Original Article

Evaluation of the Effect of Technology Readiness on the Acceptance of E-learning among Nurses of Rafsanjan University of Medical Sciences Hospitals

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Article Info

Article history:
Received 22 Sept 2020
Accepted 17 Mar 2021
Published 14 Jun 2021
Keywords:
E-learning
Technology Preparedness
Technology Acceptance
Nurses

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Abstract

Background & Objective: Technology growth results in the advancement of teaching through new educational technology acceptance and readiness, which is known as e-learning. The present study aimed to evaluate technology readiness and its impact on e-learning acceptance among nurses of Rafsanjan University of Medical Sciences.

Materials & Methods: This descriptive and correlational study was performed on 248 nurses at Ali Ebn Abi Taleb, Moradi, and Nik Nafs hospitals, who were selected based on Morgan table and random stratified sampling according to the service location. In addition, data were collected using Richey's technology readiness scale and Davis's technology acceptance model. Moreover, data analysis was performed in SPSS using descriptive statistics, independent t-test, regression test, and Pearson's correlation coefficient.

Results: In this study, 56 subjects were male and 139 were female. In terms of the level of education, 174 had a BSc while 21 had an MSc. The maximum and minimum work experience was 29 years and 1 year, respectively. According to the results, technology readiness had the highest impact on technology acceptance for e-learning in dimensions of optimism and innovation with a beta value of 0.374 and 0.332, respectively. Furthermore, R2=0.331 showed that about 33% of e-learning acceptance could be predicted by four dimensions of optimism, insecurity, innovativeness, and discomfort.

Conclusion: According to the results of this study, nurses' readiness to accept e-learning was assessed as moderate due to the novelty of e-learning.

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Introduction

Today, one of the most important concerns in the field of education is to prepare students to deal with the complications of the age of information explosion. Information and communication technology services enable students to learn at the desired time, place, and speed, compared to traditional learning (1). The new education method (i.e., e-learning) applies different types of advanced technologies, including the Internet, information databases, TV, videotapes, and computer-based education (2). E-learning can be assessed from different perspectives. UNESCO defines e-learning as teaching via new multimedia technologies and the Internet (3). Application of information technology without taking the underlying factors for its acceptance (e.g., infrastructural, cultural, technical, managerial factors and computer skills level and attitude factors) into account leads to wasted resources (4).

Developed by Davis, the technology acceptance model (TAM) is composed of two primary constructs, including perceived usefulness and perceived ease of use. Perceived ease of use is defined as the amount of effort required to effectively use technology. Perceived usefulness is defined as the extent to which a technology is expected to improve a potential user's performance. It is notable that perceiving ease of use affects perceived usefulness (2, 5, 6). On the other hand, technology readiness (TR) aims to better understand people's propensity to embrace and use cutting-edge technologies and refers to people's propensity to embrace and use new technologies (7, 8).

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[DOR: 20.1001.1.22519521.1400.14.41.1.3]
[DOI: 10.52547/edcj.14.41.63]

[Downloaded from edujournal.zums.ac.ir on 2026-11-11]

[DOR: 20.1001.1.22519521.1400.14.41.1.3]

[DOI: 10.52547/edcj.14.41.63]

Various dimensions of the TR include optimism, innovativeness, discomfort, and insecurity, the definitions of which are presented below:

Optimism refers to a belief that technology offers people increased control, flexibility, and efficiency in their life.

Innovativeness is defined as a tendency to be a technology pioneer and thought leader.

Discomfort is defined as a perceived lack of control over technology and a feeling of being overwhelmed by it.

Insecurity refers to distrust of technology and skepticism about its ability to work properly.

The first two dimensions are regarded as drivers of TR, whereas the final two dimensions are referred to as inhibitors of TR (7, 9). Each of the TR dimensions has significant impacts on technology acceptance, which should be used as a predictor of technology acceptance independently (8). According to Park, technology acceptance had proper usability in the academic environment (10). However, information technology acceptance was higher in nurses, who were aware of their responsibilities towards the computer program or those aware of the computer program objectives (11).

