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Identification of Organizational Factors Affecting the Deployment of E-learning System in Islamic Azad University Tehran Medical Sciences Branch

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ABSTRACT

The growing desire and demand for university education and the ever-increasing attention paid to education in Iran on the one hand, and the attractions and capabilities of web-based training on the other, have brought e-learning into focus. E-learning can make it possible for university students to use new knowledge, and medical faculties are based on the use of such skills and knowledge. The present paper aimed to identify organizational factors affecting the evaluation of e-learning in the Islamic Azad University of Medical Sciences, Tehran. The statistical population included all faculty members of the Islamic Azad University of Medical Sciences, Tehran. In order to achieve the research objectives, the mixed methods research was used. In the qualitative part, study findings indicate that organizational factors affecting the deployment of e-learning in universities include economic, technological, and administrative-logistic factors. Results of the confirmatory analysis of the model suggest the suitability of factor loadings of markers (items) related to each component in the prediction of the capacities of economic, technological, and administrative-logistic dimensions, and the suitability of the factor loading of each component as the marker of economic, technological, and administrative-logistic dimensions of the feasibility assessment of e-learning deployment in the prediction of this variable. Results of the evaluation of the current status of the Islamic Azad University of Medical Sciences, Tehran, in terms of the identified organizational factors showed that the technological dimension of the feasibility assessment of e-learning deployment is significant, positive, and in a favorable condition ($t = 6.656$, $P = 0.001$), while the administrative-logistic ($t = -0.339$) and economic ($t = 0.685$) dimensions are not significant or in a good status for the deployment of e-learning.

Keywords: Organizational, Economic, Technological, Administrative, Logistic Factors, E-learning, University
JEL Classifications: L2, L91

1. INTRODUCTION

In the millennium of digitals and high technology, the human society has undergone great revolutions and developments in the information and communication technology (ICT) which have substantially influenced the lifestyle and interaction of humans. With the advent of the Internet in the 1990s and the use of this technology by organizations and higher-education and academic institutions around the world, the new e-learning paradigm came into existence. The development of ICT, application of networks, and expansion of the global village has largely transformed learning and teaching. E-learning refers to the use of ICTs such as the Internet and multimedia systems which creates tools to improve the quality of learning by offering facilities for an easy access to resources and educational services and providing mechanisms to provide, support, and optimize the teaching, learning, assessment, and evaluation of the e-learning environment, distinguished from the traditional learning environments (Clark and Mayer, 2016).

Electronic communication technologies with various textual, visual, and audio formats, have the ability to expand interactions within the boundaries of time and place and change the structure of teaching and learning. Application of ICT is a necessity to create a network community which has formed virtual collections

since the past decade (Paulin, 2016). The network community aims to introduce the comprehensiveness, complexity, and development of technology to the educational system and take advantage of technology in the best way possible to improve the quality of teaching and learning. ICT removes old barriers and boundaries and makes new links in the emergence of the global village. It has also been the key factor for the progress of individuals, communities, and nations. Therefore, the world of trade, commerce, education, and all the spheres of economy and social activities are moving towards the policy of globalization (Fallon and Brown, 2016).

E-learning is perhaps one of the widely used terms which have entered the field of education in Iran along with the term "information technology." Many educational centers and especially universities in Iran have included this type of education in their long-term plans and heavily invest in it. However, it should be taken into account that such criteria alone are not enough, because what increases the understanding of education industries and helps them in decision-making is the evaluation of advantages and shortcomings of these instruments and comparison of their capabilities and shortcomings through the feasibility assessment of e-learning in universities and educational centers (Walkington, 2013).

Virtual education refers to an environment which provides e-learning services using appropriate multimedia tools and suitable communication infrastructure (computers, networks, the internet, fax, cameras, software facilitating online communication, etc.,) in a way that usually there is no need for a physical location and one can enjoy many services provided such as electronic lessons and evaluation in every place and at any time. In fact, e-learning is an independent system to provide electronic services using new ICT technologies. By utilizing the potentials and facilities offered by the Internet and multimedia tools and technologies, this system aims to raise the level of culture in societies. In this system, instructors are provided with a tool through which they can electronically present their knowledge and information in the form of multimedia contents at the lowest cost. Additionally, the process of training and evaluation has been predicted in this system and education management can be implemented via the Internet. The format known as virtual or electronic lesson can be provided for the learners either synchronously or asynchronously. With the capability of holding virtual classes, such a system enables individuals to attend to the synchronous learning process in an interactive and cooperative environment. Moreover, taking advantage of a digital library, the system supplies the learners and instructors with rich scientific resources in order to enrich the learning process (Heredia and Cantu, 2016).

