revista
tempos e espacos
em educacão

Rev. Tempos Espaços Educ. v.13, n. 32, e-14674, jan./dez.2020
Doi: http://dx.doi.org/10.20952/revtee.v13i32.14674

DESIGNING AND WRITING AN EFFECTIVE E-LEARNING MODEL(MINISTRY OF EDUCATION)

DESENHAR E ESCREVER UM MODELO E-LEARNING EFICAZ (MINISTÉRIO DA EDUCAÇÃO)

DISEÑAR Y ESCRIBIR UN MODELO DE APRENDIZAJE ELECTRÓNICO EFECTIVO (MINISTERIO DE EDUCACIÓN)

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Abstract: The purpose of this paper is to develop an effective e-learning model for descriptive-survey research of a practical type. The statistical population of this study is two groups. The first group consists of subject specialists and professors in the field of education and e-learning. In order to validate the initial framework and respond to the survey form, this study is conducted in this research. The sampling in this group is non-randomly targeted and based on the criteria. Is. The second group is all staff and managers with a total population of 12400, according to the chart number 375 as a result of the research. SPSS and Expert selection software have been used and analysis of data shows that individual characteristics include factors, individual characteristics, individual perceptions, individual skills, tolerance of ambiguity and risk, technical skills, proper character and culture. Organizational features include management support, social impacts, organizational leadership, organizational learning strategies, flexible organizational structure, organizational agility, financial management and appropriate funding, performance management structures, organizational learning and service quality management. . In the infrastructure features, including understanding the usefulness, understanding the ease of use, the IT infrastructure and Communication, required hardware, applications, information infrastructure, infrastructure and infrastructure responsiveness and customer relationship management, content production and infrastructure consistent with my country.

Key words: E-learning. Individual characteristics. Organizational characteristics. Infrastructure.

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Resumo: O objetivo deste artigo é desenvolver um modelo de e-learning eficaz para pesquisas descritivas de tipo prático. A população estatística deste estudo é de dois grupos. O primeiro grupo é composto por especialistas em disciplinas e professores da área de educação e e-learning. A fim de validar o quadro inicial e responder ao formulário de pesquisa, este estudo é realizado nesta pesquisa. A amostragem neste grupo é direcionada não aleatoriamente e com base nos critérios. É. O segundo grupo é formado por todos os funcionários e gestores com uma população total de 12400, de acordo com o gráfico número 375 como resultado da pesquisa. Os softwares de seleção SPSS e Expert foram usados e a análise dos dados mostra que as características individuais incluem fatores, características individuais, percepções individuais, habilidades individuais, tolerância à ambigüidade e risco, habilidades técnicas, caráter e cultura adequados. As características organizacionais incluem suporte de gestão, impactos sociais, liderança organizacional, estratégias de aprendizagem organizacional, estrutura organizacional flexível, agilidade organizacional, gestão financeira e financiamento apropriado, estruturas de gestão de desempenho, aprendizagem organizacional e gestão de qualidade de serviço. . Nos recursos de infraestrutura, incluindo a compreensão da utilidade, compreensão da facilidade de uso, infraestrutura de TI e comunicação, hardware necessário, aplicativos, infraestrutura de informações, capacidade de resposta da infraestrutura e infraestrutura e gerenciamento de relacionamento com o cliente, produção de conteúdo e infraestrutura consistente com meu país

Palavras-chave: E-learning. Características individuais. Características organizacionais. Infraestrutura.

