Factors Affecting ICT Adoption among Distance Education Students based on the Technology Acceptance Model—A Case Study at a Distance Education University in Iran

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Abstract

The incorporation of Information and Communication Technologies (ICT) into education systems is an active program and movement in education that illustrates modern education and enables an all-encompassing presence in the third millennium; however, prior to applying ICT, the factors affecting the adoption and use of these technologies should be carefully investigated. The present study was conducted to examine the factors affecting ICT adoption among distance education students based on the Technology Acceptance Model. The present descriptive survey was conducted in a statistical population consisting of all the distance education students residing in Isfahan, Iran, in 2013, 281 of who were selected as the sample population through simple random sampling. The data collection tool used was a researcher-made questionnaire designed based on field studies and using the questionnaires used in studies conducted by Nair (2012), Alanazy (2006) and Wikins (2008). The items in each section were designed based on the constructs and factors forming the Technology Acceptance Model examined in this study. Descriptive and inferential statistics were used to analyze the data in SPSS-21 and LISREL. The results of the analysis showed significant relationships between perceived usefulness and ease of ICT use and the attitude toward the use of these technologies, between the attitude toward ICT use and the decision to use ICT, and also between the decision to use ICT and its actual use.

1. Introduction

The new methods of education adopted in different education systems across the world have emerged as a way to fulfill the educational needs of learners and to provide educational opportunities to learners in regions with different climatic characteristics and in accordance with their different living conditions. Distance education is a method of education that was first developed to remove the geographic barriers of educational environments and learners' age and gender limitations (Talebzadeh & Hoseini, 2007). As the traditional education system can no longer fully meet the social demand for trained experts due to the increasing public demand for education and the lack of adequate financial resources, distance education was developed to complement traditional education and to create more education opportunities for the public. An inclusive education should therefore be provided based on modern standard methods, according to scientific principles, and through the assistance of experts, the establishment of modern facilities and equipment and the use of new technologies (Amanat et al., 2010).

ICT's spread across all parts of the society has been increasing every day and is now an integral part of people's daily life (Bankole & Babalola, 2012). ICT is comprised of a diverse set of technological tools and resources used for establishing communication, creating dissemination and storing and managing information that is at the heart of the process of education (Bolton, 1999). Teaching and learning in distance education settings are in fact under the direct effect of these technologies. The extensive communication networks available, such as the Internet and advanced education tools, have transformed methods of education and enabled a wide range of aspiring learners across the world to be trained by non-traditional methods of education (Khan, 2004). Researchers tend to use validated models for investigating issues pertaining to a particular subject. Technology acceptance is a field of research incorporating certain models that have already been validated in various studies, such as Davis' Technology Acceptance Model (1989).

Davis (1989) proposed the Technology Acceptance Model to describe and predict the adoption and use of IT. The basis of the Technology Acceptance Model is that "perceived usefulness" and "perceived ease of use" determine the acceptance of new technologies. Davis calls "perceived usefulness" the limit to which technology helps improve performance, while "perceived ease of use" is the belief that people have about the degree of easiness with which a particular technology can be used. The Technology Acceptance Model has been widely used in recent decades as a tool for predicting the adoption of new technologies in the field of information systems. Many studies have used this model to show that "perceived usefulness" and "perceived ease of use" are the antecedents of the adoption of technology (Davis, 1989).
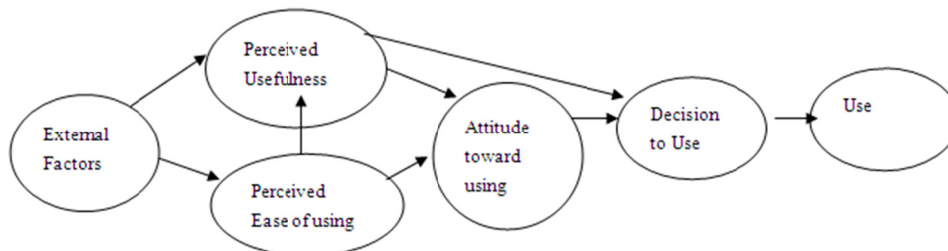

