Identifying and Presenting a Model of Evaluation Components of Cognitive Learning Levels in the Electronic Educational System of Islamic Azad University

Shahla Rezaei[1*]

1. Ph.D, Department of Educational Management, Kermanshah Branch, Islamic Azad University, Kermanshah, Iran.

Abstract

Objective: Identifying and presenting a model of evaluation components of cognitive learning levels in the electronic educational system of Islamic Azad University. Given that the research seeks to achieve a practical goal, it is considered an applied research. The research was planned based on a mixed research approach, and accordingly, the exploratory research design strategy was used. In the qualitative part of the research, the phenomenological and synthesis research method was used, and in the quantitative part, the survey method was used. The research population includes all faculty members and instructors of the Western Azad University (Kermanshah, Sanandaj, Ilam, and Hamadan) and the Azadshahr universities of Tehran. The research sample in the qualitative part was selected using the purposeful snowball method and the desired cases, and in the quantitative part, the stratified random sampling method was used. Qualitative data collection was conducted through semi-structured interviews and a review of research documents and quantitative data using a researcher-made questionnaire.

Keywords: Evaluation model, e-learning, cognitive learning levels, online evaluation.

Introduction

Many researchers in the field of education, such as McLuhan (1962), Chandler (1996), Postman (1993), Wellman (2012), Siemens (2004), Downs (2006), Prensky (2001; 2009), Ghasemi et al. (2018), Barari et al. (2020), and Lee (2022), believe that technology cannot play a neutral role in the human learning process and that within each technology used, there are hidden philosophies and ideologies that can affect the learning process and evaluation of human learning. Proponents of the theory of communication also believe that learning methods in humans have undergone drastic changes based on the changes caused in individuals due to the spread of technologies and the generalization of access to information (Siemens, 2005; 2009). In general, with the development of technology, each aspect of human life has undergone changes and developments that have affected human lifestyles.

In these circumstances, educational institutions have not been spared from the changes resulting from the development of technology. The influence of new technologies on educational institutions has also affected teaching methods and the evaluation of students' learning, and with the presence of technology, different perspectives have been presented on the concept of learning and evaluation (Kavez et al., 2011);

In summary, what has been stated shows that technologies have caused changes in the learning style of individuals and the way they acquire knowledge, experience, and skills (Siemens, a2001). However, learning based on these technologies (e-learning) is expanding day by day due to its many benefits for learners (Cows, 2015). Along with the expansion and acceptance of this learning method, improving its quality and integrating learning theories and ideas into it is considered a necessity. The need for using these technologies in e-learning environments to ensure the achievement of educational goals and the results obtained by learners is becoming more and more apparent

every day. To achieve a quality evaluation system, paying attention to the leveling of learning goals by Benjamin Bloom and his colleagues is very fruitful and efficient (Lee, 2022). On the other hand, cognitive levels of learning constitute the most important part of the content of formal training in learning activities in the field of higher education in our country, and accordingly, the evaluation of all levels of learning is the most important concern of evaluation designers in e-learning environments. Therefore, this chapter presents the general outline of the research in the form of stating the problem, the importance and necessity of the research, the objectives and questions of the research, and the definition of the research variables. In stating the problem, the researcher presents the identified gaps and damages related to the subject and seeks a suitable solution to solve them. Also, in the section on the importance and necessity of the research, the reason and necessity of conducting this research are stated. Then, the objectives and questions will be stated along with the gaps related to each of them. Also, in order to create a common understanding of the concepts and variables of the research, the conceptual and operational definition of the research variables is discussed. Finally, the scope of the research and the conclusion of the first chapter of the research are presented.

Problem Statement

E-learning is considered by educators as a method of providing more flexible learning and creating more opportunities for learners, facilitating the tracking of learners' progress and their activities, and also providing an opportunity to create effective learning environments. However, the aforementioned factors can be improved and their quality guaranteed only when these factors are reviewed and evaluated (Abbasi Kasani, Shams Murkani, Saraji, & Abedi, 2020; Khalifa & Razavi, 2012). Therefore, along with the development of e-learning at the level of universities and higher education institutions, the issue of evaluation and validation has gained importance, especially in terms of ensuring the quality of the teaching and learning process in higher education. Because assessment and evaluation are an integral part of any type of educational system and are considered important and influential activities in the educational process (Anari-Nejad, Sakti, & Safavi, 2010). In fact, without evaluating learners in e-learning, this type of education cannot be considered desirable or its quality can be improved (Basati, 2014).