In a study titled "feasibility study of implementing virtual learning courses in the Islamic Azad University of Khorasgan," Afyooni et al. (2013) reported that faculty members of this university believed that the feasibility of implementing these courses is significantly above average in all four dimensions. Based on demographic characteristics (sex, age, education department, and work experience), there was no significant difference between the respondents' mean views and comments. Their findings indicated that the Islamic Azad University of Khorasgan is capable of holding virtual learning courses, but the existing shortcomings should be eliminated to prevent problems during implementation.

In a study titled "measuring e-learning in higher education," after reviewing the proposed models for e-learning readiness, Tarvid (2008), proposed a comprehensive model which involved the dimensions of e-learning and can be applied to all higher education institutions. He tested this model on three higher education institutions in Latvia, the Faculty of Economics in the University of Stockholm, and the Transport Institute and the Institute of Commerce in Sweden. Results suggested that the developed model possesses an acceptable fit and its dimensions can be easily measured.

Neoka and Woet (2011), in a study titled "the capabilities and capacities of teachers and students, understanding of and access to e-learning technology: The concept of implementation of e-learning at the University of Tanzania," showed that, despite limited access to technologies, instructors and students have positive impressions about the use of e-learning technologies for distance education and supporting the students, and the capabilities and potentials of the base computer and practical applications on the Internet. It has been argued that challenges related to the limited bandwidth of and access to the Internet as well as the experiences and motivations of teachers to use e-learning technology should be considered in decision-making about the use of technology.

In Iran, much effort has been made in the field of e-learning. The expansion of activities related to e-learning in higher education in Iran has been substantial in recent years, as the development of e-learning is considered a necessary and basic condition for realizing the objectives of the Fifth Development Plan. Given the sensitive and critical nature of areas of work covered by medical universities, e-learning in these universities is much behind and younger than universities affiliated with the Ministry of Science, Research, and Technology, resulting in offering a limited number of master majors (mainly theoretical ones) in the form of virtual training (Kazempour and Ghaffari, 2011). The present study aims to identify and prioritize organizational factors affecting the deployment of e-learning in the Islamic Azad University of Medical Sciences, Tehran.

2. CONCEPTUAL MODEL OF RESEARCH

In order to identify the organizational factors affecting the feasibility assessment of deploying e-learning in the Islamic Azad University of Medical Sciences, Tehran, it was necessary to first extract and review the parameters of readiness and virtual learning patterns considering different models of e-learning readiness. Based on these models and patterns, the following dimensions were identified:

1. Technological infrastructure: In this research, technological infrastructure refers to telecommunications infrastructure such as optic fiber, satellite receivers, Internet networks, and Internet service providers which are a prerequisite for e-learning.
2. Economic infrastructure: This means the expansion of the students' choices of subject, instructor, media, price, speed, learning style, etc.

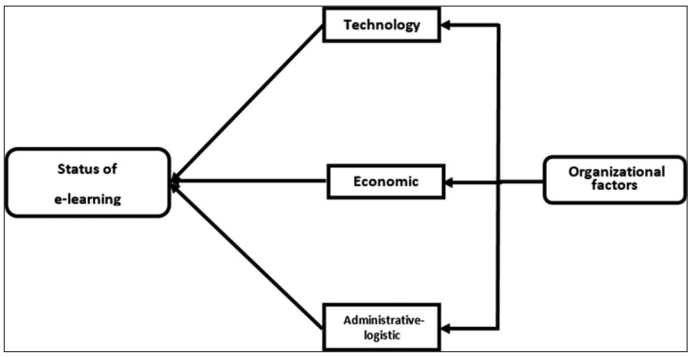
3. Administrative-logistic infrastructure: This refers to an electronic and paperless administrative system; organizational, educational, and technical logistic systems for the students, instructors, and the staff; and accessibility to digital resources and services (Figure 1).

3. METHODOLOGY

This research is an exploratory mixed methods study which utilizes a combination of qualitative (including exploratory interviews to extract components and research measures) and quantitative (to confirm the measurement models and test the conceptual model) methods. Figure 2 depicts the steps of a mixed methods research with an exploratory approach.

The statistical population included faculty members of the Islamic Azad University of Medical Sciences, Tehran, who were implementing the e-learning project while studying, teaching, or managing in this university in the 1st semester of the academic year 2015-2016. In the qualitative section, the statistical population included all the scholars and experts in the field of e-learning, some of whom were selected as the sample based on purposive snowball sampling method until reaching theoretical saturation. Although this was achieved by the 15th interview, the author continued until the twentieth interview for further caution.