Resumen: El propósito de este artículo es desarrollar un modelo de aprendizaje electrónico eficaz para la investigación de encuestas descriptivas de tipo práctico. La población estadística de este estudio es de dos grupos. El primer grupo está formado por especialistas en la materia y profesores en el campo de la educación y el e-learning. Con el fin de validar el marco inicial y responder al formulario de la encuesta, este estudio se realiza en esta investigación. El muestreo en este grupo no está dirigido al azar y se basa en los criterios. Es. El segundo grupo es todo el personal y gerentes con una población total de 12400, según el cuadro número 375 como resultado de la investigación. Se ha utilizado el software de selección SPSS y Expert y el análisis de los datos muestra que las características individuales incluyen factores, características individuales, percepciones individuales, habilidades individuales, tolerancia a la ambigüedad y al riesgo, habilidades técnicas, carácter y cultura adecuados. Las características organizativas incluyen apoyo a la gestión, impactos sociales, liderazgo organizativo, estrategias de aprendizaje organizativo, estructura organizativa flexible, agilidad organizativa, gestión financiera y financiación adecuada, estructuras de gestión del desempeño, aprendizaje organizativo y gestión de la calidad del servicio. . En las características de la infraestructura, incluida la comprensión de la utilidad, la comprensión de la facilidad de uso, la infraestructura de TI y la comunicación, el hardware requerido, las aplicaciones, la infraestructura de información, la infraestructura y la capacidad de respuesta de la infraestructura y la gestión de la relación con el cliente, la producción de contenido y la infraestructura de acuerdo con mi país.

Palabras clave: E-learning. Características individuales. Características organizacionales. Infraestructura.

1 INTRODUCTION

The process of learning is more complicated than it can be limited to classroom space. In the meantime, the development of the use of technologies has affected education, like many other areas. Educational practices are also rapidly changing and evolving along with important and significant advances in modern technology. Nowadays, the use of modern educational technologies has attracted the attention of many universities, institutes and educational centers. E-learning as one of the new educational methods facilitates education and learning by using computer-based technologies and recently has been widely welcomed in Iran due to its many advantages compared to traditional education. So that it is used in some educational centers along with traditional education and as its complement and in many others as an alternative to traditional education.

Nowadays, e-learning is considered as an important part of training in organizations (Garavan, Carbery, Malle, OíDonnell, 2010, 159). Of course, according to the results of recent studies, the combination of face-to-face learning and e-learning methods provides a more flexible method for learning (Garrison, 2004). This type of learning has increased the ways to learn and teach due to the rapid progress of the Internet (Simonson , Smaldino S, Albright MJ, Zvacek S, 2015, 120).

Learning makes this method as useful and reliable tool for instructors for high quality learning due to its benefits such as its availability everywhere, at any given time Ruiz , Mintzer , Leipzig., 2006, 207).

Meanwhile, it can be defined as follows: “E-learning is an active and intelligent learning method that, while evolving in the process of teaching and learning and knowledge management plays an important role in expanding, deepening and sustaining the culture, and according to the results of reports provided by ICT experts, by 2020, electronic space-based learning would be the most common educational method in the world. Other advantages of implementation of education is motivating employees, having more contact with learners, having more contact with learners and better control of them, providing team works facilities in multimedia and electronic conferences, providing suitable spatial and temporal coverage to respond to the huge flood of learning applicants and numerous other benefits have led to the solving of many current problems, and its implementation, along with organizational learning, will lead to improve the status of the education of the organizational students (Kumrow, 2007, 140).

According to the results of study conducted in 2012, other learning methods such as the use of multimedia, PowerPoint can’t overcome the shortcomings in traditional education. Another study shows that learning provides a new environment for learners and allows them to develop their professional skills and knowledge through this dynamic environment (Chen , Tsai, 2007, p. 68).

About the effectiveness of e-learning in the education system, it can be stated that studies carried out in this regard in recent years have shown that the implementation of e-learning in the educational system of the country has major challenges from different aspects of human and technical and management that ultimately lead to failure to achieve the desired effect. The present study has tried to investigate the similar studies and conduct a study on the study of the effectiveness of e-learning in the Ministry of Education. The main question raised in this research is that “Can the dimensions of effective relationships be identified in the Ministry of Education due to the wide range of e-learning?”

2 THEORETICAL FOUNDATIONS

E-learnin

E-learning is considered as one of the most popular terms that have introduced to the educational field with the word "information technology". Many educational centers, especially universities of countries, have included this type of learning as part of their long-term plans, and mainly make macro investments in this field.

