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Original Article

Factors Affecting a Medical Faculty's Engagement in Virtual Learning Environments

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ABSTRACT

Background: This study aimed to investigate the intrinsic and extrinsic factors affecting faculty engagement in virtual learning environments at Shiraz University of Medical Sciences (SUMS) in Shiraz, Iran.

Methods: In this comparative study, 112 eligible faculty members at SUMS were enrolled in 2018-2019 academic year. The sample was surveyed by a researcher-made questionnaire consisting of 28 items, including 17 questions on intrinsic factors (familiarity with e-learning, faculty attitudes and human resources) and 11 on extrinsic factors (financial resources, inherent barriers, infrastructural factors and institutional support). The reliability of the research instrument, as measured by internal consistency and Cronbach's alpha, stood at 0.92. It was measured at 0.87 and 0.92 for extrinsic and intrinsic factors respectively. The CVR and CVI values were found to be 0.6 and 0.8 respectively. One-sample t-test was applied to compare the mean scores of the intrinsic and extrinsic factors with the hypothetical mean, and to determine the ranking of the factors.

Results: In order of their impact, the intrinsic and extrinsic factors included inadequate financial resources (P=0.566) lack of familiarity with electronic learning (P<0.001), inherent barriers such as institutional disbelief in the complementary role of e-learning (P=0.001), infrastructural factors (P<0.001), faculty attitudes (P<0.001), inadequate human resources (P<0.001), and lack of institutional support (P<0.001).

Conclusion: University administrators should provide educators with adequate resources for handling new educational environments, remove administrative and structural obstacles, and create motivation among faculty members to use e-learning systems.

Keywords: Education, Virtual learning environment, Intrinsic and extrinsic factors, Electronic learning

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Introduction

One of the most important educational challenges of the 21st century is to prepare learners to deal with the ever-changing societies and complexities of the information age. Along with the rapid obsolescence of old knowledge and previous findings, extensive technological advances require an educational approach that facilitates student engagement in learning and problem-solving activities while ensuring their enjoyment of the challenges along the way. A number of educational psychologists believe that learning conditions should be organized to enable individual learners to work and learn according to their abilities. E-learning covers a wide range of educational processes such as computer-based learning, web-based learning, virtual classes, and digital collaboration, and it provides educational content through a variety of electronic media including the Internet, intranet, extranet, satellites, video and audio tapes, and CDs (1).

E-learning is the most efficient form of learning in which the learner acquires better knowledge, attitude and skills than in traditional methods of learning (2). Iran has entered the third millennium while lagging far behind the developed countries in terms of information development. In this regard, faculties, as the principal actors in a country's higher education system, should be sufficiently familiar with ICT in order to make optimal use of this technology. It is evident that introducing ICT and other modern technologies in educational environments, particularly in universities, is a process rather than a singular event, and accordingly there might be certain hesitations in accepting this process. The obstacles in this process are not necessarily visible or tangible, since the term "obstacle" here refers to any factor or indicator that brings about resistance among educators to accept new technologies in curriculums.

In this regard, studies show that several factors can prevent the use of new technologies in the teaching process. For instance, Ertmer (3) classified the barriers to teachers' use of computer technology into two categories, namely extrinsic barriers (access, time, support, resources, and internships) and intrinsic barriers (attitudes, beliefs, activities, and resistance). She maintains that teachers may not use technology even if all the extrinsic barriers are overcome, and the intrinsic barriers will prevent the optimal use of technology (3). Most studies point to a number of common barriers including the lack of organizational and structural support, inefficient teaching and underdeveloped programs, as well as the factors that lead to disinterest in educational technologies.

In support of this observation, one can refer to a study by Coopasami et al. (4), which showed that although e-learning can be applied in teaching medicine, special technologies and equipment must be provided for its implementation, otherwise it will be a challenging procedure. In their research, Drent & Meelissen (5) also pointed to the lack of cooperation from administrative staff in utilizing ICT, and identified it as the main obstacle to the implementation of e-learning in school curriculums.