Figure 1. The Technology Acceptance Model (Davis, Bagozzi, & Warshaw, 1989)

As seen in the figure, external factors can affect perceived usefulness and ease of IT use. These factors include organizational and social factors, the hardware and software features of computer systems and other people's assistance in using technologies. In the Technology Acceptance Model, the decision to use technologies is determined by a combination of the personal attitude toward the use of the system, perceived usefulness and perceived ease of use. In this case, personal attitude affects the decision to use technologies rather directly while perceived usefulness and ease of use affect it indirectly.

The results of a study conducted by Davis, Bagozzi, and Warshaw (1989) showed that students' perceived usefulness of a technology has a clear effect on their decision to use it, while their perceived ease of use has a smaller effect on this decision, which has become even smaller over time. Personal attitudes have partial effects and subjective values and norms have no effect on the decision to use a technology.

The results of a study conducted by Durrani and Rashidi (2007) on technology acceptance showed that perceived ease of use has a significant effect on perceived usefulness of a technology and the attitude toward its use. Perceived usefulness of IT also has a significant effect on the decision to use these technologies.

The results of a study conducted by Abasalt-Khorasani, Abdolmaleki, and Zahedi (2011) showed that perceived ease of e-learning, perceived usefulness of e-learning, the students' attitude toward e-learning and the decision to use e-learning have positive effects on the adoption of e-learning among students. Suleimani and Zarafshani (2011) conducted a study using the Technology Acceptance Model and showed that perceived usefulness of IT and the attitude toward using it have significant positive effects on the decision to use IT. The decision to use IT had a significant positive effect on actual IT use as well. Perceived ease of using IT had a significant positive effect on the attitude toward using IT. A study conducted by Salari et al. (2009) showed that perceived ease of use and perceived usefulness of e-learning were relatively satisfactory and perceived ease of using and perceived usefulness were correlated with the adoption of e-learning.

Moreover, the results of a study conducted by Nazemi and Mirabi (2011) identified the quality of the education system and the individual abilities as predictors of the usefulness of technologies through their prediction of the ease of using technologies, social interactions and mental perceptions. In addition, the individual propensity for innovation was confirmed to be the third factor influencing the inclination toward the adoption of technologies. Moreover, a study conducted by Moradi et al. (2010) showed that perceived usefulness, subjective norms, perceived ease of use, past experiences and self-efficacy are factors affecting IT adoption. A study conducted by Pai (2011) also showed a direct positive relationship between perceived usefulness of IT and the attitude toward using it. In another study, Lee (2008) also showed that users' use of information systems and IT is significantly affected by their perception of these systems and that there is a direct positive relationship between perceived ease of using IT and the actual use of it.

Given the importance of the issue, the present study was conducted to evaluate the factors affecting ICT adoption among distance education students using the Technology Acceptance Model and through responding to the following assumptions:

1) There is a significant relationship between perceived usefulness of ICT and the attitude toward using these technologies.

2) There is a significant relationship between perceived ease of using ICT and the attitude toward using these technologies.

3) There is a significant relationship between the attitude toward using ICT and the decision to use these technologies.

4) There is a significant relationship between the decision to use ICT and the actual use of ICT.

2. Method

The present study is applied in objectives and a descriptive survey based on the data collection method used. The study's statistical population included all the distance education graduate students in Isfahan province of Iran and its sample population consisted of 281 students selected through simple random sampling and according to Cochran's sample size formula. The data collection tool used was a researcher-made questionnaire designed based on field studies and using the questionnaires used in studies conducted by Nair (2012), Alanazy (2006) and Wikins (2008). The items for each section were designed based on the constructs and factors forming the Technology Acceptance Model examined in this study. The questionnaire consisted of 25 close-ended questions covering perceived usefulness, perceived ease of use, the attitude toward use, the decision to use and the actual use of technologies. The questions were scored based on a 5-point Likert scale. The validity of the instrument was determined by five ICT experts who examined the questions and made corrective comments that were applied in the final version of the questionnaire. The questionnaire's reliability was confirmed through measuring its Cronbach's alpha (∂=85%). Descriptive and inferential statistics were used to analyze the data in SPSS 21 and LISREL.