Various definitions have been developed for e-learning since the 1960s and have been used in various fields of business, educational, and military and in different meanings of e-learning. But in a general definition of e-learning, network technology (for example, the Internet) is used for designing, delivering lessons, and implementation of an educational environment for the realization and continuity of learning. The term e-learning was introduced for the first time by Cross which uses Internet and Intranet technologies for learning (Majidi, 1999, 98).

In another definition, virtual education includes a wide range of processes and practices such as Web-based education, computer-based education, virtual classes and digital collaborations, and includes content delivery through the Internet, Intranet, Extranet , Satellite broadcasting, video and audio tapes, satellite broadcasting, interactive television, compact discs.

A new paradigm is created by exploring the virtual education and the ability to learn is provided in any field, for each person, at any time and place. In this environment, student and instructors are separated in terms of time and place or both, and the educational content is presented to the student through the course management software, multimedia resources, Internet and video conferencing, and the student communicates with the instructor, colleagues and other people or resources for performing individual learning activities with the help of computer communication facilities (Fathi Vajargah et al., 2011, 54).

Also, Alexander Ramyzvfsky has presented a definition about electronic learning, which is more comprehensive in terms of other definitions, in his opinion e-learning includes four dimensions. He states that e-learning can be both individual activity and group activity. At the same time, in addition to these two dimensions (ie, individual and group study), e-learning can be implemented in two methods of continuous (synchronous communication at the same time with learning resources and with individuals and in real form) and discrete (asynchronous communication using educational compact discs that have already been prepared or through educational materials that have already been downloaded from the Internet). In fact, e-learning is composed of two broad sets of information technology and education and research (Kamalian and Fazel, 2009, 54).

E-learning is referred to the learning system that the instructor and learner are separated from each other in terms of the physical distance, but they are connected to each other with the help of the tools provided for them (Zolfaghari et al., 2007, 45).

E-learning can be defined as “the remote transfer of information, skills and experiences of the instructor and with the help of software or electronic equipment to learners that these people can benefit from this type of learning anywhere in the world”. Multimedia software packages are considered as one of the e-tools for using information technology for learning purposes. In fact, e-

learning is an innovation in learning. E-learning has proven that can increase leaning up to 25% compared to traditional learning environment.

This learning method removes all the traditional classroom constraints and provides good results, and can lead to effective leaning without spending much cost or leaving work. In fact, e-learning can be considered as a supplement to traditional learning (Baba Tabarardarzi et al., 2012, p. 45).

Remote learning means the use of electronic or print media for laerning, when instructor and learner are separated from each other in terms of time and space (Khodadad Hosseini et al., 2013, 65). Nowadays, virtual learning is defined as the use of advanced computer techniques to transfer material and content to learners and students. The definition mentioned above is essentially the definition of e-learning, but since today predominant form of learning method is computer-based methods, these two terms apply instead of each other and are used in two concepts: general and specific meaning. According to the first concept, any presentation and transfer of knowledge and learning through electronic devices, such as television, radio, the Internet, and according to the second concept, only learning through the Internet and the Web is called virtual and e-learning. This learning method includes a comprehensive collection of applied software and educational tools, including computer-based education, web-based education, virtual courses, and a system or process of training that provides an important part of learning to all people at all times and places without constraint. This method is done by special methods of communication through electronic and technological tools, especially the computer network, and according to the claim of a world-known company, e-learning which is defined as “the transfer of learning materials through a network to the end user”, will form an important part of educational solutions in the future. Virtual learning deals with issues such as the human aspect, roles, norms, ethics, private affairs, and sociological-psychological affairs. On the one hand, technology and its wide range, and lack of supervision and control by technology manufacturers with easy access to it, on the other hand, introduce new topics in this field that have been raised for the first time in traditional and in person learning (Alipour and Shalbaf 2008, 45).

E-learning refers to a set of educational activities that is done using e-tools such as audio, video, computer, network and virtual. In other words, all of the programs that lead to learning through computer networks, especially the Internet, are called e-learning.

The Wikipedia encyclopedia defines e-learning as “A term commonly used for web-based remote learning without face-to-face interaction, but there is no common definition for it”. However, wider definitions are commonly used. For example, some definitions include all types of learning through technology in which technology is used to support the learning process.