In another study, Valdez (6) delineates the barriers to the use of technology as follows: 1. Educators' insufficient knowledge 2. Poor Internet access 3. Numerous filters that restrict access to various websites, and 4. Poor ICT integration in course assignments.

As a consequence of these obstacles, an education system could be subject to wide range of difficulties and drawbacks including inequality in educational opportunities, decline in the quality of teaching-learning processes, lack of attention to individual differences, lack of public access to education through new technologies, insufficient use of modern technologies as a motivational tool for students, failure to improve individual skills in using technologies and lack of access to vast data resources available on the Internet. Being delivered in-person, traditional education has generally been accompanied by coercion and punishment, and as a result, it has led to academic failure both within and outside the classrooms (7).

Research has also been conducted on the

factors influencing participation in e-learning. For instance, a study by Nazeri et al. (8), demonstrates that teachers' participation in e-learning can be influenced by 6 major factors, namely management, educational content, required facilities, educators, rules and regulations, and learners.

In their study entitled "Identifying the Causal Factors Affecting the Virtual Higher Education Model in Iran", Roodsaz et al. (9) highlighted a total of 80 indicators influencing Iran's model for virtual higher education. These indicators were categorized into 11 concepts: institutional issues, integrated management, competitive advantage, targeted educational quality, knowledge management, technology, measurability, ease of access, innovation and creativity, foresight and meritocracy (9).

E-learning enables students to make use of new knowledge and skills, which provide the basis for establishment of medical universities. The importance of this issue lies in the fact that medical knowledge is undergoing continuous evolution in the information age so that every 4 to 5 years, on average, 50% of medical knowledge becomes obsolete, and this rate reaches 75% for every 8 to 10 years. Accordingly, the knowledge and skills acquired by the end of an academic program at a medical university are not sufficient for a future medical career. The developments in e-learning technology have had significant effects on medical sciences, and it is imperative to study these effects from various aspects.

In line with the above observations, Kumar et al. (10) argue that even ordinary students can make significant progress, provided that classroom environments are transformed by means of computer technology. The importance of this study is further highlighted by Iran's Medical Education Development and Innovation Package which was issued to the country's medical universities by the Ministry of Health and Medical Education. This document contains 11 different packages that have defined and communicated the country's strategy to transform different fields of medical sciences. The eighth package of this document is dedicated to virtual learning, outlining its objectives as well as the monitoring and evaluation indicators. A notable item in this package is the universities' participation in electronic coverage of the content related to 30% of the programs in at least 3 fields in the first academic year. To achieve this objective, it is necessary that the universities take initiative in this area. Being one of the pioneers of virtual learning in the country, Shiraz University of Medical Sciences (SUMS) is home to one of the two virtual schools in the country, currently operating as a research environment due to its accessibility. SUMS has made some progress in this area, but it has not yet reached the standards outlined in the Development and Innovation Package. One of the main reasons is insufficient participation on the part of faculty members in the development of virtual learning. Therefore, it appears necessary to conduct a research on the possible reasons for faculty participation or nonparticipation in virtual programs. The conceptual model proposed for this study is illustrated in Figure 1. Given the discussed advantages and disadvantages, the main research question can be formulated as follows: What are the intrinsic and extrinsic factors affecting faculty engagement in virtual learning environments at Shiraz University of Medical Sciences?

Methods

The present study was an applied research in terms of purpose and a comparative one in terms of methodology and execution. The study population included all the faculty members at Shiraz University of Medical Sciences (SUMS) in 2018-2019 academic year.

