

Providing a Conceptual Framework for Electronic Education System of Higher Education Institutions in the Iran

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Abstract

The purpose of this study is to provide a conceptual framework for the e-learning system of higher education institutions in the Iran, based on the views of experts related to the field of e-learning at the level of higher education institutions and prioritizing factors over each other. The present study is applied in terms of purpose; It is descriptive-exploratory in terms of how data is collected and qualitative in terms of the nature of the data. Accordingly, in order to collect qualitative data, after reviewing the literature related to the research topic, a framework was developed to ask questions of interviews with experts. Then, using purposive sampling method (snowball), the opinions of 15 experts up to the theoretical saturation stage were used. The interviews were coded using Clark and Brown six-step inductive theme analysis. Accordingly, the identified speech evidence from the interview text was labeled in the form of 53 initial codes. Then, the

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initial codes were drawn in the form of 12 sub-themes and then, three main themes including specialized requirements of e-education system, general requirements of e-education system, results and consequences of e-education system, classification and conceptual framework of e-education system of higher education institutions. Then, in order to validate the results of the interviews and confirm the components of the research conceptual framework, the fuzzy Delphi questionnaire and method were used and in order to prioritize the components of the research conceptual framework, the fuzzy hierarchy questionnaire and process (FAHP) were used. Based on the results of the research in the Delphi section, all 12 sub-themes or questions of the Delphi questionnaire were approved by the research experts. The results of fuzzy hierarchical analysis also showed that the technical requirements of e-learning have the highest priority among the specialized requirements, followed by the quality requirements of the education system, support requirements, requirements related to professors, requirements for educational quality and related requirements. With students, they are in the next ranks. Also, achieving effectiveness is the highest priority among the general requirements of the e-learning system, followed by satisfaction, optimal use and utilization, in the next ranks. In addition, saving time and money is the highest priority. Among the factors and then the development of learning and integration of education, are in the next ranks.

Keywords: E-learning, Educational system, higher education institutions, conceptual framework.

Introduction

The digital transformation of educational systems at all levels has brought an educational ecosystem about; a form of new learning better known as e-learning. The recent Covid 19 pandemic too closed the classes in all over the world and made one milliard and a half school and university students as well as sixty three million teachers and academic staff change their academic methods all of a sudden wherever they might be. (Batara,2021) This situation displays the strong and weak points of traditional educational systems as confronted with digital challenge. To the very effect, Bates(2020) states that Covid 19 pandemic has revealed the existing inequalities as regards electronic devices, and necessity of having public low-cost access to the internet for educational purposes. This can not be attributed to e-learning per se, but this fact can not be concealed that the potentiality of e-learning had been underestimated prior to Covid 19 pandemic and crossed off the digital education projects at higher education institutions.

On the other hand, the quality of electronic educational systems has attracted a lot of attention too(for instance Ouajdouni et al,2021; Muhammad et al, 2020), and not to mention many other researchers have attempted to identify the factors believed to guarantee the success of e-learning with a view to optimizing the effectiveness of this method in the higher education system. (for example Naveed et al,2020; Mtebe & Raphael,2018) For the most part, the parts independent from the key determinants of successful e-learning systems have been surveyed, which overlook the double effects of success variables interacting with each other. (Eom & Ashill) In another course of research, the direct relations between the success determinants of electronic education and application or the success determinants of electronic education and satisfaction have been investigated. (for example Ozkan & Koseler, 2009; Selim, 2003) Even so, the large and simultaneously dispersed number of the factors effective on the success of e-learning presents a big challenge that researchers ought to confront in the process of developing a conceptual framework in this area. (Eom & Ashill,2018)

In this respect, Kideral et al (2018) classified the e-learning studies done between 2001-2016. As it turned out the studies in 2001 began with focus on usage intention, usability, contents of lessons and customization, and then they evolved and since 2007 they have

included satisfaction as well. Since 2013 the studies have been focused on the overall success of e-learning and how the characteristics of students influence e-learning. Additionally, a large number of researches into technical points and technologies pertaining to e-learning have been carried out. Yet, the recent researches have been more focused on the attitudes and interactions of students and professors which play an essential role in the success of e-learning. (Yawson & Yamoah, 2020) Also, given the fact that the success factors of e-learning vary in the degree of importance, different priorities have been adopted to investigate the factors in question. For example, in developing countries, barriers in the way of accessing resources, accessibility and infrastructure have priority and communication features and the role of social factors (such as the interaction between student and professor) receive more attention, whereas in developed countries, increase of lifetime education, effectiveness of education, efficiency of systems, and ethic and legal issues are more conspicuous. (Mohammadi, 2015)

Today, a large number of learning resources in various formats (such as text, photos, audio files, and video files) are available through the Internet, which fosters step-by-step learning and transcends geographical boundaries. There are also more opportunities for collaborative and interactive features - such as wikis, forums, and peer-to-peer activities. However, if the expected results of this transformation are established at the level of higher education institutions, there are many benefits such as no space limit, no time limit, comfortable imagination in learning and teaching, using famous and well-known professors, Remote consulting, easy access to educational resources and content, etc., will be available and various aspects related to satisfaction, effectiveness and optimal application in the use of e-learning system will be realized. (Palacios & Evans, 2014)

Thus, It is important to investigate the different aspects of e-learning success in various domains. What the present research is actually driving at is to fill this gap by identifying the factors effective on the success of country's e-learning system and moreover by presenting a conceptual framework that determines the requirements and successful aspects of e-learning and integrates them with each other. Accordingly, the present research seeks to answer the following questions: What are the components of e-learning conceptual

framework in the institutions of Iran`s higher education? How are they prioritized? Which conceptual framework is appropriate for e-learning? How is the presented conceptual framework rated in terms of authenticity and measurement?