Although the education technique is often not part of the definition, but there are other definitions emphasizing this aspect, definitions such as those that address e-learning equipped with digital technology (Kia, 2009, 45). Rosenberg defines e-learning based on three basic criteria: e-learning is a network that is able to publish information; E-learning is distributed through ICT; e-learning develops student-centered activities. E-learning includes the following benefits compared to traditional education: learning at any place and at any time, less costs and time for institutions, student-centered learning, creating an environment for learning through co-operation, creating

association, unrestricted access to e-learning tools, updating knowledge and keeping it in any place (Ghorbani Fard et al., 2012, 15).

It should be noted that the term e-learning has several aspects. In addition, this term is often used instead of other related terms, such as remote learning and e-learning. Also, it seems that the meaning of the term depends on the context in which it is used. In general, the term e-learning includes a wide range of applications and functions, including web-based learning, computer-based education, virtual classrooms and e-collaboration, and the Internet, intranet, extranet, satellite broadcast, video or audio tapes, television and interactive, and compact discs are considered as the tools of this learning method (Kia, 2009, 25).

3 BACKGROUND RESEARCH

Both internal studies and external studies related to research variables have been studied in order to investigate the research background. It has tried to summarize the subject, objective, and outcome of the research.

NosGUARD and Angren (2015) during a study entitled “The Model of Key Factors Affecting the Effectiveness of E-Learning” have examined the effective factors on the effectiveness of holding e-learning courses. In this model, the interactions aspects have been mentioned and, on the other hand, operational functions published are discussed. Al-Rahmi et al. (2015) during ther study have concluded that the necessity of using these technologies in the field of pre-university education is of utmost importance due to the scope of using electronic services at various levels, especially in the field related to education. Hamd et al. (2015) during a study entitled “Evaluation Model of the Effectiveness of E-Learning” have concluded that evaluates the effectiveness of e-learning. In this study, researchers have investigated the effective factors on e-learning in different dimensions. This study has focused on the quality aspects of learning courses. FAO (2014) during a study entitled “Effectiveness Model of Decision Making on Messages sent on e-learning”, has concluded that the FAO has been working on in developing agricultural activities and developing public education to use e-learning tools in this field. This model has developed a guide for the design and development of e-learning in this industry. Luo et al. (2014) during a study have concluded that the effective factors should be identified in two levels of individual and organizational in order to measure the effectiveness of e-learning, because both the software and the hardware dimensions should be analyzed well. Amao (2013) during a study entitled “the Effectiveness model of e-learning adaptability has stated that the researcher in this study investigates the effectiveness of e-learning adaptability in university systems. In this study, it has been stated that e-learning in the first step needs to be adapted to social needs and individual characteristics that the success of the organization in the correct adaptability can ultimately lead to successful implementation of e-learning.

Different studies have investigated and modeled e-learning. Some of the most important studies in this field are presented in this section. Arian Mehr (2016) during a study showed that the scores were higher than theoretical average, so e-learning was at the optimum level and had a positive effectiveness. Bazrafshan (2016) during a study concluded that an accurate understanding of the impact of information and communication technology on higher education as well as

knowledge and recognition of learning-learning processes is necessary for planning in the field of the design and implementation of a sustainable and effective electronic system.

Different e-learning models have been presented according to the experiences and studies conducted in this field. These models seek to develop frameworks to consider learners' concerns and the challenges of using technology in learning to provide e-learning education and e-learning. Hadawand et al. (2013) during a study concluded that in the most important variable affecting e-learning from the perspective of employee, belief in continuous education is considered as the least important variable for providing educational certificates. Management support of e-learning and easy use of courses had the highest load factor (0.967) and attention to the characteristics of organization and staff in developing courses had the lowest load factor (0.504).