However, one of the problems of e-learning is the evaluation method (Basati, 2010). There are major problems in holding exams via the Internet: First, it is not clear who the examiner is. Therefore, the exams must be held in person. Another problem of evaluation in e-learning is the excessive increase in objective tests (such as multiple choice, true or false, blank, etc.). Due to the speed of presenting the test and feedback, this is one of the natural applications of the electronic environment. However, such tests mostly measure low-level thinking skills and it is difficult to measure high-level skills with them (Amin Khandaghi and Baghani, 2010). Studies show that preparing and presenting evaluation reports in e-learning centers is also one of the problems in this field. For example, only the time of student entry and exit to the system is recorded in the reports, there is no report on course participation, the report only shows the student's activities and not their performance (the process of circulation in the system), etc. While reporting in full detail by the professor of all the activities performed by the student and the process of performing these activities can be a very suitable source for subsequent decision-making (Farhangi et al., 2018). Haghighi, Farajollahi, and Norouzzadeh (2013) also state that in online tests, due to the existence of very simple technology, there is a greater possibility of cheating, and this is a very big problem in evaluating learners. Tari (2016) also points out that the weakness of the evaluation system in virtual education is one of the challenges of e-learning, which includes the weakness of monitoring and controlling the accuracy of electronic tests, the inability to identify virtual examinees, and little trust in the accuracy of virtual tests.

To see the general status of evaluation in e-learning environments in our country, we can pay attention to the results of relevant research. The results of the research show that evaluation in e-learning environments in our country's educational institutions faces fundamental challenges. Jafarifar and Rezaeizadeh (2019) have identified the challenges of e-learning environments in universities in the country in a study and in the section on pedagogical challenges, they have considered one of the fundamental challenges to be the confusion of professors in the category of final evaluations and the arbitrary actions of university administrators in this regard, which has caused confusion among students and distanced them from conducting a comprehensive evaluation of learning objectives.

In support of this claim and describing the current status of online assessments in our country's higher education, Barari et al. (2020) in a study published in the Latin Journal of Interactive Learning Environments, in an attempt to prepare educational standards for e-learning environments, point out that during evaluation, which is the most important component of the e-learning curriculum, there is very little balance between learning objectives and the content of evaluations held in our country's universities, which they consider the most important reason to be the lack of specific and clear strategies and frameworks for professors to conduct evaluation in e-learning environments. They also point out that the incomplete understanding of instructors and students of the nature of e-learning environments and the failure to differentiate between such learning environments and face-to-face learning environments is one of the main reasons for the challenges in the field of e-learning in our country.

A review of new research and comparison of them with older research shows that most of these problems have existed in our country's e-learning environments since the past and have not yet been resolved.

In confirming the comprehensiveness of Bloom's taxonomy, Anderson (1994) states that the revised Bloom's taxonomy not only helps in understanding the stages and levels of learning but also in determining the educational objectives of lessons and the depth to which educators want to convey the subject matter. This taxonomy has been widely used by curriculum planners, administrators, researchers, and teachers in schools at all levels of education. It should also be noted that other taxonomies of educational objectives have directly or indirectly used Bloom's views over the past fifty years.

In short, it should be said that so far, no specific and indigenous framework has been developed for cognitive evaluation of learners in e-learning. Therefore, considering the research gaps and the need for the e-learning system of the Iranian Azad University to improve and complete the testing and evaluation section of its e-learning management system, as well as the importance and critical position of formative evaluation in the learning process, the researcher in this study seeks to identify the strengths and weaknesses of this system and to identify the necessary components for conducting a comprehensive evaluation that can cover all levels of learning objectives. In conclusion, it should be said that can we take effective, albeit small, steps to solve the evaluation problems existing in this e-learning system of our country's universities, and specifically the Islamic Azad University of Iran? Can we design a framework based on the facilities and technologies available in the e-learning system of our country's Azad University, based on which instructors in the field of e-learning can evaluate and assess the goals of the cognitive learning spectrum from the most basic goals to the highest ones?

E-learning

E-learning is the organization of teaching-learning activities in a formal and organized manner in which the teacher and the learner use information and communication technology to facilitate the process of interaction and collaboration (Samur et al., 2008, cited in Rezaeizadeh, 2014)

The National Education Authority of Australia states that e-learning is a broader concept than web-based learning, this type of learning includes a wide range of applications and processes that use electronic media to deliver professional education and flexible learning. The overall goal of supporting a wide range of electronic media (Internet, extranet and intranet) is to provide highly flexible professional learning for clients" (Saraji, 2009).