Given the increasing use of e-learning in the world and the need for continuous training of nurses (12), and with regard to the fact that e-learning rarely occurs among nurses of Rafsanjan University of Medical Sciences, the present study aimed to evaluate TR and its effect on e-learning acceptance among nurses of Rafsanjan University of Medical Sciences.

Materials and Methods

This was a descriptive-correlational study, and its statistical population included 700 nurses at Ali Ebn Abi Taleb, Moradi, and Nik Nafs hospitals. The sample size was estimated at 248 based on the number of nurses in each hospital using the Krejcie and Morgan table (152 from Ali Ebn Abi Taleb, 40 from Moradi, and 56 from Nik Nafs hospitals). The participants were selected by stratified random sampling and according to the service location. The inclusion criteria were nurse organizational position and service location. Sampling was carried out after receiving a code of ethics from the ethics committee of the university (IR.RUMS.REC.1397.225) and making the necessary arrangements with the authorities of hospitals. Data were collected using a combination of two instruments, which included two sections: section A contained five demographic items on level of education, age, gender, work history, and service location. Section B was a combination of Richey's technology readiness scale (13), which included 14 items in four dimensions of optimism (five items), innovativeness (three items), discomfort (one item), and insecurity (five items), and Davis's technology acceptance model (14), which contained eight items in two dimensions of perceived usefulness (four items) and perceived ease of use (four items). The items are scored based on a five-point Likert scale, from very low (one score) to very high (five scores). The maximum and minimum scores are 115 and 23, respectively, and content validity was used to assess the validity of the instrument. Moreover, CVR and CVI were applied to assess content validity. In order to determine CVR, 10 experts in the field of education and nursing of Rafsanjan University of Medical Sciences were asked to score each item based on a three-point scale (it is essential, beneficial but not essential, and not essential). Afterwards, the answers were calculated according to the formula and the item would be accepted in case of an estimation larger than the value presented in the table. On the other hand, experts were asked to review each item based on a four-part spectrum (irrelevant, needs serious review, relevant but needs serious review, but need to review, and fully relevant) to determine CVI. Afterwards, responses were estimated based on the formula and items higher than 0.79 were accepted. Therefore, the instrument was approved by the experts. In addition, the reliability of the scale was approved at a Cronbach's alpha of 0.8. In this study, the instruments were distributed in person and research objectives

were explained to the subjects to increase cooperation. Moreover, data analysis was performed in SPSS version 21 using descriptive statistics (mean, percentage, standard deviation, and frequency) and inferential statistics, including independent t-test, regression test, and Pearson's correlation coefficient.

From 248 employees, 197 fully cooperated in the data collection process, 56 of whom were male (28.4%) and 139 were female (70.6%). In terms of the level of education, 174 subjects had a BSc and 21 had an MSc. The maximum and minimum work experience was 29 and 1 years, respectively. The mean and standard deviation of the age of nurses was 35.29±7.563 years.

Results

Table 1: Nurses demographic information

Variable	group	Abundance	Percent
Gender	Male	139	70.6
	Female	56	28.4
education	BSc	174	88.3
	MSc	21	9.4

Pearson's correlation coefficient was used to evaluate the relationship between the dimensions of TR and technology acceptance among nurses, the results of which are presented in Table 2. In addition, regression analysis was applied to understand the role of TR components in e-learning acceptance among nurses (Table 3).