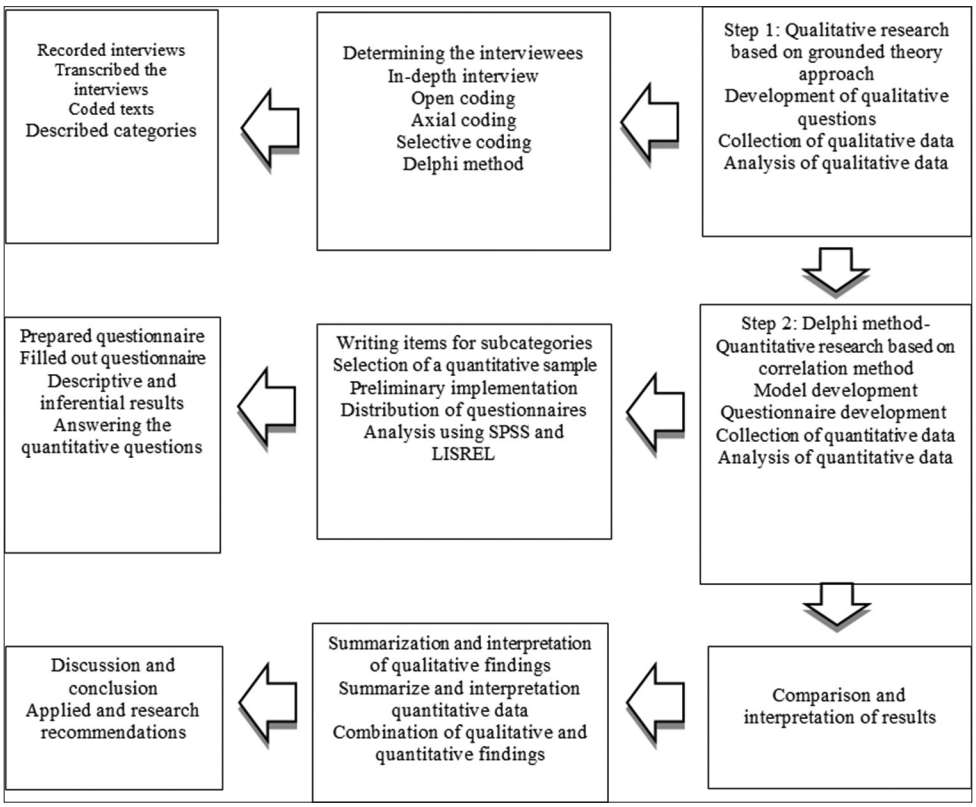
Figure 1: Conceptual model of research



4. FINDINGS

The data were analyzed through the coding process based on the systematic design of grounded theory. In open coding, the transcribed content of interviews was marked using *in-vivo* codes and repeated ideas were identified. At the end of this step, a great amount of information gained from interviews was summarized into concepts and categories that were similar in these questions. Open coding brought themes and concepts extracted from the primary research question, themes in the literature, and terms used in interviews, to the surface from the depth of data. In axial coding, out of the codes obtained from open coding, those that seemed to be used further in later stages were selected. In fact, this step refines, separates, integrates, and regulates the themes obtained from open coding. The main purpose of this step is to reduce the initial set of codes to an explanatory framework of high-level categories. This was done by either relating the categories to each other in any possible way or breaking them into more manageable units. In addition, similar themes obtained in all research questions (Table 1) were given titles in this step. The selection of a name for each category was based on common and similar themes which had

Figure 2: Research process based on the exploratory mixed methods design



been obtained from open coding, i.e., the title of a category makes a link or connection between themes that are interrelated or similar. Finally, 3 categories were selected as the final major categories, including technical-technological, economic, and administrative-logistic factors. For example, the economic category involves items such as the allocation of funds, provision of facilities for human resources, and equipment of the university.

The type of relationship between extracted factors for the feasibility assessment of deploying e-learning based on selective coding was presented in the form of theoretical propositions. Therefore, based on the qualitative phase of model development, the conceptual model of research which describes the relationship between the criteria for the feasibility assessment of deploying e-learning was proposed (Figure 3). Based on the conceptual model of research, the feasibility assessment of deploying e-learning in the Islamic Azad University of Medical Sciences, Tehran, included technical-technological, economic, and administrative-logistic factors.