Electronic Learning Environments

With the development of information and communication technologies, universities and various organizations have turned to providing electronic education. Designers of such educational environments, using electronic facilities and tools, guide and manage all elements and processes of education and place learners in the learning environment from any place and at any time (Nistani and Yaqoub Kish, 2011). In this environment, the learner and the teacher, paying attention to the time and place distance, carry out all educational activities, including registration, management, content presentation, communication between the instructor and the student, communication between the student and other students, learning activities and evaluation using electronic facilities.

Since 1997, numerous e-courses and universities have been launched, some of which simulate and apply face-to-face education mechanisms in their design and delivery of their training, regardless of the characteristics and capabilities of the electronic environment (Siraj, 2009). The designers of these courses mostly use electronic tools to take control of the registration process, provide content, and conduct objective tests, and in other words, they manage e-learning. In contrast, in some e-courses or universities, the learning environment is designed in a way that assigns the responsibilities of the learning process to the learner. In this approach, learners are encouraged to form groups or research communities using the communication capabilities of technology.

Common approaches to designing e-learning environments

A group of e-learning environment designers, emphasizing the multimedia and informational features of the e-environment, design e-learning with an emphasis on information and management mechanisms. In contrast, since 2002, another group of e-learning environment designers, emphasizing the communication, personalization, and anytime features of the e-environment, have entrusted the control of the learning process in this environment to the learner so that he can access various people, content, and resources based on his learning needs and interests. Siemens, examining approaches to designing e-learning environments, divides them into two categories: administrator-centered and learner-centered (Siemens, 2006).

E-Learning Educational Framework

E-learning is a new and different approach to the teaching-learning process. As mentioned earlier, this different approach provides all stages of designing, presenting and evaluating the learning flow with electronic media. These media include the Internet, intranets, extranets, satellites, audio and video files, interactive televisions and a variety of digital technologies and applications that form an e-learning management system on an electronic infrastructure. This system can control the entire process of managing, presenting and evaluating the learning process. E-learning is definitely a new phenomenon in the field of education, but this new phenomenon must be a follower of learning theories and theories and cannot go beyond them (Beisler and Spotts, 2000). Most of the learning theories that are used in face-to-face classrooms can be developed to be used in technology-based learning and improve the quality of e-learning. Educational principles and learning theories should be the basis for creating new features in e-learning systems (Gwendezmi, 2001). Each of these principles, which include explicit instructions to guide the improvement of learning quality, can be integrated into these systems, and in this way, it can be hoped that the influence of educational professionals in the field of designing e-learning environments will improve.

Application of the Behaviorist Learning School in e-learning

The behaviorist learning approach is one of the first theories on which computer-based learning systems were designed. This school of thought is influenced by the theories of researchers such as Thorndike (1913), Pavlov (1927), and Skinner (1974), who believe that learning is a change in observable behavior and that it is caused by external stimuli in the environment (Seif, 2013). Behaviorists claim that observable behavior indicates whether a learner has learned something or not, and on this basis, behaviorists do not care about what happens in the learner's mind, and they consider the mind as a black box and only consider behavioral results. In general, this view ignores the mental processes of the mind; therefore, this school examines overt behaviors that are observed and measured by learning indicators (Goode and Braffy, 2000).

Application of the Constructivist Learning School in E-Learning

Constructivists consider learners as active and consider learning to be a continuous activity by the learner. Knowledge is not received from outside or from another person, but rather the learner's own interpretations and processing of what happens through the learner's thinking, feelings and activities in the actual learning environment (Jonasson, 1997); therefore, the learner is at the center of learning and the teacher plays the role of a guide and facilitator. The learner should be allowed to construct knowledge rather than having knowledge presented to him through teaching (Duffy and Cunningham, 2006). Also, Topscot (2008) states that learning is changing from one-way teaching by the teacher to the learner and the learning process is the construction and

discovery of knowledge by him. Constructivists believe that learners interpret and interpret information and the world based on their individual reality and learn through observation, processing and interpretation.

