a direct effect on the faculties' perception to use e-learning.

3. SI will have a direct effect on the faculties' perception to use e-learning.

4. FC will have a direct effect on the faculties' perception to use e-learning.

5. Behavioral intention will have a direct effect on the faculty members' behavior in accepting e-learning.
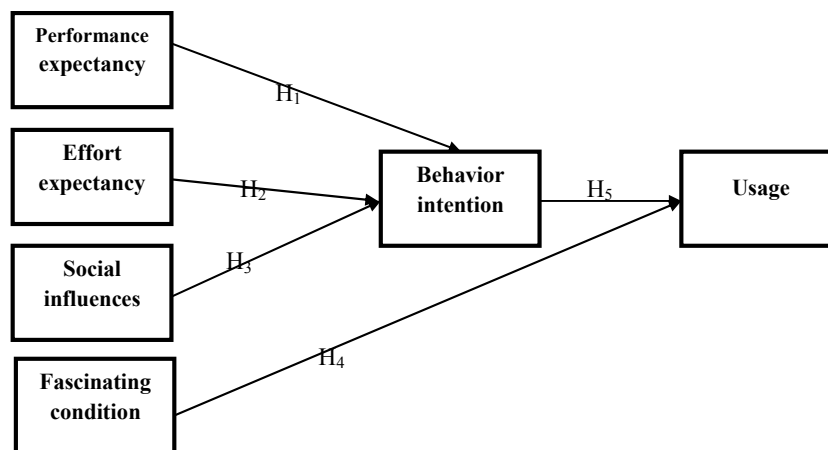
Fig. 1. The UTAUT Model for Accepting WBT by Faculty Members

Methods

This study was conducted from August to October 2015 at T abriz University of Medical Sciences (TUOMS). The population of this study consisted of all faculty members (n=790) of the TUOMS. As faculty members at clinical settings did not use e-learning at that time, it was decided to exclude them as well as those who had not participated in any e-learning workshops. Then a stratified random sampling was used to select a sample (n=190) from among those taking at least one educational workshop on e-learning or virtual education at TUOMS.

A researcher- made questionnaire based on the studies performed by Sun Joo Yoo et al. (2012), Alrawashdeh et al. (2012), Pi-Tzong Jan (2012) and Ayman Bassam Nassuora (2013) was developed for data collection (2,18-20).

The content and face validity of the questionnaire were confirmed by eight faculty members of medical education and health information management departments. Test-retest was used to measure the reliability of the questionnaire (α=91.2).

A structured questionnaire with 23 questions on Performance Expectancy (PE), Effort Expectancy (EF), Social Influences (SI), Facility Condition (FC), Behavioral Intention (BI), and User Behavior (Usage) was used as a survey instrument. In addition to the demographic questions, a questionnaire of 5-point Likert scale was used,

and the participants were asked to show their attitudes by choosing "totally agree", "agree", "neutral" "Disagree", and "totally disagree".

In this survey, behavioral intention and user behavior were dependent variables, while PE, EF, SI and FC were independent variables. The participants were informed by an introduction e-mail, explaining the aim and purpose of the survey.

The ethical approval, indicating that no human subjects were involved in the study, was granted by the TUOMS Ethical Committee. From 190 questionnaires, 181 were completed and returned, but at the end, 177 questionnaires were appropriate for analysis.

A correlation matrix was created to determine the correlation between UTAUT variables and to simplify the model prior to testing. In addition, a graphical path model was constructed to test the proposed study model.

The collected data were analyzed by SPSS16, using Pearson's correlation and regression tests to measure the correlation between variables. Structural equation model (SEM) was used to analyze the paths of the proposed model, which was finally developed and presented, using AMOS $_{16.0}$ SEM software. The six constructs and 23 items measuring these constructs in the proposed model are presented in Table 1.