4.1. Confirmatory Factor Analysis of Research Data

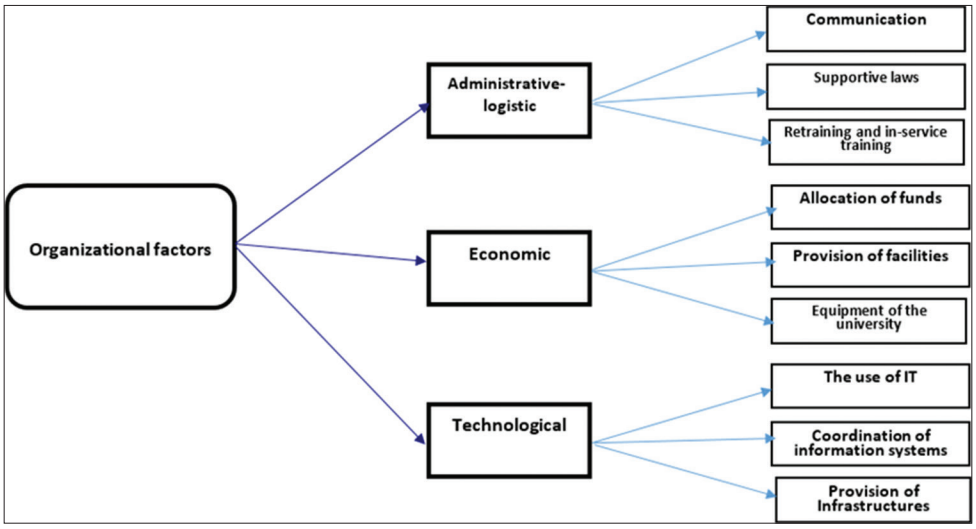
Confirmatory factor analysis is used when the researcher has a great knowledge of the underlying latent construct. Based on the

Table 1: Output of encoding the levels and factors affecting the deployment of e-learning

Major categories	Subcategories	Themes extracted from interviews
Technical and technological factors	Application of IT	Investigating the state-of-the-art technologies in ICT in the world and updating the visions and goals (interviews 1, 3, 6, 7, 15) using electronic devices (interviews 1, 3, 5, 7, 10, 14, 15)
	Coordination of information systems	Developing standards related to ICT (interviews 1, 3, 5, 6, 11, 13, 14) providing a comprehensive database of technical information related to ICT (interviews 1, 2, 3, 7, 10, 11, 13, 15)
	Provision of hardware infrastructure	Availability of computer networks in the university (interviews 1, 2, 3, 4, 10, 12, 13) availability of a sufficient number of computers (Interviews 3, 5, 8, 10, 11, 12) classrooms equipped with educational technology (interviews 1, 3, 5, 8, 10, 12, 15)
Economic factors	Allocation of funds	Allocation of budget to buy broadband Internet (interviews 1, 2, 5, 8, 9, 12, 15) allocation of budget to educate students in the virtual learning system (interviews 2, 3, 5, 8, 10, 12, 13)
	Provision of facilities for human resources	Providing the necessary funding for students to purchase laptops (interviews 2, 4, 8, 10, 12, 13) accessibility of students to computers and the Internet in the university (interviews 1, 3, 5, 8, 10, 12, 15)
	Equipment of the university	Possibility of establishing a digital library in the university and its accessibility (interviews 1, 3, 6, 7, 10, 11, 13) providing the necessary facilities for the students to use the electronic content (interviews 2, 5, 9, 10, 12, 14)
Administrative-logistic factors	Communication	Informing the students about the rules and regulations of virtual courses (interviews 1, 3, 4, 7, 10, 12, 14)
	Supportive laws	Solving the problem of staff desertion to participate in off-campus schools (interviews 1, 2, 5, 7, 10, 12, 13) development of clear regulations for electronic affairs (interviews 1, 2, 5, 7, 10, 14, 15) providing e-learning retraining courses for the instructors (interviews 1, 2, 5, 8, 10, 11, 13)
	Retraining and in-service training	Holding workshops and training courses for the staff and instructors to learn more about virtual education (interviews 1, 2, 5, 7, 10, 13, 15) providing conditions and facilities for the establishment of a virtual in-service training system for the staff and instructors (interviews 1, 3, 5, 8, 10, 12, 15)

ICT: Information and communication technology

Figure 3: Conceptual model of research



theoretical knowledge, empirical research, and previous studies, the researcher postulates that there is a relationship between the observed variables and fundamental factors and then tests this hypothesis. In confirmatory factor analysis, the researcher aims to develop a model that is assumed to describe or explain the experimental data based on a relatively small number of parameters. The research model is also based on pre-experimental information about the structure of data. This model can be based on a theory or hypothesis, a specified classification scheme for items or sub-tests, specified experimental conditions, or the knowledge gained from previous studies on large data (Houman, 2008). After specifying the pre-experimental factors, confirmatory factor analysis tests the optimal adjustment of observed and theoretical factor structures to the set of data by determining the fit of the preset factor model (Houman, 2008).