Application of the Theory of Relationalism in E-Learning
Due to the novelty of this learning theory, it is better to give a general description of this learning theory in order to clarify its applications in e-learning environments. The theory of relationalism states that, unlike other learning theories, it can respond to the challenges and demands facing educational systems. Despite its short life, this theory seems to have been more fortunate in attracting the attention of researchers. For example, Fenoglio (2008) believes that the recognition and understanding of relationalism as a contemporary dynamic learning theory shows that this theory has the potential to increase student engagement in learning experiences.

From the perspective of connectionism, learning is the process of creating new nodes and connections. In other words, learning is the process of shaping and shaping networks (Siemens and Titenberg, 2009). Connectionism is a perspective that sees knowledge and cognition as distributed at the level of a network of people and technology and considers learning as the process of communication, growth and navigation of those networks (Siemens, 2005, quoted in Eskandari et al., 2010). In simpler terms, creating nodes, connecting nodes to each other and forming a network of these nodes and connections creates learning; this type of learning is called network learning. The subtle point is that this definition does not consider learning as a result of communication, but rather communication itself. In this definition, learning does not only occur through the network, or is not facilitated by the network, but networking itself is introduced as learning.

Data Analysis
In order to create an overall view of the method of analyzing the collected data, it is necessary to state that the following steps were taken in order to answer each question.

A) For the interview file
1. Implementing the questioner in Word software

2. Uploading the text file of the interviews to the Max Quda software

3. Extracting speech signals related to the research question in the interview file

4. Extracting concepts by classifying speech signals for each research question

5. Extracting categories related to the classification of concepts from the interview

B) For the file of documents reviewed in the research synthesis section
1. Uploading the text documents of the research sample in the research synthesis section in the Max Quda software

2. Extracting speech signals related to the first three research questions

3. Extracting concepts related to the first three research questions

4. Extracting the main categories related to the first three research questions

5. Defining the categories

C) Combining and summarizing the results of the interviews and reviewing the documents related to each of the research questions and eliminating similar cases

Demographic information
The statistical population of the research includes two different groups of people from the faculties of educational sciences and humanities Islamic Azad University and other public universities are available, which include: a) In the qualitative part, all lecturers and faculty members of these faculties. b) In the quantitative part, all doctoral

students in the fields of educational technology and information technology in higher education. The research sample in the qualitative data section includes 14 people from the statistical population who were selected purposefully and until saturation was reached in data collection. The demographics of the research sample in the qualitative section are given in Table 1.

Table 1- Characteristics of the research sample population

Code	Relevant expertise and experience in the field of research	Workplace University
1	PhD student in e-learning - Teaching assistant at the e-learning center - Visiting lecturer at Arad Islamic University	Shahid Beheshti University, Tehran-Iran
2	PhD in Educational Technology - Faculty member of the Faculty of Educational Sciences - Instructor of e-learning courses - Lecturer at Arad Islamic University	Tarbiat Modares University, Tehran-Iran
3	PhD in Educational Management - Faculty member of the Faculty of Educational Sciences - Instructor of e-learning courses	Islamic Azad University, Kermanshah
4	PhD in Educational Technology - Faculty member of the Faculty of Educational Sciences - Instructor of e-learning courses	Islamic Azad University, Sanandaj
5	PhD in Educational Technology - Lecturer at the Faculty of Educational Sciences	Islamic Azad University, Kermanshah
6	PhD in Computer Engineering - Software, Vice-Chancellor of Technology and Information - Visiting lecturer at Islamic Azad University	University of Tehran-Iran
7	PhD in Educational Technology - Faculty member of the Faculty of Educational Sciences - Instructor of e-learning courses - Visiting lecturer at Islamic Azad University	Alzahra University, Tehran-Iran
8	PhD in Educational Management - Faculty member of the Faculty of Educational Sciences - Author of numerous publications in the field of web-based learning	Islamic Azad University, Kermanshah
9	PhD in Higher Education Management - Faculty member of the Faculty of Educational Sciences	Islamic Azad University, South Tehran
10	PhD in Curriculum Planning - Faculty member of the Faculty of Educational Sciences	Islamic Azad University, Kermanshah
11	PhD in Educational Technology - Faculty member of the Faculty of Educational Sciences - Visiting lecturer Islamic Azad University	University of Kurdistan
12	PhD in e-Learning - Faculty Member, Faculty of Educational Sciences - Instructor of e-Learning Courses - Visiting Lecturer, Islamic Azad University	University of Ilam-Iran
13	PhD in Educational Technology - Faculty Member, Faculty of Educational Sciences - Experienced in the Management of e-Learning Courses - Visiting Lecturer, Islamic Azad University	Khwarizmi University, Iran
14	PhD Student in Curriculum Planning - Teaching Assistant in e-Learning Courses - Research Background in the Field of e-Learning - Visiting Lecturer, Islamic Azad University	Shahid Beheshti University, Iran