Table 1. Items Measuring the Constructs in the Model

Construct	Item Number	Items
Performance Expectancy	1	I find e-learning useful in my work.
	2	Using e-learning facilities enables me to do my tasks more quickly.
	3	Using e-learning increases my work productivity.
	4	If I use e-learning, it will increase my chances of getting a promotion.
Effort Expectancy	5	My interaction with e-learning would be clear and understandable.
	6	It would be easy for me to become skillful at using e-learning.
	7	I would find e-learning stress-free to use.
	8	Learning to operate e-learning is easy for me.
Social Influences	9	People who influence my behavior think that I should use e-learning.
	10	People who are important to me think that I should use e-learning.
	11	The senior management of this business has been helpful in the use of e-learning.
	12	In general, the organization has supported the use of e-learning.
Facility Condition	13	I have the resources necessary to use e-learning.
	14	I have the information necessary to use e-learning.
	15	WBT is not compatible with other systems I use.
	16	A specific person or team is available for support with e-learning difficulties.
Behavior Intention	17	I intend to use e-learning in the future.
	18	I am sure I will use e-learning in the future.
	19	I predict I would take e-learning courses in the future.
Usage	20	E-learning makes work more fascinating.
	21	Using e-learning is a good idea.
	22	Working with LMS is a pleasure.
	23	I like working with e-learning.

Results

The demographic information of the study shows that 51% of participants (n=90) were males, 35% of participants (n=41) were in the age range of 36-45 years, and 40% (n=47) of them were associate professors. Also, 36% (n=43) had more than 15 years of work experience.

Findings in Table 2 revealed that there was a statistically significant and positive correlation between UTAUT variables (PE, EE, SI, and BI) and the use of e-learning; however, no significant correlation was found between BI and the use of e-learning.

The authorized proposed conceptual path model of accepting e-learning is presented in Figure 2. The figure shows that PE and EE had a significantly positive effect on behavioral intention. In addition, the figure displays that SI significantly affects behavioral intention to use e-learning. This Figure also shows that behavioral intention had a direct and significant effect on using e-learning. Furthermore, this figure displays that the model explains about 56% of the variance (R^2=0.56) for using e-learning while PE, EE and SI, together, explain about 52% of the variance for BI (R^2=0.52).

Table 3 summarizes the recommended goodness-of-fit measures. This table demonstrates that the relative X^2 value is 2.3, which is acceptable. Other suggested indexes; i.e., Tucker- Lewis Index (TLI), comparative Fit Indices (CFI), Normal Fit Index (NFI) and Root Mean Squared Error of Approximation (RMSEA) were reported and appeared to be favorable.

Table 2. The Correlation between the Variables of the Proposed Conceptual Path Model[1, 2, 3]

Constructs	PE	EE	SI	FC	BI	Usage
PE	1					
EE	0.411[**]	1				
SI	0.268[**]	0.273[**]	1			
FC	0.193[*]	0.503[**]	0.327[**]	1		
BI	0.649[**]	0.336[**]	0.301[**]	0.104	1	
Usage	0.364[**]	0.310[**]	0.307[**]	0.069	0.604[**]	1

1) ** P-value is significant at 0.01 levels.
2) * P-value is significant at 0.05 levels.
3) PE: Performance Expectancy; EE: Effort Expectancy; SI: Social influences; FC: Facilitation condition; BI: Behavioral intention; Usage : Use of e-learning
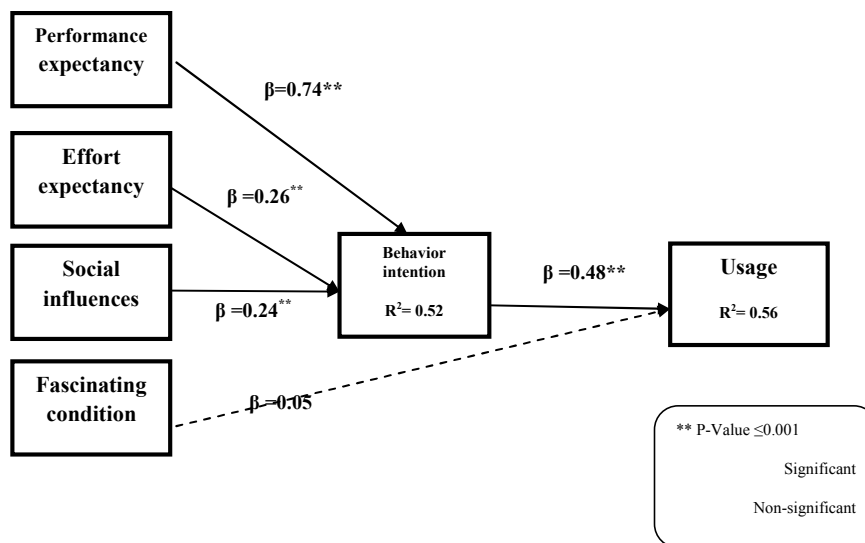
Fig. 2. The Results of the Authorized Proposed Conceptual Path Model