4.2. Second-order Confirmatory Factor Analysis for the Technological Dimension

One of the features of LISREL is the analysis of models with second-order factors. Second-order factor models are defined as models in which latent factors, measured by observed variables, are themselves influenced by a more fundamental variable or, in other words, a latent variable at a higher level (Syedabbasizadeh et al., 2012). Since the technological dimension in this study involves three components which can serve as the indicators of this construct, the second-order confirmatory factor analysis was performed in order to test the measurement model and the validity of the structural components of the technological dimension of the feasibility assessment.

The Figure 4 indicates the suitability of factor loadings of markers (items) related to each component in the prediction of the capacities of the technological dimension and the suitability of the factor loading of each component as the marker of the technological dimension of the feasibility assessment of e-learning deployment in the predicting this variable. T coefficients between ±1.96 and ±2.58 are significant at the level of 0.05, and T coefficients above ±2.58 are significant at the level of 0.01. As can be observed in Figure 4, T coefficients for all factors are above 2.58. This suggests that all factors, at the significance level of 0.01, affect the technological dimension of the feasibility assessment for deploying e-learning. Table 2 shows the fit indicators of the measurement model.

According to Table 2, the fit indicators of the measurement model show that the research model has a very good level of fit.

4.3. Second-order Confirmatory Factor Analysis for the Administrative-logistic Dimension

Since the administrative-logistic dimension in this study involves two components which can serve as the indicators of this construct, the second-order confirmatory factor analysis was performed in order to test the measurement model and the validity of the structural components of the administrative-logistic dimension.

Figure 5 indicates the suitability of factor loadings of markers (items) related to each component in the prediction of the capacities of the administrative-logistic dimension and the suitability of the factor loading of each component as the marker of the administrative-logistic dimension of the feasibility assessment of e-learning deployment in predicting this variable. Factor loadings and the T coefficients of components are reported in Figure 5 according to which the T coefficients for all factors are above 2.58. This suggests that all factors, at the significance level of 0.01, affect the administrative-logistic dimension of the feasibility assessment for deploying e-learning. Table 3 shows the fit indicators of the measurement model related to the administrative-logistic dimension.

Table 2: General fit indicators of the tested model for the technological dimension

Indicator	Estimate
Ratio of Chi-square to the degree of freedom (χ^2/df)	1.4
RMSEA	0.03
GFI	0.9
AGFI	0.9
CFI	0.9
NFI	0.9

RMSEA: Root mean square error of approximation, GFI: Goodness of fit index, AGFI: Adjusted goodness of fit index, CFI: Comparative fit index, NFI: Normed fir index

Figure 4: T coefficients obtained from the second-order confirmatory factor analysis for the technological dimension