Table 2 - Comparison of differences and similarities of categories extracted from dual information sources in the first research question

Row	Category title	Information source	
		Professors	Documents
1	Lack of use of various electronic evaluation tools	✓	✓
2	Weakness in giving and receiving feedback	✓	✓

Row	Category title	Information source	
		Professors	Documents
3	Inability to authenticate students	✓	✓
4	Weakness in class presentations	✓	-
5	Poor design of exercises and projects	✓	-
6	Weakness in online tests	✓	-
7	Weakness in discussion and exchange of opinions	✓	-
8	Not paying attention to electronic evaluation	-	✓
9	Weakness in reporting	✓	✓
10	Weakness in evaluation planning	-	✓
11	Weakness in evaluation implementation	-	✓

Weakness in giving and receiving feedback

Another weakness that was emphasized by all three sources of information and was mentioned a lot was the issue of feedback. As is clear, appropriate, timely and quick feedback can have a huge impact on e-assessment and provide the basis for continuous correction and improvement of learning and help identify weaknesses and strengths as early as possible. However, there are many weaknesses in the learning management system in this regard. Interviewee code 6 of students stated this as follows:

"When cheating occurs, the test results are good and the teacher thinks that he has taught well and in this case he cannot identify the weaknesses of the student."

Inability to authenticate students

One of the challenges of e-learning is the lack of clarity about the people participating in the class or assessments. This is a point that many interviewees and the literature pointed out and believed that some students only enter the class and it is no longer clear whether they are actually in the class or not. For example, interviewee code 2, a student, said:

"Another problem is that children bypass the classroom. That is, they turn on the system and leave. The professor sees that they are not logged in there."

The opinion of interviewee code 1, a professor, regarding the issue of authentication during evaluations in electronic environments was also as follows:

"One is that the student himself may not be behind the system and, for example, his wife or colleague may participate in the discussions instead. And that way, we cannot understand."

According to the opinions of the interviewees and the research literature, it can be concluded that our virtual education systems, and especially the virtual education system of the Islamic Azad University, are still far from new authentication technologies and that ultimately some professors can use traditional authentication methods, which also have their own limitations. In summary, all concepts extracted from the statements of the interviewees and the research literature in this field were named under the main category of the impossibility of authenticating students, and thus another weakness of electronic evaluation in the Islamic Azad University e-learning management system was identified.

Weaknesses in class presentations

The use of class presentations is considered one of the continuous evaluation tools in traditional and electronic educational systems. The interviewees believed that the use of this tool in the Islamic Azad University e-learning management system has weaknesses that have prevented it from being considered a tool for assessing learning. For example, the interviewee code 9 student believes that:

"Since the presentations were a lot of material and were only read by one person, usually the professors did not listen much and very few students listened."

Also, the opinion of the student interviewee code 6 was as follows:

"Due to the small number of sessions, the number of presentations in a training session is usually two or more, and this sometimes means that the professor does not have the opportunity to evaluate the student and provide accurate feedback."

The professor interviewee code 11 also believed that regarding the weaknesses of class presentations as a tool for electronic evaluation in e-learning environments:

"The time limit in reviewing the materials presented in class presentations prevents us from properly identifying existing problems and needs, and therefore we cannot obtain sufficient information to correct and improve the learning process."

The totality of such statements from the interviewees was classified into a general category titled Weaknesses in Class Presentations. As shown in the comparative table (Table 4-7), this category was obtained from interviews with students and interviews with professors. If used well as an electronic assessment tool, classroom presentations can play a significant role in correcting and improving learning as well as identifying strengths and weaknesses.

Poor design of exercises and projects

Classroom or extracurricular exercises along with various activities that are named in the form of projects are also another tool that can be used in electronic evaluation and are also available in the learning management system of the Islamic Azad University. However, according to the interviewees, this tool has weaknesses. The time-consuming nature of completing exercises and projects, the lack of interest of students in doing some projects, and such issues were among the issues that the interviewees mentioned. For example, the interviewee code 5 student stated:

"Exercises and projects in the electronic evaluation system have disadvantages, and that is that some of these projects are not of interest to students, and anything that goes against the ideas, beliefs, and interests of the student is of no use, even if he/she tries hard."