E-learning frameworks

Access to more information is not the main issue in education today. In fact, one of the most important challenges for students is to make sense of the volume of content they face. Targeted absorption of all information is impossible, even in the smallest of topics. We need new approaches because of the information explosion and the simultaneous advances in communication. The goal is to provide students with the necessary skills and strategies to manage deep and voluminous information. Moving towards this goal, educators found that the only long-term solution was to create an educational environment in which students could not only learn but also learn how to learn. For this reason, the goal of education is to move towards the development of critical thinking and strategic self-learning abilities that will help the person for life. Hence, the desired outcome of training is coherent knowledge structures consistent with subsequent learning rather than absorbing specific components of information. These are in fact hypotheses, themes, concepts and principles that form the framework of e-learning theory (Andson and Grayson, 2004).

Various frameworks in the field of e-learning have been presented with emphasis on one of the technical, educational or general and general attitudes, but considering that the implementation and establishment of e-learning in an educational institution requires a comprehensive and comprehensive view, Attempts have been made to select and compare most of the frameworks that cover the various dimensions of the e-learning system.

In the present study, 12 e-learning frameworks and their components have been reviewed, the results of which are presented in Table 1:

Table 1. E-learning frameworks and their main and sub-dimensions

| Framework provider | Main dimensions |
|---|--|
| Institute of University Education Policies (2000) | Institutional Support - Lesson Development - Teaching / Learning Process - Lesson Structure - Learning Support - Teacher Support - Evaluation and Evaluation |
| Pop (2000) | Lesson suitable for e-learning environment - Lesson |

| | |
|--------------------------------------|--|
| | creation in the course - Lesson content - Lesson maintenance in each course - Platform - Measuring lesson success |
| Includes intellectual property | Technology - Master - Learners - Human factors |
| Thierry Valerie (2000) | Human factors - technical skills of teacher and learner - familiarity of teacher and learner |
| Sang Chan Cho and Lu (2001) | Academic - Content |
| Graf and Caines (2001) | Master's expertise in e-learning - Learner readiness - Infrastructure - Technology - Content and learning resources - Educational design |
| Oliver (2001) | Institutional Support - Lesson Development - Teaching and Learning - Lesson Structure - Learning Support - Teacher Support - Evaluation and Evaluation |
| Gubrudasami (2002) | Master Characteristics - Learner Characteristics - Technology - Support |
| Salim (2005) | School factors-Technology factors-Teacher-related factors-Learners factors-Educational design-Educational science factors |
| Based on learners' perceptions | Administrative Affairs - Management - Technology - Educational Affairs - Ethics - Intermediary Design - Resource Support - Evaluation |
| Freezen (2005) | Learning resources - main learning processes - learning area |
| General e-learning frameworks (Khan) | Procurement of infrastructure - technical standards - content - educational affairs - school development |

Methodology

The present research is applied regarding purpose and it is descriptive-exploratory in terms of deduction method, and so far as the essence of data is concerned with, it is qualitative and quantitative. The research community consists of the experts of e-learning domain in the institutions of higher education. The size of the research sample based on the views of the experts, who were available or willing to cooperate, was determined as 15 people using the purposive sampling method (Snowball). Also, efforts were made to comply with theoretical saturation principle. In the qualitative part, the theme analysis method was employed to collect data and information from interviews. Accordingly at the first stage, a framework was developed for the interview questions to ask the experts with a view to collecting qualitative data and after an extensive survey of the relevant literature.

At the second stage, the processed interviews were codified using Clark and Brown six-step inductive theme analysis. Accordingly, the identified speech evidence from the interview text was labeled in the form of 53 initial codes. First the initial codes were classified as 12 sub-themes and then the 3 main themes including specialized requirements of e- learning system, general requirements of e-learning system, and results and consequences of e-learning system were assorted and after it, the conceptual conceptual framework of e-learning system at institutions of higher education was formulated. Then, in order to validate the results of interviews and to confirm the components of the research conceptual framework, the questionnaire and the fuzzy Delphi method were used. The finalized fuzzy amount of all research questions exceeded the threshold amount (0/7). In order to prioritize the components of the research conceptual framework, the fuzzy hierarchy questionnaire and process (FAHP) were applied.

To measure reliability by means of reliability re-test method, three interviews of all interviews as sample were selected and each was codified again within a short spell(2 weeks). Then, the determined codes were compared with each other within two spells for each interview. In each interview, the codes found identical/similar in two spells or periods of time, were determined as “agreement”, and the ones found different or dissimilar, were determined as “disagreement/lack of agreement”. The reliability re-test of the interviews in this research using the proposed method, equals %80. As this amount is over %60, it can be claimed that the reliability of codifications in this research is confirmed. The results of these codifications are presented in table 1:

Table 1. Measurement of reliability of re-test (stability criterion)

| Interview | Total number of codes | Number of agreements | Number of disagreements | Reliability of re-test |
|-----------|-----------------------|----------------------|-------------------------|------------------------|
| 4 | 18 | 7 | 4 | %77 |
| 8 | 17 | 7 | 3 | %82 |
| 13 | 15 | 6 | 3 | %80 |
| total | 50 | 20 | 10 | %80 |

Research findings

1. Presenting the conceptual framework of e-learning system at higher education institutions in the Iran

The process of analyzing qualitative data based on theme analysis method, begins when the researcher considers the statements and meaningful phrases pertaining to the subject/theme. This analysis starts by frequently checking the data, and once the significant/meaningful statements related to the theme of the research are determined, the codification process begins. In the present research, data has been checked and investigated several times as the researcher has had to return to some of the previous stages for further precision and verification. At this stage, the desired data of the researcher, which was previously determined, was labeled, that is to say, the initial codes of data were developed. The researchers choose a word or label for their desired data (already determined). The label in question eventually shows the initial codes of the research. To classify the initial codes and to form the sub-theme, the initial codes were investigated and the codes which were closer to each other in meaning, and so to speak, presented a semantic proximity, were divided into the same group and new meanings and words appeared. Actually, the codes were classified in the form of sub-themes.