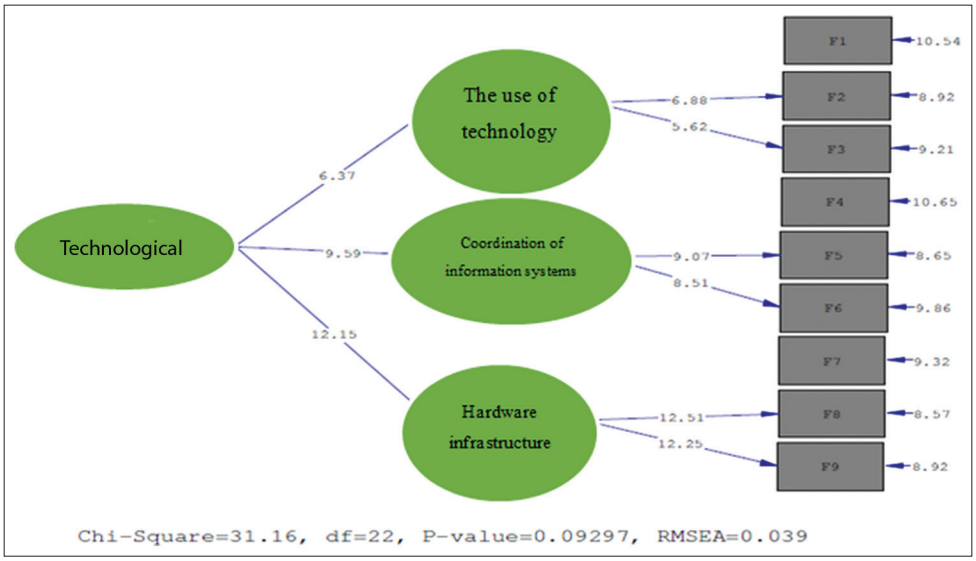
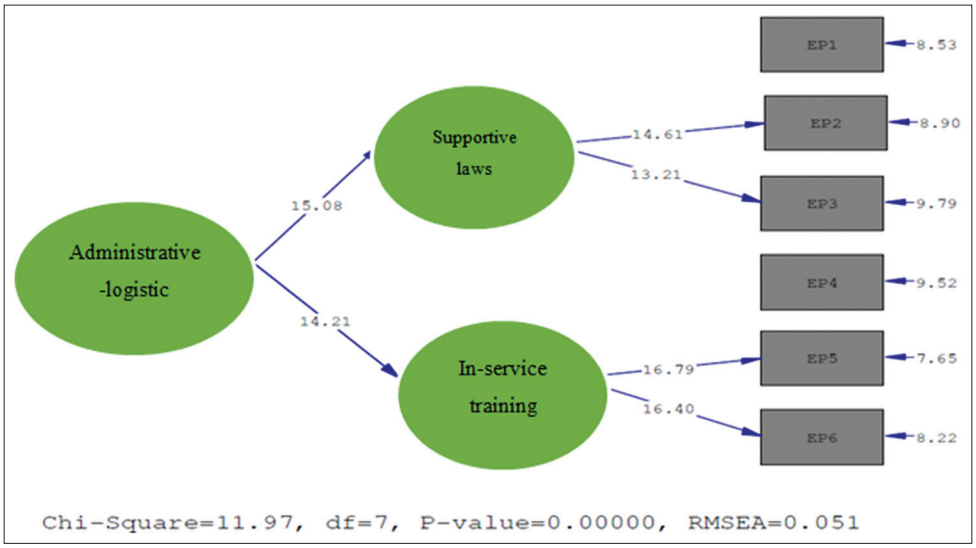


Figure 5: T coefficients obtained from the second-order confirmatory factor analysis for the administrative-logistic dimension



According to Table 3, fit indicators of the measurement model show that the research model has a very good level of fit.

4.4. Second-order Confirmatory Factor Analysis for the Economic Dimension

Since the economic dimension in this study involves two components which can serve as the indicators of this construct, the second-order confirmatory factor analysis was performed in order to test the measurement model and the validity of the structural components of the economic dimension.

Figure 6 indicates the suitability of factor loadings of markers (items) related to each component in the prediction of the capacities of the economic dimension and the suitability of the factor loading of each component as the marker of the economic dimension of the feasibility assessment of e-learning deployment in predicting this variable. Factor loadings and the T coefficients of components are reported in Figure 5 according to which the T coefficients for all factors are above 2.58. This suggests that all factors, at the significance level of 0.01, affect the economic dimension of the feasibility assessment for deploying e-learning. Table 4 shows the fit indicators of the measurement model related to the economic dimension.

According to Table 4, fit indicators of the measurement model show that the research model has a very good level of fit.

4.5. Evaluation of the Status of Feasibility Assessment Components for the Deployment of E-learning

In order to assess the status of feasibility components of e-learning deployment, the population mean comparison test or student t-test was used. According to statistical concepts, the information required for the test is as follows:

1. The number of samples is 269, so the degree of freedom is equal to 268.
2. Since test items have five choices, the assessment of hypotheses was done on the basis of 3.
3. Considering this information, the test statistic should be determined. If the test statistic is greater than the critical point, H_0 is rejected and the alternative hypothesis is confirmed at the confidence level of 95%.

H_0: $\mu \leq 3$
H_0: $\mu > 3$

Table 3: The fit indicators of the tested model for the administrative-logistic dimension

Indicator	Estimate
Ratio of Chi-square to the degree of freedom (χ^2/df)	1.71
RMSEA	0.051
GFI	0.94
AGFI	0.92
CFI	0.99
NFI	0.97

RMSEA: Root mean square error of approximation, GFI: Goodness of fit index, AGFI: Adjusted goodness of fit index, CFI: Comparative fit index, NFI: Normed fir index

Table 4: The fit indicators of the tested model for the economic dimension

Indicator	Estimate
Ratio of Chi-square to the degree of freedom (χ^2/df)	1.89
RMSEA	0.058
GFI	0.96
AGFI	0.94
CFI	0.98
NFI	0.97