3. Results

From the total of 281 students examined in the study, 66% were men and 34% were women. Table 1 presents the mean and standard deviation of the indicators for the research variables.

Table 1. Variables' index values in the Technology Acceptance Model

Variable	Mean	SD
Perceived Usefulness	3.10	2.05
Perceived Ease of Use	3.21	2.38
The Attitude toward Use	3.31	2.35
The Decision to Use	3.04	2.21
Actual Use	3.02	2.43
Total		281

Table 2. The correlation matrix for the research variables in the Technology Acceptance Model

Variable	To Use Perceived	Ease of Use	The Attitude toward Use	Usefulness The Decision	Actual Use
Perceived Usefulness	1				
Perceived Ease of Use	0/41	1			
The Attitude toward Use	0/31	0/29	1		
The Decision to Use	0/28	0/51	0/37	1	
Actual Use	0/51	0/53	0/30	0/47	1

p<%1.

The analysis of the correlation matrix of the research variables presented in Table 2 shows that the R value is positive in all cases and significant at the level of P<1%. There is thus a significant, direct and paired relationship between all the variables.

Table 3. The results of the research variables testing using the confirmatory path analysis

Assumptions Predictor Variable Results	Criterion Variable	Indicators		Coefficients		
		T	B	BT		T
H1: Usefulness Confirmed	The Attitude toward Use	0/23	5.34	./41	./24	5/39
H2: Ease of Use Confirmed	The Attitude toward Use	0/27	4.09	./49 ./40	./34 ./24	6.69 3.40
H3: Usefulness Attitude toward Use Confirmed	The Decision to Use	0/31	3.41	./30 ./35	./21 ./28	3.10 4.21
H4: The Decision to Use Confirmed	Actual Use	0/35	6.16	/.50	./40	7.42

p<%1.

According to the analysis of the data presented in Table 3, the standardized regression coefficient, called the Path coefficient, is 24%, and the T value obtained for this coefficient is 5.39, which is significant at 1%.
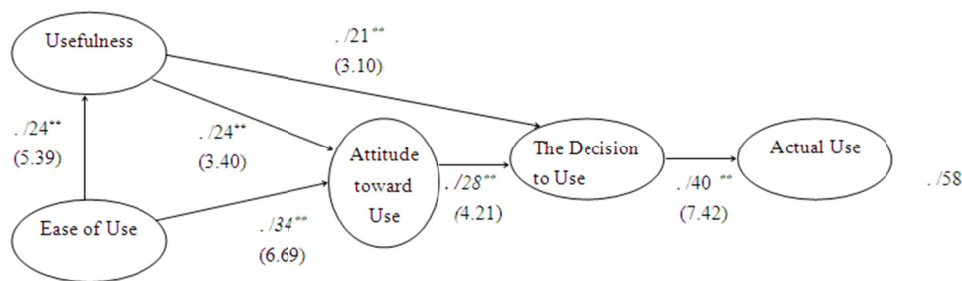
Figure 2. The structural model of ICT adoption among distance education students

The results of the analysis of the effects of perceived ease of using technologies and perceived usefulness of technologies on the attitude toward using them showed the standardized regression coefficient for perceived ease of use to be 34% and the T value obtained for this coefficient to be 6.69, which is significant at 1%. In addition, the standardized regression coefficient for perceived usefulness was 24% and the T value obtained for this coefficient was 3.40, which is significant at 1%. As for the effect of perceived usefulness of technologies, the attitude toward using technologies and the decision to use technologies, the standardized regression coefficient for usefulness was 21% and the T value obtained for this coefficient was 3.10, which is significant at 1%. The standardized regression coefficient for the attitude toward using technologies was 28% and the T value obtained for this coefficient was 4.21, which is also significant at 1%. The decision to use technologies and the actual use of technologies had a regression coefficient of 40% and a T equal to 7.42, which was also significant at 1%. The chi-square value obtained for the structural model provided in the present study, was 52.16, which is not significant at 5%, suggesting the value of the model with the data. The low error rate of 39% is confirmed in the measurements according to the RMSEA index.