Qualities such as belief of students, students tendency, students anxiety, past experience of students and self-utilization of students presented a high rate of semantic proximity to the researcher and were subsumed under “The requirements relating to students” based on speech evidence presented by those interviewed. The final results of this classification or in other words, the reckoning of the research sub-themes, are presented at table 2.

Table 2. The resulted sub-themes

| Sub-subject | Initial codes |
|---|------------------------|
| Technical requirements of E-learning | Simple access |
| | Simpleness of learning |
| | User requirements |
| | System characteristics |
| | System availability |
| | Flexibility |
| | Integration |
| | System reliability |
| | Trusting the system |
| | Security |
| | Personalization |
| Requirements of educational quality | Efficiency |
| | Accessibility |

| Sub-subject | Initial codes |
|---|--|
| | Usability |
| | Exactitude |
| | Perceptibility |
| | Up-dated content |
| | Quality of content design |
| Back up requirements | Rendering guidance services |
| | Giving help and assistance |
| | Availability of staff |
| | Proper perception |
| | Accountability |
| Requirements of educational system quality | Being interactive and communicative |
| | Effective relation |
| | Learning diversity |
| | Evaluation parts |
| Requirements pertaining to students | Belief of students |
| | Tendency of students |
| | Anxiety of students |
| | Past/previous experience of students |
| | Self-efficiency of students |
| Requirements pertaining to professors | Abstract norm |
| | Enthusiasm of professors |
| | Accountability of professors |
| | Interactive communications of professors |
| | Tendency of professors |
| Engendering satisfaction in beneficiaries | Satisfaction with system`s functioning |
| | Enjoyable experience |
| | Presentation of educational needs |
| Realization of effectiveness | Getting things done faster |
| | Learning improvement |
| | Effective learning |
| Usage and being an optimal user | Usage sustainability |
| | Regular usage |
| | Length of usage period |
| Learning expansion | Knowledge increase |
| | Enhancement of learning process |
| | Attainment of learning goals |
| Education integration | Simpler interaction and communications |
| | Education standardization |
| Saving time and expenses | Saving time |
| | Saving expenses |

To determine the main themes and depict the research conceptual framework, the reckoned qualities of previous stages were put into the following classes: 1- The specialized requirements of e-learning system, 2- The general requirements of e-learning system, and 3- The anticipated consequences.

The qualities, devoted to the formation and promotion of Iran's e-learning system, are subsumed under "The specialized requirements of e-learning system". If we want our country's e-learning system to be one of the best ones in the world, we ought to consider the adoption of certain initiatives subsumed under "The specialized requirements of e-learning system" in the technical domains of e-learning, educational quality, back up, quality of educational system, and the qualities involving both students and professors.

The qualities which the country's e-learning system should generally possess to be acknowledged top and successful, are classified as "The general requirements of e-learning system", which in the present research include guaranteeing the satisfaction of the beneficiaries, realization of educational effectiveness and also usage and optimal utilization.

The qualities, which the country's e-learning system is aspiring, are classified and designated as "Results and consequences of e-learning system", which in the present research include learning expansion, educational integration and saving time and expenses.

Given the results of present research in the qualitative part, the conceptual conceptual framework of e-learning system in the higher education institutions of the country has been designed and presented at figure 1 below.