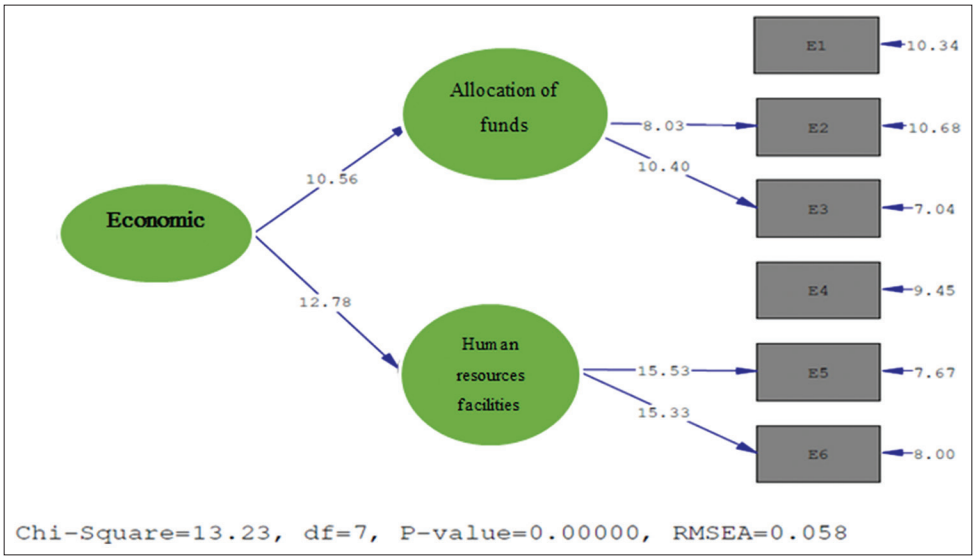
RMSEA: Root mean square error of approximation, GFI: Goodness of fit index, AGFI: Adjusted goodness of fit index, CFI: Comparative fit index, NFI: Normed fir index

5. TECHNOLOGICAL DIMENSION

To evaluate the status of the technological dimension of the feasibility assessment of e-learning deployment, mean, univariate t-test, and significance level are presented in Tables 5 and 6 and explained and interpreted below.

According to Table 6, the t-statistic of the technological dimension of the feasibility assessment of e-learning deployment (6.656) is significant and positive at the level of 0.001. In other words, this

Figure 6: T coefficients obtained from second-order confirmatory factor analysis for the economic dimension



dimension has an appropriate status and is significantly above the average.

6. ADMINISTRATIVE-LOGISTIC DIMENSION

To evaluate the status of the administrative-logistic dimension of the feasibility assessment of e-learning deployment, mean, univariate t-test, and significance level are presented in Tables 7 and 8 and explained and interpreted below.

According to Table 8, the t-statistic of the administrative-logistic dimension of the feasibility assessment of e-learning deployment (−0.339) is not significant. In other words, this dimension does not have an appropriate status.

Table 5: Descriptive indicators related to the technological dimension of the feasibility assessment of e-learning deployment

Mean	Standard deviation	Standard error of mean
3.3	0. 74	0.04

Table 6: Univariate t-test for evaluating the status of the technological dimension of the feasibility assessment of e-learning deployment

Mean difference	Level of significance	Degree of freedom	t-statistic
0.3	0.001	268	6.656

Table 7: Descriptive indicators related to the administrative-logistic dimension of the feasibility assessment of e-learning deployment

Mean	Standard deviation	Standard error of mean
2.98	0.95	0.06

7. ECONOMIC DIMENSION

To evaluate the status of the economic dimension of the feasibility assessment of e-learning deployment, mean, univariate t-test, and significance level are presented in Tables 9 and 10 and explained and interpreted below.

According to Table 10, the t-statistic of the economic dimension of the feasibility assessment of e-learning deployment (0.685) is not significant. In other words, this dimension does not have an appropriate status.