Also, the opinion of the interviewee code 5 professors on this matter was as follows:

"Exercises and projects are also one of the evaluation tools, especially electronic evaluation. In our LMS, there are not so many exercises that we can continuously evaluate students based on them."

Weaknesses in online tests

The meaning of the category of weaknesses in online tests is that there are a series of problems and weaknesses in online tests that have a significant impact on the evaluation of learners and awareness of their learning. The interviewees offered different opinions regarding the weaknesses of online tests. For example, the interviewee code 7 student said in this regard:

"We did not have an online test in this course, and even if there was, it cannot be very accurate. Because we have access to our materials and books and we can easily enter the information."

From the sum of such statements and points mentioned by the interviewees and the research literature, as well as other issues such as the failure to measure high levels of learning in online tests, the inability to report test results, and the limited time for online tests for various reasons, another main category was extracted under the title of weakness in online tests. If the conditions for holding various types of online tests are well provided, it is possible to obtain very good information about the learning status of learners, and while providing them with quick

feedback, their weaknesses and strengths can be quickly identified. □ Weakness in discussion and exchange of opinions

In order to evaluate learners in e-learning, by presenting problems to learners and observing the discussions that learners have about the problem, part of the learners' learning and participation can be evaluated. The purpose of the category of weakness in discussion and exchange of opinions is that in the electronic evaluation system of the Islamic Azad University, discussion and exchange of opinions faces many problems, which has prevented this electronic assessment tool from being useful. The student interviewee code 2 stated in this regard:

"Discussion and exchange of ideas were not very useful for us. Because we ourselves had WhatsApp and Telegram groups. But the problem was that the professor was not in these groups and our discussions really took on a personal aspect instead of a lesson discussion, and sometimes discussions would escalate between the students and there was no one to manage them."

The sum of such statements led to the creation of concepts such as lack of management of class discussions, lack of participation of all students in discussions, time-consuming discussions, conducting unscientific discussions, and such like, all of which were classified into one main category titled weakness in discussion and exchange of ideas. This category was also obtained from interviews with professors and students.

Lack of attention to electronic evaluation

This category indicates that in the electronic evaluation system of Islamic Azad University, electronic evaluation, or evaluation for learning, which aims to correct and improve learning, is not given special attention, and more emphasis is placed on final evaluations, which are simply aimed at evaluating the amount of learning and not at correcting and improving learning. The interviewee of code 8 students states in this regard:

"Proper electronic evaluation does not occur and the student is not aware of his/her academic status during the semester and is only informed at the end of the semester and after the exam".

Also, in the document code 15 of the research literature, it is stated in this regard:

"Another weakness of evaluation in e-learning is that more importance is given to final evaluation than electronic evaluation and it is considered the main criterion in evaluating students. While based on the intended curriculum of e-learning, electronic evaluation is more important than final evaluation".

The sum of these statements was named in the form of the main component of lack of attention to electronic evaluation. A component that, if not paid attention to, should not be expected to improve and correct learning. Because the nature of this type of evaluation is continuous improvement and correction of learning through feedback and identification of weaknesses and strengths. As shown in Table 4-7, this category was extracted from interviews with students and research literature.

Weakness in reporting

Professors of the Islamic Azad University e-Learning Center pointed out that there is no proper reporting in this center and that there are problems in this regard. For example, the interviewee code 3 professor stated the following regarding the weakness related to reporting:

"Regarding the problems that are facing current methods, well, naturally, when we do not have an independent method or a special plugin for evaluation that can record these records, we certainly cannot automatically report and review all the evaluations we have done."

Also, in the document code 1 of the research literature, which has pointed out the weakness of reporting in virtual education systems, it is stated as follows:

"Reports only indicate student activities, not their implementation (the process of circulation in the system)". Or "No report is provided on course participation".

The totality of concepts extracted from the statements of the professors of the Islamic Azad University e-Learning Center and also the research literature was named in the form of the main category of weakness in reporting. Appropriate and complete reporting of the status of students can play a significant role in subsequent decision-making and, to a large extent, through it, an understanding of the status of students' learning can be achieved. However, the findings show that there are still many weaknesses in this field.