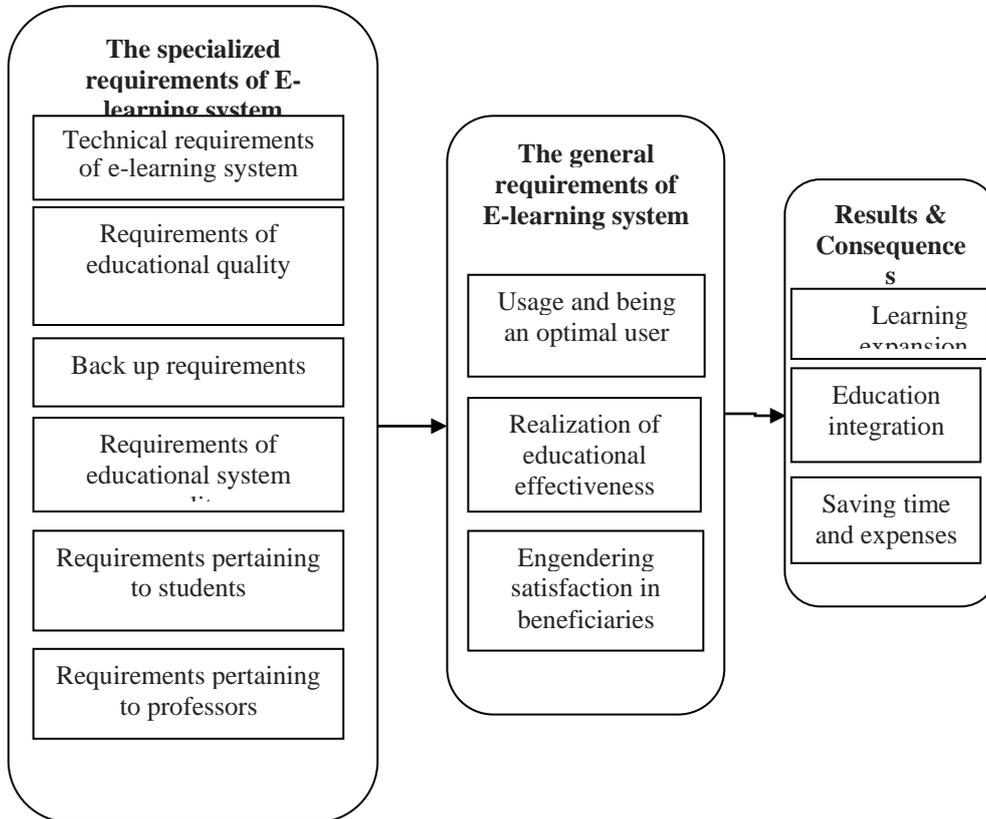


Figure 1. Research conceptual framework

Validation of research conceptual framework components

In this research, in order to validate the results of interviews and to confirm the components of e-learning system conceptual framework at the country's higher education institutions, the questionnaire and fuzzy Delphi method were applied. So, the initial questionnaire was designed and afterward it was revised drawing on the views of experts and authorities of the field. For the finalization of the questionnaire, the experts were asked to express their views on the criteria that had been identified based on the interviews and incorporated into the structure of the conceptual framework, and also to add other probable factors to the list. Accordingly, at this stage first the questionnaires distributed among the experts were collected. After the collection of completed questionnaires that amounted to 15, the rate of aggregation

and defuzzification of each question was calculated and analyzed. The results of Delphi questionnaire calculations are presented at Table 4 below.

Table 4. Fuzzy value and the definite number of Delphi questionnaire questions

| NO | Main theme | Research questions based on sub-themes | The fuzzy value of each question | | | Definite amount | The state of each question |
|----|--|--|----------------------------------|-------|---|-----------------|----------------------------|
| | | | L | M | U | | |
| 1 | The specialized requirements of E-learning system | To what extent do you think the technical requirements of e-learning contribute to the development and promotion of e-learning system in the Iran`s higher education institutions? | 0/5 | 0/899 | 1 | 0/825 | confirmed |
| 2 | | To what extent do you think the requirements of educational quality contribute to the development and promotion of e-learning system in the Iran`s higher education institutions? | 0/5 | 0/905 | 1 | 0/828 | confirmed |
| 3 | | To what extent do you think the back up requirements contribute to the development and promotion of e-learning system in the Iran`s higher education institutions? | 0/5 | 0/914 | 1 | 0/832 | confirmed |
| 4 | | To what extent do you think the requirements of educational system quality contribute to the development and promotion of e-learning system in the Iran`s higher education institutions? | 0/5 | 0/943 | 1 | 0/846 | confirmed |
| 5 | | To what extent do you think the requirements pertaining to students contribute to the development and promotion of e-learning system in the Iran`s higher education institutions? | 0/3 | 0/863 | 1 | 0/757 | confirmed |
| 6 | | To what extent do you think the requirements pertaining | 0/1 | 0/866 | 1 | 0/708 | confirmed |

| NO | Main theme | Research questions based on sub-themes | The fuzzy value of each question | | | Definite amount | The state of each question |
|----|--|---|----------------------------------|-------|---|-----------------|----------------------------|
| | | | L | M | U | | |
| | | to professors contribute to the development and promotion of e-learning system in the Iran`s higher education institutions? | | | | | |
| 7 | The general requirements of E-learning system | To what extent do you think the satisfaction engendering as a general rule and obligation contribute to the e-learning system`s success and superiority in the Iran`s higher education institutions? | 0/5 | 0/901 | 1 | 0/826 | confirmed |
| 8 | | To what extent do you think the effectiveness realization as a general rule and obligation contribute to the e-learning system`s success and superiority in the Iran`s higher education institutions? | 0/3 | 0/904 | 1 | 0/777 | confirmed |
| 9 | | To what extent do you think the usage and being an optimal user as a general rule and obligation contribute to the e-learning system`s success and superiority in the Iran`s higher education institutions? | 0/7 | 0/972 | 1 | 0/911 | confirmed |
| 10 | The anticipated results and consequences | To what extent do you think learning expansion is assumed as an anticipated consequence in the success and superiority of e-learning system at the country`s higher education institutions? | 0/3 | 0/815 | 1 | 0/733 | confirmed |
| 11 | | To what extent do you think education integration is assumed as an anticipated consequence in the success and superiority of e-learning system at the country`s higher education institutions? | 0/5 | 0/923 | 1 | 0/837 | confirmed |
| 12 | | To what extent do you think saving time and expenses is | 0/3 | 0/823 | 1 | 0/737 | confirmed |

| NO | Main theme | Research questions based on sub-themes | The fuzzy value of each question | | | Definite amount | The state of each question |
|----|------------|---|----------------------------------|---|---|-----------------|----------------------------|
| | | | L | M | U | | |
| | | assumed as an anticipated consequence in the success and superiority of e-learning system at the country`s higher education institutions? | | | | | |

The definite fuzzy amount of all research questions exceeded the threshold amount (0/7), so all the 12 sub-themes or the questions of Delphi questionnaire were confirmed by the experts, and no new variable was proposed, accordingly, the Delphi process stopped, and the research conceptual framework was validated.

Prioritization of research Conceptual framework components

In this research, in order to prioritize the components of the conceptual framework, the fuzzy hierarchy questionnaire and process (FAHP) was used. So, an initial questionnaire was designed ,and based on the views of the experts it was revised. For the finalization of the questionnaire the experts were asked to express their views on how important the research conceptual framework components were. Below, calculations of fuzzy AHP method based on the Chang development analysis method are presented:

Comparison and prioritization of the specialized requirements in e-learning system

Given the conceptual framework research (figure 1) first the hierarchical tree of decision, in order to prioritize the specialized requirements of e-learning system (figure 2) was drawn.