Table 3. Recommended Goodnessof-Fit Measure

Fit Index Category	Suggested Index	Suggested Value	Obtained Value
Absolute fit	Relative X^2	Relative $X^2 < 3.0$	2.3
Incremental fit	Tucker-Lewis Index (TLI)	.90 or above acceptable fit	0.93
Incremental fit	Comparative fit index (CFI)	.90 or above	0.96
Incremental fit	Normal fit index (NFI)	.90 or above	0.92
Parsimonious fit	Root Mean Squared Error of Approximation (RMSEA)	≤ 0.1	0.03

Discussion

The findings of this study revealed that comprehensive adoption and implementation of e-learning considerably depend on the users' acceptance. User resistance, technophobia and unfamiliarity with e-learning and LMS appear to be the main obstacles when e-learning implementation is considered. Analyzing the users' behavior by such acceptance models as UTAUT is a proper method to define the adoption of new technologies like e-learning.

With respect to the association between PE and behavioral intention toward the use of e-learning technology, the standard coefficient of PE and behavioral intention was 0.74 with a p-value of 0.001. This finding is in line with the findings of Alrawashdeh (2012), Bing tan (2013), Echeng (2013), and Bassam (2013), reporting a direct and significant path coefficient rates between PE and e-learning systems (2,15,19,21).

Concerning the association between EE and behavioral intention towards using e-learning, the standard coefficient of EE and

behavioral intention was found to be 0.26 with a p-value of 0.001; thus, H2 was supported, indicating that EE will have a direct effect on the faculties' perception to use e-learning tools and technologies. Likewise, Alrawashdeh (2012), Bing tan (2013), and Bassam (2013) found that EE had a direct and significant effect on the use of e-learning systems (2,15,19). The findings of this study and those of similar studies have acknowledged the fact that EE is an important factor when using e-learning and should be considered when comprehensive implementation of such system is pursued.

Concerning the relationship between SI and behavioral intention to use e-learning systems, the findings shown in Fig 2 suggest that SI had a direct and significant effect on behavioral intention (β=0.24, p=0.001). This finding is in line with the findings of Paola Torres Maldonado (2011), Alrawashdeh (2012), Bing tan (2013), Bassam (2013), and Usoro (2014), who have reported that SI is an important factor controlling new technology ac-

ceptance. Therefore, this factor should be considered when successful implementation of e-learning systems is in progress (2, 15,19,22,23).

With respect to the relationship between FC and the use of e-learning, the results of this study revealed that FC had no significant effect on PU (β=0.05, p=0.001). This finding is in line with the findings of Bing tan (2013), and Usoro (2014), who found that FC had no direct and significant effect on E-learning acceptance (15,23). However, this finding is in contrast with the findings of Alrawashdeh (2012), Echeng (2013) and Bassam (2013), who reported that FC had a significant effect on new technology acceptance (2,19,21).

Finally, concerning the relationship between behavioral intention and the actual use of e-learning, the standard coefficient of BI and the use of e-learning was found to be 0.48 with a p-value of 0.001; thus, H5 was supported, indicating that behavioral intention will have a direct effect on the behavior in accepting e-learning technology. Similarly, Alrawashdeh (2012), Bing tan (2013) and Bassam (2013) found that behavioral intention had a direct and significant effect on the users' acceptance of new technologies (2,15,19). Figure 2 shows that the model explains about 56% of the variance for the use of e-learning, while it shows 52% of the variance for behavioral intention towards the use of e-learning as explained by PE, EE and SI.

Consequently, this study has triple contribution for the adoption of e-learning. First, the findings of this survey acknowledged that UTAUT is a proper model for explaining and elucidating the users' behavior in adopting e-learning. Second, factors affecting e-learning adoption were addressed. Finally, in line with prior studies, the results of this study revealed that entertaining conditions do not appear to have a significant impact when widespread implementation of e-learning is considered; this might be due to the insignificant path coefficient rate on the users' behavioral intention towards the use of e-learning.

Conclusion
This was the first study to examine UTAUT with the aim of proposing a conceptual model for the successful use of e-learning in Iran. This study clearly identified significant factors, which affect faculty members' behavior when adopting e-learning. Conducting future studies is recommended to improve the proposed model and to examine other factors such as users' characteristics or institutional issues.

Limitations
Self-selection of the items in questionnaire by the researchers, self-reported use of e-learning by users, and limited setting of the study are some of the limitations which should be considered in upcoming studies.

Conflict of interest
No conflict of interest declared.

Human Subjects Protections
No human subjects were involved in the study.

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