In general, the four main factors explained a total of 69.92% of the total variance. Conclusion: Individual, occupational, organizational and educational factors have a significant effect on e-learning. Kheir Andish (2014) identified five groups of key factors affecting the effectiveness of e-learning, including factors related to the university (educational institution which holds the courses), student characteristics, teacher characteristics, educational factors and environmental factors. Also, according to the results of the study, the factor of learning and the related factor of the university have the highest and the least impact on the effectiveness of e-learning. Hosseini Nasab and Hosseini (2013) during a study concluded that e-learning affects students' skills in locating the required information and evaluating their information and resources. Hossein Zadeh and Zanganeh (2013) during a study concluded that among the dimensions of the e-learning system under study, the content of the course and self-assessment of learners had the highest effectiveness, while technology and system support services need to be improved.

The effectiveness of the whole system can be improved by taking measures such as improving the quality of technical support and providing facilities for the online presence of the instructor. Afzal Khani et al. (2010) during a study showed that establishing a virtual learning system in the secondary schools of Semnan province is possible in terms of hardware infrastructure.

In terms of software infrastructure, establishing a virtual learning system is possible at a moderate to high level, and in terms of electronic content, virtual lessons and expert human resources, and moderation measures, it is possible at the moderate level. Establishment of virtual learning is not possible in terms of financial resources and support. Kamalian et al. (2009) during a study showed that students of Sistan and Baluchestan University are relatively ready for participation in e-learning. In addition, according to the results of inferential analysis of data, a significant difference is observed between students of faculty of geography and education and students of faculty of management and accounting in terms of readiness to participate in e-learning. However, no significant difference was observed in other research questions. Mohammadi and Rezaei (2005) during a study entitled “Evaluating the Effectiveness of E-Learning Systems” showed that among the dimensions of the e-learning system under study, the highest effectiveness is related to the content of the course and self-assessment of the learners, while the technology and support services of the system need to be improved.

Measures such as improving the quality of technical support and providing facilities for the online presence of the instructor can improve the effectiveness of the whole system.

Development of hypotheses and conceptual model

Designing and explaining the pattern of e-learning effectiveness in education follows the following goals in line with this goal:

Identification of Dimensions and Indicators on the Effectiveness of E-Learning in Education in Individual layer;

Identification of Dimensions and Indicators on the Effectiveness of E-Learning in Education in the Organizational Layer;

Identification of Dimensions and Indicators on Effectiveness of E-Learning in Education on the Infrastructure Layer;

Figure 1, shows the conceptual model of this study according to the research background. In this model, the levels of effective factors on the effectiveness of e-learning are defined at the individual, organizational and infrastructure level. This model is presented initially and the final model is provided after identifying the factors using the views of the experts:

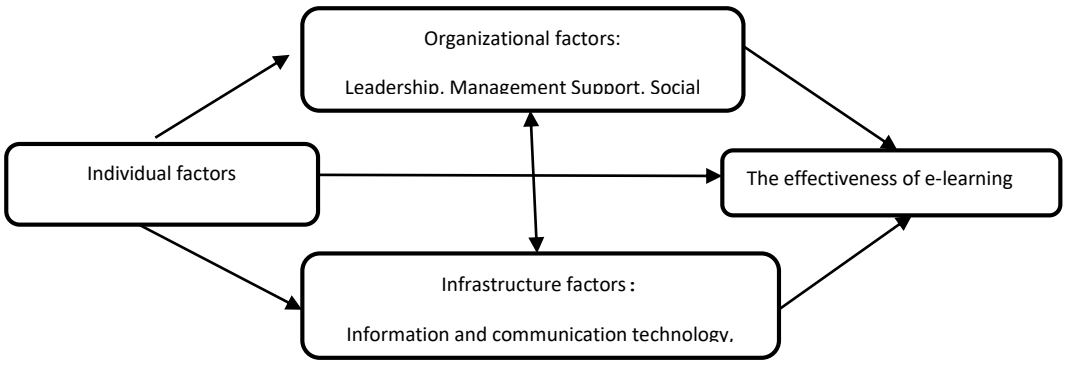

Figure 1- Theoretical model of the research

4 METHODOLOGY

This study is descriptive in terms of data collection method and in terms of objective, it is considered as an applied study, because develops the practical application on e-learning among variables. The research method is also a survey because it describes the status of the variables and the relationships between them. SPSS software and expert choice is used for analysis of data.