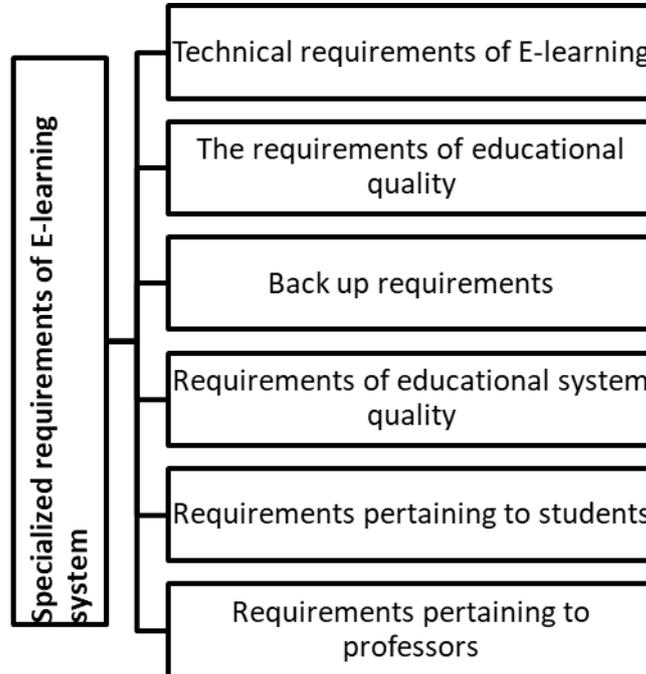


Figure 2. The hierarchical tree of e-learning system specialized requirements

Results of calculations of fuzzy AHP method based on the approach of Chang development analysis are presented in Table 5 below:

Table 5. Pair comparison and determining the rate of importance for e-learning system specialized requirements

| Matrix of integrated fuzzy comparisons | | | | | | | | | | | | | | | | | | |
|--|-------|-------|-------------------------------------|-------|-------|--|-------|-------|----------------------|-------|-------|-------------------------------------|-------|-------|--------------------------------------|---|---|---|
| Requirements pertaining to professors | | | Requirements pertaining to students | | | Requirements of educational system quality | | | Back up requirements | | | Requirements of educational quality | | | Technical requirements of e-learning | | | Specialized requirements of e-learning system |
| 5/400 | 4/474 | 0/135 | 0/649 | 0/987 | 0/652 | 0/851 | 0/982 | 0/649 | 0/226 | 0/143 | 0/094 | 6/690 | 5/400 | 4/474 | 1 | 1 | 1 | Technical requirement of e-learning |

| Matrix of integrated fuzzy comparisons | | | | | | | | | | | | | | | | | | |
|--|-------|-------|-------------------------------------|-------|-------|--|-------|-------|----------------------|-------|-------|-------------------------------------|-------|-------|--------------------------------------|-------|-------|---|
| Requirements pertaining to professors ¹ | | | Requirements pertaining to students | | | Requirements of educational system quality | | | Back up requirements | | | Requirements of educational quality | | | Technical requirements of e-learning | | | Specialized requirements of e-learning system |
| 1 | 1 | 1 | 0/145 | 0/091 | 7/156 | 5/469 | 4/341 | 0/690 | 0/876 | 0/996 | 0/686 | 0/241 | 0/145 | 0/091 | 7/156 | 5/469 | 4/341 | Requirements pertaining to professors |
| 0/146 | 0/092 | 7/009 | 5/492 | 4/376 | 0/680 | 0/236 | 0/146 | 0/092 | 7/009 | 5/492 | 4/376 | 1 | 1 | 1 | 9/639 | 7/574 | 5/681 | Requirements of educational quality |
| 0/851 | 0/982 | 0/649 | 0/226 | 0/143 | 0/094 | 6/690 | 5/400 | 4/474 | 1 | 1 | 1 | 0/226 | 0/143 | 0/094 | 6/690 | 5/400 | 4/474 | Back up requirements |
| 0/259 | 0/165 | 0/104 | 7/685 | 6/201 | 4/978 | 1 | 1 | 1 | 0/851 | 0/982 | 0/649 | 0/226 | 0/143 | 0/094 | 6/690 | 5/400 | 4/474 | Requirements of educational system quality |
| 7/685 | 6/201 | 4/978 | 1 | 1 | 1 | 0/649 | 0/987 | 0/652 | 0/851 | 0/982 | 0/649 | 0/226 | 0/143 | 0/094 | 6/690 | 5/400 | 4/474 | Requirements pertaining to students |

| Normalization of preferences | Preference degree | Degree of preferring Si to Sk | | | | | Fuzzy complex expansion | | | Fuzzy sum of each line | | |
|------------------------------|-------------------|-------------------------------|-------|-------|-------|-------|-------------------------|-------|-------|------------------------|-------|-------|
| 0/208 | 1/000 | 1 | 1 | 1 | 1 | 1 | 0/325 | 0/201 | 0/119 | 9/639 | 7/574 | 5/681 |
| 0/142 | 0/680 | 1 | 1 | 0/683 | 0/875 | 0/680 | 0/236 | 0/146 | 0/092 | 7/009 | 5/492 | 4/376 |
| 0/165 | 0/794 | 1 | 1 | 0/800 | 1 | 0/794 | 0/259 | 0/165 | 0/104 | 7/685 | 6/201 | 4/978 |
| 0/206 | 0/991 | 1 | 1 | 1 | 1 | 0/991 | 0/323 | 0/199 | 0/121 | 9/580 | 7/502 | 5/791 |
| 0/135 | 0/649 | 0/987 | 0/652 | 0/851 | 0/982 | 0/649 | 0/226 | 0/143 | 0/094 | 6/690 | 5/400 | 4/474 |
| 0/143 | 0/686 | 1 | 0/690 | 0/876 | 0/996 | 0/686 | 0/241 | 0/145 | 0/091 | 7/156 | 5/469 | 4/341 |

| | |
|---|--------------|
| Technical requirements of e-learning | 0/208 |
| Requirements of educational quality | 0/142 |
| Back up requirements | 0/165 |
| Requirements of educational system quality | 0/206 |
| Requirements pertaining to students | 0/135 |
| Requirements pertaining to professors | 0/143 |

| | | |
|-----------------------------|-------------------|---------------|
| Rate of disagreement | | |
| CRm | | CRg |
| 0/0239 | It agrees. | 0/0603 |

With regard to table 5, the technical requirements of e-learning system have achieved the highest priority amidst specialized requirements and then come in order of priority: requirements of educational system quality, back up requirements, requirements pertaining to professors, requirements of educational quality , and requirements pertaining to students.