Based on an approach suggested by Anthoine et al. (11), the sample size was estimated at 4 times the number of questions in the research questionnaire (28 items), and accordingly convenience sampling was employed to recruit 112 respondents in this study. There was no restriction on the academic rank of the participants and all

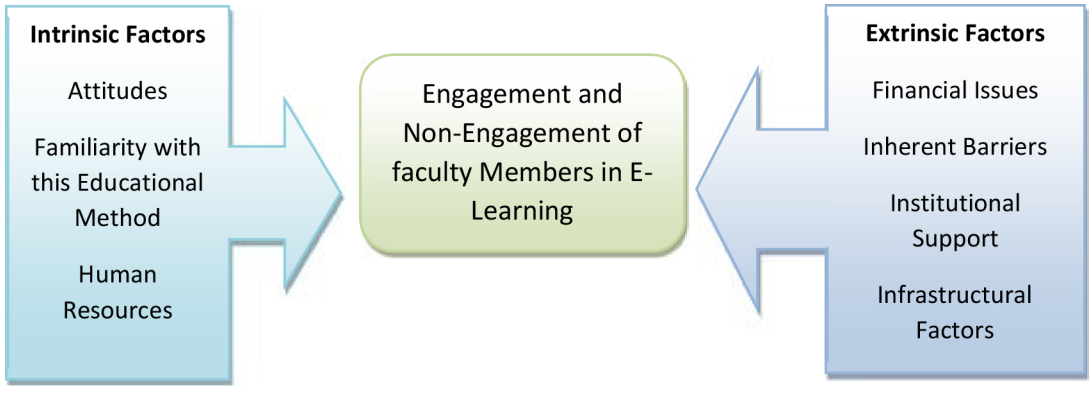

Figure 1. The main factors affecting faculty engagement in e-Learning environments

those who completed the questionnaire were accounted for in the final analysis.

Study Procedure

First, the questions were uploaded on the website of the Virtual School with the permission of the Office of the Vice Chancellor for Research at SUMS and clearance from security officials. A letter was then issued to the Office of Vice Chancellor for Technology, with a request to send an email containing the link to the questions to all faculty members. A total of 150 questionnaires were returned nearly two months after the emails were sent. Then, the collected data were analyzed using SPSS (v.16) on two levels (descriptive and inferential statistics). In terms of descriptive statistics, mean and standard deviation were calculated for data analysis, and one-sample t-test was performed for inferential statistics.

Data Collection Tools

The research questionnaire was developed in collaboration with faculty members in the field of virtual learning. This researcher-made questionnaire was created in line with the theoretical principles on the barriers and opportunities in e-learning, developed by Ertmer (4) and Hope (12), as well as other studies in the literature. Initially a total of 50 questions were extracted, and after consulting the views of 5 experts and faculty members in the field of educational sciences, 28 items were finally obtained. These items measured seven intrinsic and extrinsic factors affecting faculty engagement in e-learning environments (Figure 1). They included 17 questions on intrinsic factors (familiarity with e-learning, faculty attitudes and human resources) and 11 on extrinsic factors (financial resources, inherent barriers, infrastructural factors and institutional support). The demographics section of the questionnaire required participants to provide information on their gender, work experience, marital status, academic degree, employment status and academic rank. The items of the questionnaire were scored on a five-point Likert scale ranging from 1=strongly agree to 5=strongly disagree. The minimum and maximum obtainable scores were 28 and 140 respectively.

Validity and Reliability of Data Collection Tool

The face and content validity of the questionnaire were determined by consulting 5 faculty members in the field of educational sciences. At this stage, the necessary revisions were made in accordance with the opinions obtained from the interviews. In this way, it was ascertained that the questionnaire would precisely evaluate the features under investigation.

The reliability of the research instrument, as measured by internal consistency and Cronbach's alpha, stood at 0.92. It was measured at 0.87 and 0.92 for extrinsic and intrinsic factors respectively, indicating an adequate level of reliability. Quantitative assessment of content validity was conducted by calculating the content validity ratio

(CVR) and content validity index (CVI). A panel of 20 experts were consulted for their views about the questionnaire. The CVR and CVI values were found to be 0.6 and 0.8 respectively.

Ethical Considerations

The researchers introduced themselves and explained the purpose of the study to the participants. The respondents were also assured that their information would remain confidential. Their informed personal consent was obtained before the start of the study.

Results

The participants in this study included 112 faculty members of SUMS, whose demographic characteristics are presented in Table 1.