The use of questionnaire is considered as one of the common methods for data collection in survey research. Given that how the measurement of the research variables is determined. The use of questionnaire was considered as the best method for data collection in this study. The questionnaire of this study consists of three steps, with a 5-point Likert spectrum that has a completely disagree spectrum to completely agree.

The statistical population of this study includes two groups. The first group consists of subject specialists and experienced professors in the field of education and e-learning who are present in

this study in order to validate the initial framework and respond to the survey form. The non-random purposive sampling method based on the criteria, is used in this study. Twelve professors with a Ph.D. degree in Physical Education with a history of attending and teaching in e-learning with articles and researches registered in this field were present in this study. The second group includes all staff and managers with a total population of 12400, which 375 people are considered as sample according to the Morgan table.

Validity and reliability of the tool

All stages related to validity and reliability, were done completely in order to investigate the accuracy of the measurement tool. In order to investigate the validity of the questionnaire, all questions were first extracted from valid sources. Then, probabilistic problems were investigated after doing the pretest. Then, the measurement tool was provided by several experts for further investigation. Finally, Cronbach's alpha was used to examine the structural validity.

The Cronbach's alpha coefficient, which is the most commonly used internal consistency test for multivariable scales was used to evaluate the reliability of the measurement tool. The value of this coefficient for the research components is listed in table 3, while Table 4 shows the Cronbach alpha coefficient after performing the process of factor analysis and removing the items with values lower than allowed value. Cranbach's alpha higher than 0.6 is considered as the accepted number in tool reliability.

5 DATA ANALYSIS

In the present study, the first step is the defuzzification process. The research questionnaire was designed aimed to obtain opinions of experts about their agreement with the components and criteria of the model. The present study has tried to select these numbers equally and all individuals have been selected from the independent branches. Given that different characteristics of individuals have a significant effect on their mental representations of qualitative variables, therefore, by defining the scope of qualitative variables, the experts answered the questions with the same mindset. These variables are defined according to Table 1 in the form of triangular fuzzy numbers[2].

Table 1- Triangular Fuzzy Numbers of Verbal Variables

Verbal variables	Triangular fuzzy numbers	Crisped fuzzy numbers
I completely agree	(0 , 0.25 , 1)	(0.9375)
I agree	(0.15 , 0.15 , 0.75)	(0.75)
I have no idea	(0.25 , 0.25 , 0.5)	(0.5)
I disagree	(0.15 , 0.15 , 0.25)	(0.25)
I completely disagree	(0.25 , 0 , 0)	(0.0625)

[2] Triangular fuzzy number has been applied in many fields such as risk analysis, decision-making, and evaluation.

The defuzzification method attempts to convert the 5-point Likert Spectrum Criteria into fuzzy numbers and to be presented as triangular. Then, these numbers are then converted into a crisp fuzzy number by the **Minosky's** formula, which is used to evaluate the opinions of the experts.

Table 2- Calculation of average defuzzification of the response of experts from the first questionnaire

Factor	m	A	β	Average defuzzification
Individual features	0.89	0.21	0.07	0.85
Individual perceptions	0.83	0.20	0.10	0.80
Individual skills	0.80	0.23	0.11	0.77

Factor	M	A	β	Average de-defuzzification
Tolerance of ambiguity and risk	0.76	0.23	0.13	0.74
Technical skills	0.85	0.21	0.09	0.82
Proper character	0.88	0.22	0.07	0.84
Culture	0.84	0.20	0.10	0.81
Management support	0.95	0.23	0.03	0.90
Social effects	0.95	0.23	0.03	0.90
Organizational Leadership	0.61	0.23	0.20	0.61
Organization learning strategies	0.95	0.24	0.03	0.90
Flexible organizational structure	0.96	0.24	0.02	0.91
Organizational Agility	0.88	0.23	0.07	0.83
Financial management and proper funding	0.88	0.21	0.07	0.84
Creating Performance Management Structures	0.93	0.23	0.04	0.88
Organizational education	0.96	0.24	0.02	0.91
Service Quality Management	0.94	0.23	0.04	0.89
Understanding the usefulness	0.83	0.21	0.10	0.80
Understanding the simplicity of use	0.85	0.22	0.08	0.82
IT infrastructure	0.91	0.22	0.05	0.87
Required hardware	0.88	0.22	0.07	0.84
Information Infrastructure	0.85	0.23	0.08	0.81
Accountability infrastructure and customer relationship management	0.90	0.23	0.06	0.86
Content production infrastructures	0.94	0.25	0.03	0.88
Compliance with the country's technology infrastructures	0.86	0.23	0.08	0.83