4. Discussion

The present study was conducted to evaluate the factors affecting ICT adoption among distance education students based on the Technology Acceptance Model. The results showed a significant relationship between perceived ease of use and perceived usefulness of IT, which is consistent with the results obtained by Davis, Bagozzi, and Warshaw (1989), Khorasani et al. (2011), Durrani and Rashidi (2007). The results also showed that perceived usefulness has a direct effect on the decision to use technologies, which is consistent with the results obtained by Davis et al. (1989), Khorasani et al. (2011), Soleimani and Zarafshani (2011) and Pai (2011). The results also showed that the attitude toward using technologies has a significant effect on the decision to use technologies, which is also consistent with the results obtained by Suleimani and Zarafshani (2011), Nazemi et al., (2011) and Lee (2008). The present study also showed a significant relationship between the decision to use technologies and the actual use of technologies, which is consistent with the results obtained by Davis et al. (1989), Soleimani et al. (2011) and Khorasani et al. (2011). Authorities in charge of designing and implementing distance education are encouraged to take account of perceived ease of use and perceived usefulness of technologies in choosing a suitable technology that can be used as the means of facilitating this type of education for the students, making learning easier for them and helping improve ICT adoption. In addition, they are encouraged to evaluate the different aspects of their target technology and assess its usefulness before choosing their preferred educational technologies for long-distance learning and teaching. The attitude of the students toward the chosen technology is a vital component of its acceptance, as it dictates the students' decision to use it. They should also inform the students of the benefits of using ICT as a process that complements their education.

References

Abasalt-Khorasani, A., Abdolmaleki, J., & Zahedi, H. (2011). Factors Affecting E-Learning Acceptance among Students of Tehran University of Medical Sciences Based on Technology Acceptance Model (TAM). *Iranian journal of education in medical science, 6*(11), 35.

Alanazy, S. (2006). F*actors Associated with Implementation of Electronic Health Records in Saudi Arabia* (Unpublished doctoral dissertation). University of Medicine and Dentistry of New Jersey, USA.

Amanat, D., Momeni, Sh., & Amanat, N. (2010). Evaluation of the Students' Attitude and Satisfaction of Educational Situation in Shiraz Dental School. *Shiraz University Dental Journal, 10*(4), 356-360.

Bankole, O., & Babalola, S. (2012). Internet Use among Undergraduate Students of Olabisi Onabanjo University,

Ago Iwoye, Nigeria. Library Philosophy and Practice. *E-journal*, 812.

Blurton, C. (1999). *New Directions of ICT-Use in Education*. In: UNESCO's World communication and information 1999-2000. Paris: UNESCO (pp. 46-61).

Davis, F. D., Bagozzi, R. P., & Warshaw. P. (1989). User acceptance of computer technology: A comparison of two theoretical models. *Management Science, 35*(8), 982-1003. http://dx.doi.org/10.1287/mnsc.35.8.982

Derani, K., & Rashidi, Z. (2007). Factors influencing the adoption of IT by teachers smart schools in Tehran with emphasis on Information Technology Acceptance. *Journal of Information Science and Technology, 12*(2), 123-146.

Khan, B. H. (2005). *Managing e-learning: Design, delivery, implementation, and evaluation*. Hershey, Pa: Information Science Publishing (pp. 82-23). http://dx.doi.org/10.4018/978-1-59140-634-1

Lee, M. K. O., Cheung, C. M. K., & Chen, Z. (2005). Acceptance of Internet-based learning medium: The role of extrinsic and intrinsic motivation. *Information & Management, 42*(8), 1095-1104. http://dx.doi.org/10.1016/j.im.2003.10.007

Moradi, M., Mehrani, K., & Boromand, M. (2010). Factors affecting the adoption of information technology by the police. *Police Organizational Development Journal, 7*(1), 77.