Comparison and prioritization of e-learning system general requirements

With regard to research conceptual framework, the hierarchical tree of decision in order to prioritize e-learning system general requirements was drawn (Figure 3, below).

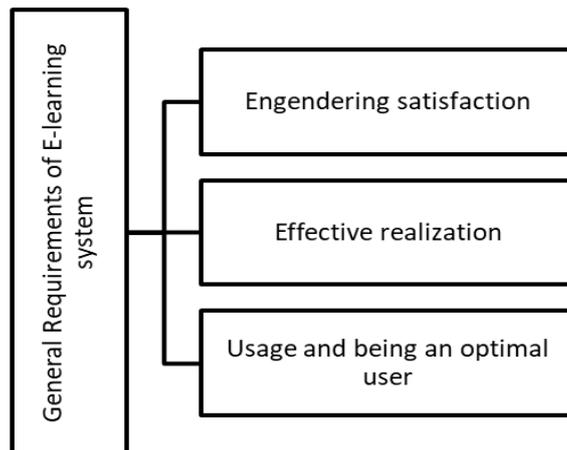


Figure 3. The hierarchical tree of e-learning system general requirements

Below, calculations of fuzzy AHP method based on the approach of Chang development analysis are presented in Table 6.

Table 6. Pair comparison and determining the rate of importance for the general requirements of E-learning system

| Matrix of integrated fuzzy comparisons | | | | | | | | | |
|--|-------|-------|-----------------------|-------|-------|--------------------------|-------|-------|---|
| Usage and being an optimal user | | | Effective realization | | | Engendering satisfaction | | | The general requirements of E-learning system |
| 1/552 | 1/149 | 0/803 | 1/280 | 0/929 | 0/680 | 1 | 1 | 1 | Engendering satisfaction |
| 1/638 | 1/140 | 0/718 | 1 | 1 | 1 | 1/470 | 1/076 | 0/781 | Effective realization |
| 1 | 1 | 1 | 1/340 | 0/891 | 0/647 | 1/246 | 0/871 | 0/644 | Usage and being an optimal user |

| Normalization of preferences | Preference degree | Degree of preferring Si to Sk | | Fuzzy complex expansion | | | Fuzzy sum of each line | | |
|------------------------------|-------------------|-------------------------------|-------|-------------------------|-------|-------|------------------------|-------|-------|
| 0/341 | 0/953 | 1 | 0/953 | 0/527 | 0/340 | 0/215 | 3/832 | 3/078 | 2/483 |
| 0/357 | 1 | 1 | 1 | 0/565 | 0/355 | 0/217 | 4/108 | 3/216 | 2/499 |
| 0/302 | 0/846 | 0/846 | 0/888 | 0/493 | 0/305 | 0/199 | 3/585 | 2/762 | 2/291 |

| | |
|---------------------------------|-------|
| Engendering satisfaction | 0/341 |
| Effective realization | 0/357 |
| Usage and being an optimal user | 0/302 |

| Rate of disagreement | |
|----------------------|---------------------|
| CRm 0/0007 | CRg 0/002 |

It agrees

With regard to research conceptual framework, realization of effectiveness has achieved the highest priority amidst e-learning system general requirements, and after it engendering satisfaction and usage; optimal utilization come in lower ranks.

Comparison and prioritization of anticipated consequences

With regard to research conceptual framework, the hierarchical tree of

decision to prioritize e-learning system anticipated consequences was drawn and presented in Figure 4 .

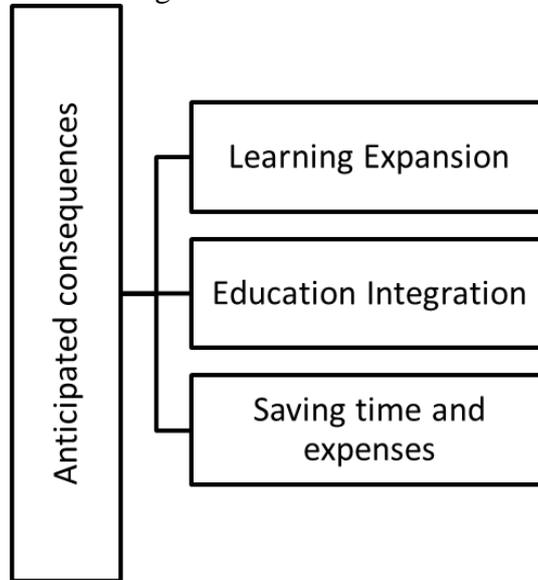


Figure 4. The hierarchical tree of anticipated consequences

Below, calculations of fuzzy AHP method based on the approach of Chang development analysis are presented in Table 7.