The average triangular fuzzy is calculated in Table 2, and then defuzzified using the Minosky's formula. The definite mean obtained indicates the intensity of agreement of experts with each of the components of the conceptual model of research. At the next stage, after providing the results of the first questionnaire for each person, the experts were informed of the initial results of each question and general answers of individuals. Then the second questionnaire was presented to the individuals. The results of the answers are presented in Table 3. Also, table 4, shows the fuzzy results of the options studied.

Table 3- Average defuzzification of the response of experts from the second questionnaire

Factors	M	A	B	Average defuzzification
Individual features	0.96	0.24	0.02	0.91
Individual perceptions	0.94	0.24	0.04	0.89
Individual skills	0.93	0.24	0.04	0.88
Tolerance of ambiguity and risk	0.94	0.24	0.04	0.89
Technical skills	0.95	0.24	0.03	0.9
Proper character	0.93	0.23	0.04	0.88
Culture	0.96	0.25	0.02	0.91
Management support	0.98	0.24	0.02	0.92
Social effects	0.98	0.24	0.02	0.92
Organizational Leadership	0.94	0.24	0.04	0.89
Organization learning strategies	0.99	0.25	0.01	0.93
Flexible organizational structure	0.99	0.25	0.01	0.93
Organizational Agility	0.95	0.24	0.03	0.9
Financial management and proper funding	0.96	0.24	0.02	0.91
Creating Performance Management Structures	0.95	0.23	0.03	0.9
Organizational education	0.99	0.25	0.01	0.93
Service Quality Management	0.96	0.24	0.02	0.91
Understanding the usefulness	0.95	0.24	0.03	0.9
Understanding the simplicity of use	0.96	0.24	0.02	0.91
IT infrastructure	0.98	0.24	0.02	0.92
Required hardware	0.96	0.24	0.02	0.91
Information Infrastructure	0.94	0.24	0.04	0.89
Accountability infrastructure and customer relationship management	0.96	0.24	0.02	0.91
Content production infrastructures	0.99	0.25	0.01	0.93
Compliance with the country's technology infrastructures	0.95	0.24	0.03	0.9

According to the views presented in the first questionnaire and comparison with the second questionnaire, if the difference between the two questionnaires is less than the threshold (0.1), then the polling process is stopped.

Table 4: Calculation of the average defuzzification difference of the response of experts from the first and second questionnaire

Factors	**Average defuzzification of second questionnaire**	**Average defuzzification of first questionnaire**	**Average difference**
Individual features	0.91	0.85	0.06
Individual perceptions	0.89	0.80	0.09
Individual skills	0.88	0.77	0.11
Tolerance of ambiguity and risk	0.89	0.74	0.15
Technical skills	0.9	0.82	0.08
Proper character	0.88	0.84	0.04
Culture	0.91	0.81	0.1
Management support	0.92	0.90	0.02
Social effects	0.92	0.90	0.02
Organizational Leadership	0.89	0.61	0.28
Organization learning strategies	0.93	0.90	0.03
Flexible organizational structure	0.93	0.91	0.02
Organizational Agility	0.9	0.83	0.07
Financial management and proper funding	0.91	0.84	0.07
Creating Performance Management Structures	0.9	0.88	0.02
Organizational education	0.93	0.91	0.02
Service Quality Management	0.91	0.89	0.02
Understanding the usefulness	0.9	0.80	0.1
Understanding the simplicity of use	0.91	0.82	0.09
IT infrastructure	0.92	0.87	0.05
Required hardware	0.91	0.84	0.07
Information Infrastructure	0.89	0.81	0.08
Accountability infrastructure and customer relationship management	0.91	0.86	0.05
Content production infrastructures	0.93	0.88	0.05

Compliance with the country's technology infrastructures	0.9	0.83	0.07

As shown in Table 4, the members of the expert group agree about most of the components and the disagreement very low in the first and second questionnaires has been less than the threshold (0.1), therefore the polling process on the component stops and the other variables are evaluated in the third survey.