Table 2 presents the mean scores of different factors in the questionnaire and one-sample t-test results for comparing each score with the hypothetical mean value (3.0).

As indicated in Table 2, the mean scores for each variable were compared with a hypothetical mean of 3.0, using a one-sample t-test. As evident in the table, only in the case of Financial Resources (P=0.566) no significant difference was observed between the obtained mean score (2.95) and the hypothetical mean (3), indicating that the financial resources allocated for faculty engagement in e-learning are at a moderate level. The other six variables included Inherent Barriers (P=0.001), Institutional Support (P<0.001), Infrastructural Factors (P<0.001), Human Resources (P<0.001), Faculty Attitudes (P<0.001) and Familiarity with E-learning (P<0.001). There is a clearly significant difference between the mean scores of these variables and the hypothetical mean value (3), indicating that they had a relatively poor effect on faculty engagement in e-learning programs.

Table 1. Demographic characteristics of the sample faculty members

Demographic Categories	Frequency	Percentage
Gender		
Female	51	42.5
Male	61	57.5
Work Experience (in years)		
<5	34	28.3
5-10	19	15.8
10-15	19	15.8
15-20	26	21.7
>20	14	18.3
Marital Status		
Single	19	15.8
Married	93	84.2
Education Level		
Clinical Specialist	32	26.7
Subspecialist	12	10
PhD	68	63.3
Employment Status		
Geographical Full Time	103	92.5
Part-Time	3	2.5
Non-Geographical Full Time	6	5
Academic Rank		
Instructor	70	62.5
Assistant Professor	28	23.3
Associate Professor	9	7.5
Professor	5	6.7
Total	112	100

Table 2. Mean and standard deviation of intrinsic and extrinsic factors

Variables		N	Mean±SD	t-Value	df	Level of Significance
Extrinsic Factors	Financial Resources	112	2.95±0.92	-0.49	111	0.566
	Inherent Barriers	112	2.67±1.09	-3.25	111	0.001
	Institutional Support	112	2.28±0.94	-8.31	111	<0.001
	Infrastructural Factors	112	2.40±0.89	-7.31	111	<0.001
Intrinsic Factors	Human Resources	112	2.35±0.74	-9.41	111	<0.001
	Faculty Attitudes	112	2.43±0.72	-8.56	111	<0.001
	Familiarity with E-learning	112	2.62±0.93	-4.40	111	<0.001

Table 3. Ranking of the factors affecting faculty engagement in virtual learning environments at SUMS

Variables	Average Rankings
Inadequate Financial Resources	5.10
Lack of Familiarity with E-Learning	4.34
Inherent Barriers	4.17
Infrastructural Factors	3.84
Faculty Attitudes	3.80
Inadequate Human Resources	3.45
Lack of Institutional Support	3.31

The above results can be applied to determine the ranking of intrinsic and extrinsic factors affecting faculty engagement in virtual learning environments at SUMS. For this purpose, Friedman test was performed to compare the mean scores of the intrinsic and extrinsic factors. The Friedman test statistic was equal to 62.13, with a degree of freedom of 6 and a significance level of 0.001. The factors are listed in Table 3 in order of their average rankings:

Table 3 demonstrates that inadequate financial resources (average ranking = 5.1) and lack of institutional support (average rank = 3.31) had the highest and lowest average rankings respectively. These results suggest that there is a significant difference between the average rankings of the factors affecting the faculty engagement in virtual learning environments at SUMS.

Discussion

The purpose of this study was to investigate the intrinsic and extrinsic factors affecting faculty engagement in virtual learning environments at SUMS. The results show that the financial resources allocated for faculty participation in e-learning are moderate. The impact of inherent barriers on faculty members' non-participation in e-learning is below average and relatively weak. Therefore, factors other than inherent barriers have led to their non-participation in this mode of education. The level of University support for faculty participation in e-learning programs is below average and relatively low. SUMS' infrastructural facilities are relatively insufficient for fostering faculty engagement in e-learning. The human resources in this institution are also poorly developed for this purpose. The faculty attitudes toward e-learning programs at SUMS are mostly unfavorable.