Nair, S. V. (2012). *Benefits and security of electronic health record (EHR) use by pediatric staff: A Technology Acceptance Model (TAM)-based quantitative study* (Unpublished doctoral dissertation). University of Capella, Africa.

Nazemi, Sh., & Mirabi, A. (2012). A Conceptual Model of Technology and E-services Acceptance among Universities' Students (Case Study: Ferdowsi University of Mashhad. *Iranian Research institute for science and technology, 28*(1), 180-202.

Pai, F. Y., & Huang, K. I. (2011). Applying the Technology Acceptance Model to the introduction of healthcare information systems. *Technological Forecasting and Social Change, 78*(4), 650-660. http://dx.doi.org/10.1016/j.techfore.2010.11.007

Salari, M., yaghmaei, F., Mehdizade, S., Vafadar, Z., & Afzali, M. (2009). Factors related to accept of e-learning in nursing students. *Iranian Journal of Education in Medical Science, 3*(2), 103-108.

Suleimani, A., & Zarafshani, K. (2011). Factors determining Adoption of information technology by vocational agricultural teachers using Technology Acceptance Model in Kermanshah province. *Iranian Research Institute of Science and Technology, 28*(4), 8.

Talebzadeh, M., & Hosseini, A. (2007). E-learning: A new approach to education in Iran to investigate the effectiveness of distance education and training programs and courses in the school year of 2004-2005. *Innovation Research Quarterly, 19*(3), 73-92.

Wilkins, M. A. (2009). Factors Influencing Acceptance of Electronic Health Records in Hospitals. *Perspectives in Health Information Management, 6*(3), 1.

Appendix

Questionnaire of ICT Usage

Dear Students

Questionnaire that is available to carry out a research plan has been developed, it should be noted your answers confidential to us, so please write with honesty answer the questions.

Thanks

Sex: Age: Level of Education:

A-Questions to perceived usefulness of ICT usages Item

1-I think the use of information and communication technology at work leads:

number	questions	I quite agree	agree	I am not sure	disagree	Totally disagree
1	I've been accelerating tasks					
2	I've been improving the quality of work					
3	work is increasing efficiency (reducing costs while maintaining or increasing the level of performance and functionality without increasing costs)					
4	It is increase the level of goal achievement in My job					
5	Easily and is easy tasks					
6	in my opinion, I have been helpful the overall use of information and communication technology to perform my duties					

Questions to perceived ease of using ICT item-B

2-In terms of using different types of information and communication technology at work, in my opinion….

number	questions	I quite agree	agree	I am not sure	disagree	
1	it is easy for me Learning how to work with them					
2	Use them in all cases, it is convenient for me					
3	How to communicate with them clear and understandable for me					
4	I have the flexibility to respond to business needs					
5	Proficient in using them easy for me					
6	I think generally use various types of information and communication technology to fulfill our tasks is easy.					

C-Questions to attitude toward using ICT item

3- I think the use of information and communication technology…

number	questions	I quite agree	agree	I am not sure	disagree	Totally disagree

1	That's good					
2	It is wise					
3	It is Lovely					
4	It is Acceptable					
5	It is Usefulness					

D-Questions to decision to use ICT item

4-I decide from a variety of information and communication technology….

number	questions	I quite agree	agree	I am not sure	disagree	Totally disagree
1	I use to do my duties					
2	I constantly use					
3	Of those that are available for use at work					
4	In the future, I'm going to the use of ICT for tasks, if possible					

F-Actual use of information and communication technology item…

5-The mean frequency of your use of information and communication technologies to perform tasks almost a few hours a week?

Almost not ☐   Less than half an hour   ☐   from half an hour to an hour ☐

1 -2   hours☐   2-3   hours☐

More than 3 hours☐

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