In the third stage of the questionnaire, after presenting the results of the second questionnaire for each person, it has tried to inform the experts of the initial results of each question and general answers, then a third questionnaire was presented to the subjects. Table 5, shows the results of the responses. Also, the results of the defuzzification of the options under study are also presented in Table 5.

Table 5- Calculation of the average defuzzification difference of the response of experts from the third questionnaire

Factors	**m**	**α**	**B**	**Average defuzzification**
Individual skills	0.80	0.23	0.11	0.87
Tolerance of ambiguity and risk	0.76	0.23	0.13	0.85
Culture	0.84	0.20	0.10	0.84
Organizational Leadership	0.61	0.23	0.20	0.84
Understanding the usefulness	0.74	0.24	0.14	0.87

According to the views presented in the second questionnaire and comparison with the third questionnaire, if the difference between the two questionnaires is less than the threshold (0.1), then the polling process is stopped.

Table 6- Calculation of the Average defuzzification difference of the response of experts from the third questionnaire

Factors	**Average difference**	**Average defuzzification of the third questionnaire**	**Average defuzzification of the second questionnaire**
Individual skills	0.01	0.87	0.88
Tolerance of ambiguity and risk	0.04	0.85	0.89
Culture	0.07	0.84	0.91
Organizational Leadership	0.05	0.84	0.89
Understanding the usefulness	0.03	0.87	0.9

As shown in Table 6, the members of the expert group agree about most of the components and the disagreement very low in the second and third questionnaires has been less than the threshold (0.1), therefore the polling process on the components stops.

6 DISCUSSION, CONCLUSIONS AND SUGGESTIONS

In this section, the factors affecting e-learning were identified by the experts by using two open and closed questionnaires. The results extracted from these questionnaires ultimately led to identify the proposed indicators.

In individual features, including factors, individual characteristics, individual perceptions, individual skills, tolerance of ambiguity and risk, technical skills, proper personality, and culture.

Organizational features include management support, social impacts, organizational leadership, organizational learning strategies, flexible organizational structure, organizational agility, financial management and appropriate funding, creating performance management structures, organizational learning and service quality management.

Infrastructure features include understanding the usefulness, understanding the simplicity of use, IT infrastructures and communications infrastructure, applied hardware, information infrastructure, response infrastructure, and customer relationship management and content infrastructure and compliance with the country's technology infrastructure. According to the results of the research, proposals are presented to education and other researchers in two dimensions (Applied and Research):

The following suggestions are presented according to the research results:

- ❖ Paying attention to individual characteristics in the design of electronic systems and e-learning according to the different requests and needs of individuals.
- ❖ Designing e-learning systems with considering individual perceptions of individuals, taking into account the application user interface.
- ❖ Considering the level of individual skills of the individuals about the use of electronic systems and making it easy to use this tool.
- ❖ Increasing tolerance of ambiguity and risk for users in the field of e-learning by providing practical training as well as advertising at various levels.
- ❖ Acquiring technical skills in different fields and providing different methods of learning in fields related to applied skills.
- ❖ Paying attention to the culture of individuals in the use of social networks and developing the culture of using the Internet and social networks and applications.
- ❖ Management support for implementation of e-learning projects at different levels, considering the need for high-level support from the implementation of these projects.

- ❖ Paying attention to the social effects of the use of social networks by considering different social and skill infrastructure in different sectors.
- ❖ Leading organizational leadership in order to implement e-learning in different sectors and the attention of organizational leaders to implementation of these courses.

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Received On: 09-13-2020.
Approved in: 10-22-2020.
Published in: 11-02-2020.