Overall, the results revealed that, in order of importance, the intrinsic and extrinsic factors affecting faculty engagement in SUMS' virtual programs included: inadequate financial resources (extrinsic factor), lack of familiarity with electronic learning (intrinsic factor), inherent institutional barriers (extrinsic factor), infrastructural factors (extrinsic factor), faculty attitudes (intrinsic factor), inadequate human resources (intrinsic factor)

and lack of institutional support (extrinsic factor). Very limited research can be found with similar findings to the results of the given hypothesis and the ranking of factors in the present study. In this respect, one can refer to a study by Sife et al. (13) whose findings are consistent with the present findings.

In this article the authors found that ICT did not make a substantial improvement in the performance of educational institutions due to the socio-economic and technological factors. However, our findings were not in agreement with a number of studies which revealed that internet access, lack of enough training, institutional policy and instructional design were the most significant barriers perceived by faculties. Their motivators could also be intrinsic as well, including personal interests and intellectual challenges (14).

One possible explanation for this difference in results is that the countries with higher financial resources are in a better condition compared to the ones with limited resources. Universities in less developed countries are recommended to save their resources via using free software programs, attracting donor-funded projects, and requesting financial support from their governments. They can also motivate their faculties by using other incentives in their regulations such as assigning higher scores (5).

With regard to the most important factor, namely financial resources (extrinsic factor), It should be noted that rewards can be considered as an organization's official and unofficial means of recognizing members for their efforts. Like incentives, rewards can clearly be intrinsic or extrinsic. In relation to inherent barriers, it should be noted that some of the factors defined as barriers in the research literature can fall under the definition of inhibitors. For example, one of the most common inhibitors is the excessive need for time. Almost universally, faculties express concern about the length of time required for distance learning (15).

In addition, SUMS struggles with the lack of adequate infrastructural facilities for encouraging faculty engagement in e-learning. Considering the results of this study, a successful e-learning initiative in a medical university requires the establishment of the necessary standards and infrastructures before implementation and follow-up. Experience dictates that e-learning objectives cannot be achieved in absence of these standards and infrastructures (16, 17).

Finally, given the relatively low level of faculty knowledge reflected in this study, it is suggested that a range of internship courses and briefings be set up to familiarize faculty members with modern electronic tools. It would be more convenient to encourage voluntary participation, since compulsory courses may lead to unanticipated beliefs, attitudes, and fears that discourage educators from adopting new educational approaches. In-service training sessions that are tailored to their needs might be a better option for enhancing their professional skills (18).

To conclude, we propose that for better application of e-learning in teaching-learning process at SUMS and other universities with similar challenges, policymakers and educational planners should take a systematic approach to e-learning. In other words, besides providing infrastructure and training, they need to factor in the faculties' incentives, and above all, financial support. Moreover, they should work on improving faculties' attitude toward e-learning through organizing different events like seminars, workshops and briefing sessions. Other factors highlighted in this study should also be addressed in concert with these measures.

Research Limitations

One of the limitations of this study was the disproportionate participation of faculty members with the academic rank of instructor, possibly due to the fact that they had more free time in their schedules.

Ethical Considerations

At the beginning of the study, the researchers introduced themselves and explained the objectives of the study to the participating faculty members. Written

consent was obtained from all the respondents. They were also assured that all information collected will remain confidential. This study is excerpted from a dissertation submitted in partial fulfillment of the requirements for the masters' degree in Educational Management at the Islamic Azad University of Shiraz, Iran.

Authors' Contributions

M.MO ran the study intervention, collected the data, drafted the manuscript and supervised the project.

M.ME devised the study concept, supervised the construction of the questionnaire and critically modified the manuscript.

M.V oversaw the design and analysis of the study data and assisted in design modifications.

Conflict of Interest

The authors declare that there is no conflict of interest in this study.

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