Table 7. Pair comparison and determining the rate of importance for anticipated consequences

| Matrix of integrated fuzzy | | | | | | | | | |
|----------------------------|-------|-------|-----------------------|-------|-------|--------------------|-------|-------|--------------------------|
| Saving time and expenses | | | Education integration | | | Learning expansion | | | Results & Consequences |
| 0/891 | 0/603 | 0/392 | 1/380 | 1/140 | 0/944 | 1 | 1 | 1 | Learning expansion |
| 1/145 | 0/874 | 0/630 | 1 | 1 | 1 | 1/059 | 0/887 | 0/725 | Education integration |
| 1 | 1 | 1 | 1/587 | 1/145 | 0/874 | 2/551 | 1/657 | 1/122 | Saving time and expenses |

| Normalization of preferences | Preference degree | Degree of preferring Si to Sk | | Fuzzy complex expansion | | | Fuzzy sum of each line | | |
|------------------------------|-------------------|-------------------------------|-------|-------------------------|-------|-------|------------------------|-------|-------|
| 0/273 | 0/595 | 0/595 | 0/996 | 0/426 | 0/295 | 0/201 | 3/271 | 2/743 | 2/336 |
| 0/268 | 0/584 | 0/584 | 1 | 0/417 | 0/296 | 0/203 | 3/204 | 2/751 | 2/355 |
| 0/459 | 1 | 1 | 1 | 0/668 | 0/409 | 0/258 | 5/138 | 3/802 | 2/996 |

| | | | |
|-----------------------------|--------------------------|-------|---------------|
| | Learning expansion | 0/273 | |
| | Education integration | 0/268 | |
| | Saving time and expenses | 0/459 | |
| Rate of disagreement | | | |
| | CRm | | CRg |
| | 0/0285 | | 0/0758 |
| It agrees. | | | |

With regard to Table 7, saving time and expenses has achieved the highest priority among the other factors and after it, learning expansion and integration of education form the next ranks.

Discussion & conclusion

E-learning technical requirements is a determinant in our research conceptual framework, which subsumed under e-learning specialized requirements, influences the general qualities and characteristics. In this respect, the other researchers have also confirmed that technical requirements have a direct effect on usage and the satisfaction of users with e-learning system. Several researchers have discovered a positive relation between technical requirements and optimal usage (Halawi et al 2008; Po-An Hsieh and Wang 2007). As regards e-learning systems, It has been proven that there is a strong relation between the realization of technical requirements and the e-learning system (Sarmast et al 2020; Balaban et al 2013; Garcia-Smith and Effken 2013; Lin 2007; Marjanovic et al 2016). There are also some other researchers who have studied the relation between technical quality of the system and satisfaction of users and have demonstrated positive relations between them (Chiu et al 2007; Halawi et al 2008; Po-An Hsieh and Wang 2007; Leclercq 2007; Wu and Wang 2006). Hassanzade et al(2012) assumed that the higher the technical quality of e-learning systems was, the higher the satisfaction of users with e-learning system would be. They defended what they claimed with empirical investigations. So, It can be stated that if users find the e-learning system compatible with their requirements, this will positively compel them to use the system and to find it effective and satisfactory.

Owing to the essential role of educational quality requirements in the realization of learning purposes and serious problems arising from

poor quality education, the educational quality requirements were regarded as an exclusive specialized aspect in the evaluation of e-learning system success, and subsumed under specialized requirements of e-learning, were associated with general qualities and characteristics. The relation between educational quality requirements and any of the general requirements such as engendering satisfaction in beneficiaries, realization of educational effectiveness, and being an optimal user, were empirically studied by the researchers of e-learning. For instance, Priatna et al(2020) regard availability, trustworthiness, access, usability and content as determinants in e-learning. Klobas & McGill(2010) and Eom et al(2012) found an important relation between “Educational quality requirements” and “Usage and satisfaction with e-learning”. In Lwoga’s research(2014) into e-learning systems in an organizational background, it became evident that the relation between educational quality requirements and effectiveness is of paramount importance. To the very effect, Rai et al(2002) showed that there is an important relation existing between e-learning quality and being an optimal user. Halawi et al (2008) in their research into systems of knowledge management. Also, Niazy et al(2021) raise E-learning quality(including syllabus, content, objectives) as a main category in the promotion of e-learning. Thus, we can possibly assume that enhancement of educational quality requirements in the e-learning system can lead to increase of effectiveness, satisfaction of beneficiaries, and usage as well as being an optimal user in the e-learning system.

The back up requirements in the structure of research conceptual framework as a specialized tool for the success of e-learning system are totally important. The presented conceptual framework in the present research shows that back up requirements subsumed under the specialized requirements of e-learning system influence general qualities and characteristics. In the articles on the success of e-learning system, such issues pertaining to back up in e-learning system have been looked into as rendering guideline services, giving help and assistance, availability of staff, proper perception and accountability. For example Niazy et al (2020) think of infrastructures and back up as ground-breaking factors in the promotion of e-learning quality at universities. In an empirical study carried out by Ozkan and Koseler(2009) , It was reflected that usage of e-learning at Brunel university had notably increased due to the support and backup that

students and academic centers received from the university to utilize the e-learning system. This increase of popularity is mostly resulted from the increase of back ups at e-learning portals. The researchers also studied the relation between back up requirements and satisfaction and found it utterly important. On the other hand, according to a study conducted by Navimipour and Zareie(2015), organizational back up in e-learning system had a positive and constructive effect on the staff satisfaction. Taking everything into account, It can be declared that the realization of back up requirements in an e- learning system, will have a positive effect on usage and optimal utilization of the system, perception of usefulness, and effectiveness of e-learning system. The reason is that recently more attention has been paid to educational guidelines showing how to utilize the e-learning system, and new requirements have been introduced by back up system guardians. Therefore, preparation of on-line guidelines before using e-learning system can increase the awareness of users, and can considerably influence their perception from the general effectiveness of the system. In addition, the popularity of e-learning system, and the policy, higher education institutions pursue to propagate their e-learning system, play a prominent role in the increase of usage system by academic centers and learners.