Table 2: Pearson correlation coefficient between dimensions of technology readiness and nurses' technology acceptance

Model dimensions		Dimensions of technology readiness				Dimensions of technology acceptance	
		Optimism	Innovation	Insecurity	Discomfort	Be useful	Easy to use
Dimensions of technology readiness	Optimism	1					
	Innovation	0.392	1				
	Insecurity	0.097	0.165	1			
	Discomfort	0.033	0.270	0.330	1		
Dimensions of technology acceptance	Be useful	0.323	0.479	-0.56	-0.31	1	
	Easy to use	0.446	0.265	0.029	0.023	0.497	1

Table 3: Regression analysis to predict nurses' e-learning acceptance through dimensions of technology readiness

Variable	B	Beta	confidence interval 95%	T test statistics	P-value
Fixed	13.689				
Optimism	0.615	0.374	0.378-0.825	5.122	0.000
Innovation	0.776	0.332	0.435-1.116	4.501	0.000
Insecurity	-1.134	-0.091	-0.339-0.071	-1.289	0.199
Discomfort	-0.505	-0.083	-1.363-0.352	-1.165	0.246

According to the results presented in Table 2, R2=0.331 showed that about 33% of technology acceptance can be predicted by four dimensions of optimism, insecurity, innovativeness, and discomfort.

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[DOI: 10.52547/edcj.14.41.63]

According to the results, the dimensions of optimism and innovativeness with beta values of 0.374 and 0.332, respectively had the highest effect on the increase of e-learning technology acceptance. In addition, an independent t-test was applied to evaluate the relationship between gender and various dimensions of the scale. In the end, the results were indicative of no significant relationship between the level of education and dimensions of the questionnaire ($P<0.05$). However, there was a significant relationship between gender and TR, in a way that the mean scores of the male and female participants were different in this regard.

Discussion

In this study, the effect of TR on e-learning acceptance was evaluated among 248 nurses of Rafsanjan University of Medical Sciences. According to the results, the dimensions of optimism and innovativeness had the highest impact on technology acceptance for e-learning, which is consistent with the results obtained by Davoudnia (7), Esen & Erdogmus (15), and Lin & Chang (16). According to the results, there was a significant relationship between the gender of the participants and preparedness for e-learning, which is in line with the results obtained by Golband (17) but inconsistent with the results of Saleh (18) and Maleki (19).

The present study showed that nurses are moderately prepared for e-learning, which is congruent with the results obtained by Saleh (18) in a study on 218 students and Maleki (19) in a study on 327 subjects. On the other hand, our findings are not in line with the results obtained by Kaur & Abbas (20), who showed high readiness in students, and the results obtained by Mehraeen, who reported a low TR among students. It is worth noting that the mentioned studies were conducted on students, whereas the current research was performed on nurses. In addition to providing health services to the community, medical universities are also required to train specialized and skilled manpower. The application of information technology and e-learning in medical universities increases the quality of medical education, knowledge, and skills of staff and reduces training costs (21).

Conclusion

Overall, nurses studied in the present study had moderate e-learning acceptance due to the novelty of this type of training. Our findings could be a guide for education officials to take effective steps toward e-learning by using information technology. It is recommended to provide several training courses for nurses on a trial basis to prepare and improve their skills as well as to identify strengths and weaknesses in this field. Since four dimensions were tested to analyze TR, it is recommended that the effect of new technology on education quality be explained to nurses to increase TR in the dimension of optimism. In the dimension of innovativeness, sufficient information about the latest changes in education should be provided to all nurses. In the discomfort dimension, nurses should be justified in terms of the use of an e-learning system to eliminate any sense of ambiguity. Finally, in the insecurity dimension, people can learn e-learning independently and technology is the only tool for learning.

Acknowledgments

We thank the research deputy of Rafsanjan University of Medical Sciences for the financial support of this project .

Conflicts of Interest: The authors declare that there are no conflicts of interest.

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Peikari H R, shakiba E, Bari feyzabadi S. Evaluation of the Effect of Technology Readiness on the Acceptance of E-learning among Nurses of Rafsanjan University of Medical Sciences Hospitals. J Med Educ Dev. 2021; 14 (41):63-67

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[DOI: 10.52547/edcj.14.41.63]