8. DISCUSSION AND CONCLUSION

E-learning can make it possible for university students to use new knowledge, and medical faculties are based on the use of

Table 8: Univariate t-test for evaluating the status of the administrative-logistic dimension of the feasibility assessment of e-learning deployment

Mean difference	Level of significance	Degree of freedom	t-statistic
−0.019	0.735	268	−0.339

Table 9: Descriptive indicators related to the economic dimension of the feasibility assessment of e-learning deployment

Mean	Standard deviation	Standard error of mean
3.04	0.9	0.05

Table 10: Univariate t-test for evaluating the status of the economic dimension of the feasibility assessment of e-learning deployment

Mean difference	Level of significance	Degree of freedom	t-statistic
0.04	0.494	268	0.685

such skills and knowledge. This is of great significance because the information society has predisposed medical knowledge to continuous change, as on average 50% and 75% of medical knowledge become obsolete every 4-5 and 8-10 years, respectively. Naturally, the knowledge and competencies acquired at the end of an academic course of medical training may not be enough for the future. Since the impact of e-learning technology development on the field of medicine has been dramatic, it is of great importance to study the dimensions of this impact.

The medical education process is influenced by several variables such as students, teachers, education environment, teaching methods, educational resources, and the growing trend of educational technologies and e-learning. The timely response to the increasing changes in new technologies as well as the guidance and management of training programs in the age of information and communication can keep learners up-to-date and increase the level of health in the society by educating skilled physicians.

The study findings indicate that the status of the technological dimension of the feasibility assessment of e-learning deployment is significant and positive at the level of 0.001. In other words, this dimension has an appropriate status and is significantly above the average. This finding suggests that the technological infrastructure is adequately provided for the deployment of e-learning system in the Islamic Azad University of Medical Sciences, Tehran. This means that there are enough computer sets, a website with the capability of content management, appropriate e-learning infrastructure systems, broadband Internet connection, classrooms equipped with video projectors and other playback facilities, appropriate equipment for the contact between students and instructors, possibility of task assignment by instructors over the Internet, and the possibility of holding extra classes by the instructors over the Internet. Therefore, to deploy e-learning system in this university, it is necessary to develop IT skills, expand IT infrastructure both quantitatively and qualitatively, and strengthen the infrastructure of the Internet network.

In addition, the status of the administrative-logistic dimension of the feasibility assessment of e-learning deployment is not significant. In other words, this dimension does not have an appropriate status. This indicates that the administrative-logistic infrastructure required for the deployment of e-learning system is not provided in this university. This means that there are not enough facilities and infrastructure in the Islamic Azad University of Medical Sciences, Tehran, for holding workshops and training courses on virtual education for the staff and faculty members, deployment of a virtual in-service training system for the staff and faculty members, development of certain rules for the electronic conduct of affairs, development of a system for the continuous evaluation of virtual training success, or the provision of opportunities for training advanced computer skills to virtual education administrators. Moreover, results showed that the status of the economic dimension of the feasibility assessment of e-learning deployment is not significant. In other words, this dimension does not have an appropriate status. This indicates that the economic infrastructure is not provided for the deployment of e-learning system in the Islamic Azad University of Medical Sciences, Tehran. Therefore, it can be stated that this university cannot afford sufficient funds to pay the logistic and technical staff, purchase broadband Internet, train the students in the virtual learning system, or provide the necessary facilities to purchase e-learning system software. In addition, the students of this university are supplied with facilities necessary for having computers and the Internet or purchasing laptops. Hence, the Islamic Azad University of Medical Sciences, Tehran, should be appropriately funded to achieve a high level of preparation for the deployment of e-learning system. The results of this study are consistent with the findings of Afyooni et al. (2013), Govender and Maharaj (2007), Lopes (2007), Ure Beck (2011), Clark and Mayer (2011), Walkington (2013), and Buchanan et al. (2013). Based on the study findings, the following recommendations are proposed:

1. Given the high potency of some of the medical universities of Iran in the field of basic sciences, it is recommended that the university students be provided with online training packages. Holding joint courses with prestigious universities can create valuable opportunities in this regard. In addition, virtual classes can help students of other universities, especially small ones, to experience the culture of e-learning promotion by improving the quality of education.
2. Financing the required funds for deployment of e-learning system in Islamic Azad University of Medical Sciences, Tehran.
3. Developing and updating a separate educational website in each organization and equipping all the units with broadband Internet or Intranet in order to make it possible for the staff, students, and teachers to exchange information and knowledge with one another.
4. Offering courses with the largest audience in the electronic form (e.g. ICDL) as a pilot for one of the organization units and then extracting feedback and analyzing the results in order to solve problems and cases that are likely to cause discontent. Then, other courses can be held publicly for a larger audience.
5. Based on the study findings, the use of educational technologies alone does not make for an optimal e-learning system. Therefore, it is necessary that educational authorities conduct principled and accurate needs assessments in order to develop training courses in accordance with the needs of learners. In addition, they can design a high-quality course with the help of instructional design teams such as course instructors, instructional designers, software specialists, network administrators, psychologists, and sociologists.

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