As regards educational system quality requirements, Hassanzade et al (2012) while developing a conceptual framework for evaluation of e-learning success at universities of Iran, learned that the quality of educational system has a positive direct effect on the satisfaction of users and an indirect effect on “Usage of system”, and this goes to show that the educational qualities in the e-learning system and facilities such as discussion societies, chat-rooms, and corporate learning tools can bring about the satisfaction of users and usage optimization of e-learning systems. Xing et al (2015) ; Kim et al (2012), and Mohammady (2015) found a positive relation between the quality of educational system and satisfaction. Cidral et al (2018) also discovered that there is a significant relation between “ Diversity of evaluation material, educational system quality and the interaction of learners in the e-learning system”, and “The satisfaction of beneficiaries”.

The requirements pertaining to students, which were somehow incorporated into the structure of several researches, conducted

previously into e-learning, have been investigated too. For example Ong et al (2004) studied self-utilization of learners and learned that there is an important relation between the self-utilization of learners and the effectiveness of the electrified educational system. Park(2009) too in his research came to the same conclusion. Also, the result of the research done by Klobas & McGill (2010) clarified that the relations between “Participation of students” and “ Usage and satisfaction” are both important. In the surveys carried out by Sun et al (2008) and Ozkan and Koseler (2009), it became evident that the relation between learner and satisfaction with the e-learning system is of great account. Given the positive relations of the criteria accompanying different characteristics of the learner, the requirements pertaining to students will be more likely to influence the usefulness of e-learning system and optimal utilization of the system.

According to the results of researches, the role of professors and academic staff in the success of e-learning has received a lot of attention from the researchers in the domain of e-learning. In this respect, Ghanbary et al (2019) highlight the academic qualities of a professor as a factor guaranteeing the success of e-learning. Sun et al(2008) dealt with the relation between instructor`s dimension(using the two criteria “The timely response of the instructor”, and “ Instructor`s attitude towards e-learning”) and satisfaction with E-learning, and demonstrated that it is such an important and positive relation. Cidral et al (2018) also got similar results, and found a positive relation between “Instructor`s attitude towards E-learning” and “The satisfaction of users”. Lwoga (2014) drew on the instructor`s quality as a separate structure and approved of the relation between “ Instructor`s quality” and “ The effectiveness of E-learning and satisfaction of beneficiaries”. Mtebe & Raphael (2018) ,also discovered in their research that the requirements pertaining to professors including teaching quality have an important effect on learners` satisfaction with an e-learning system. Besides the points mentioned earlier, the results of the present research showed that the aspects pertaining to professors such as abstract norm, the enthusiasm of professors, the accountability of professors, interactive communications between students and professors, and a positive tendency towards using the E-learning system, are very specific and effective factors on the e-learning system. The research carried out by Alam et al (2021) confirmed the same results.

It goes without saying that satisfaction and trustworthiness have proven themselves as a necessary assessment tool for the success of information systems and E-learning systems. In this survey, the satisfaction of beneficiaries has been regarded as a general determinant in the structure of the conceptual framework for e-learning system in the Iran. On this score, and in the DeLone-McLean (2003) conceptual framework of e-learning systems success, it was demonstrated that the effect of users' satisfaction on the advantages resulted from the system are empirically important. Hassanzade et al (2012) explained that when the users of e-learning system have more satisfaction, they will utilize the system more frequently and will find the advantages of the system usage more tangible. Effendy et al (2021), Ejdy (2021), Eom et al (2012), and Hassanzade et al (2012) obtained similar results. Cidral et al (2018) also discovered that the perceived satisfaction justifies 43.3% of the individual effects variance standing for an important relation between these two.

The conceptual framework of this research assumes the educational effectiveness as a general requirement for the realization of E-learning system success and superiority. The relevant articles support this assumption empirically. Accordingly, Arbaugh (2000) in his survey assumes that the software effectiveness of a field of study will have a positive relation with the satisfaction of students with an internet-based field. Also, the research done by Al-Sabawy (2013) into e-learning systems success, and the one done by Limayem and Cheung (2008) both showed that the realization of educational effectiveness has an important and direct effect on the satisfaction of users. Moreover, if students suppose that the e-learning system is effective for them, they will be more likely to utilize it. This relation has been evaluated in several surveys into e-learning system: for example Islam (2013), Pituch & Lee (2006), Van Raaij & Schepers (2008), Sandjojo & Wahyuningrum (2015), Sumak et al (2011). Furthermore, the previous studies have shown an important and direct relation between effectiveness and education advantages (Hwang et al, 2008); effectiveness and organizational advantages (Park et al, 2011); effectiveness and individual effect (Lee et al, 2011); and finally, effectiveness and individual as well as organizational effects (Hasan et al, 2017).

The optimal usage of the system is an assessment tool, usually used for the evaluation of system success. Kuliya & Usman (2021)

confirmed in a research that the ease of usage and the perceived usefulness of e-learning immensely encourage the behavioral intention of participants in the utilization of e-learning. DeLone & McLean (2003), and Petter et al (2008), within the systematic browsing of articles, have reported that “Optimal usage” has an average relation with system utilization advantages. Also, in the previous studies it has been determined that the relation between optimal usage and system advantages is an important one (Chen & Tseng, 2012; Garcia-Smith & Effken 2013; Hou,2012). Additionally, It has been proven that at an organizational level the optimal usage of e-learning systems to offer training courses to the staff, has a direct and positive effect on company`s net benefits (Chen & Tseng, 2012). Other studies have produced similar results (Halawi et al 2008; Kositanurit et al 2006; Zhu & Kraemer 2005). Besides the above-mentioned points, the results of present research showed that usage and being an optimal user of e-learning system such as usage continuation, regular usage and how long usage endures, also contribute to the e-learning system as general factors.

With regard to the results of our findings, a solid authoritative conceptual framework and a tool for the evaluation of e-learning systems success is proposed to universities and higher education institutions, so that they can realize first the specialized requirements and then, the general requirements of e-learning system in the Iran, and can take long strides in learning expansion, education integration and saving time and expenses.

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