Weakness in evaluation planning

One of the categories related to the weaknesses of electronic evaluation in e-learning that was only mentioned in the research literature and that students and professors did not pay attention to under this title was the category of weakness in evaluation planning. This category means that there are problems in the planning and design stage for electronic evaluation that prevent this type of evaluation from achieving the desired results. For example: In document code 15 of the research literature, it is stated as follows:

"Evaluation of students' academic progress in e-learning is not carried out in accordance with the e-learning curriculum guide."

Also, in document code 5 of the research literature, the discussion of building a culture of using electronic evaluation is mentioned:

In many studies, electronic evaluation has been emphasized, but the culture of using new and active methods such as electronic evaluation has not yet been implemented in schools.

By reviewing the research literature, the extracted concepts were named under the main category of weakness in evaluation planning. As the research literature also shows, there is no specific planning for electronic evaluation in e-learning. While this type of evaluation should be considered much more seriously. Because it is through electronic evaluation that we can identify strengths and weaknesses and improve the quality of learning.

Weakness in the implementation of evaluation

The category of weakness in the implementation of evaluation means that there are shortcomings in the implementation of evaluation that affect the evaluation in the first stage and the learning of students in the next stage. In the document code 7 of the research literature, one of the research results referred to the critical situation of conducting remote exams as follows:

"Investigating the gap between the importance and performance of the components of the assessment and evaluation dimension showed that the component of the possibility of conducting remote exams had a larger gap among other components, which indicates the more critical situation of this component."

In the document code 15 of the research literature, the difficulty of the level of tests in e-learning is also mentioned as one of the evaluation problems:

"The difficulty of the level of evaluation is another evaluation problem in e-learning."

As can be seen, the research literature has noted points related to the weaknesses of the evaluation implementation stage that the interviewees did not address under this title. In the evaluation implementation stage, and especially electronic evaluation, all necessary measures should be taken to ensure that this type of evaluation is implemented well. Because the results of this type of evaluation play a significant role in subsequent decision-making for student learning.

Quantitative data analysis

After screening, replacing missing values, quantitative data analysis was performed in two stages: a) descriptive data analysis b) inferential analysis and conducting statistical tests related to the research data. In the screening stage, two basic activities were applied to the completed questionnaires. First, questionnaires that were incompletely answered or had more than two options selected for each item were separated and eliminated. Due to the length of the questionnaire, the number of these questionnaires was relatively large (16), so an attempt was made to collect other questionnaires from the same university based on the university of the study sample. In the second stage of screening, due to the need for teaching experience in an e-learning environment within the learning management system of Islamic Azad University, respondents who answered zero for the number of evaluations completed were excluded from the data analysis process. The number of this type of questionnaire was 3. Most respondents who had not experienced conducting an electronic archive were contacted when they saw this question in the electronic questionnaire file and were thanked and prevented from completing the questionnaire.

Descriptive analysis of demographic data from the study The findings from the data analysis regarding the demographic characteristics of the participants (gender, experience in e-learning, academic field and academic level of the participants) which are the result of formal questions in the questionnaire or informally recorded information when exchanging questionnaires are presented in Table 3.

Table 3 - Descriptive statistics related to the demographics of the research sample in the quantitative data section

Participant characteristics	Frequency	Frequency	
Gender Experience in e-learning courses	%51	%51	%51
	%42	%42	%42
	%7	%7	%7
Field of study	%13	%13	%13
	%23	%23	%23
	%64	%64	%64
Organizational position Gender Experience in e-learning courses Field of study Organizational position	%13	%13	%13
	%30	%30	%30
	%1	%1	%1
	%5	%5	%5
	%5	%5	%5
	%14	%14	%14
	%5	%5	%5
	%8	%8	%8
	%9	%9	%9
	%5	%5	%5
	%4	%4	%4
University of study or service Gender	%66	%66	%66
	%32	%32	%32
	%3	%3	%3
Experience in e-learning courses	%24	%24	%24
	%10	%10	%10
	%26	%26	%26
	%7	%7	%7
	%5	%5	%5
	%6	%6	%6
	%10	%10	%10
	%12	%12	%12

Descriptive and inferential analysis of quantitative data

In this section, based on descriptive and inferential analyses of quantitative data collected from the questionnaire, the final research question, "What is the validity and weight of each component and subcomponent of the evaluation model developed for the Islamic Azad University e-learning system?", has been examined. Since all variables are random and there is only one variable in each hypothesis, the problem is a univariate observational study. Also, since judgment is involved in the problem, the inference is a statistical hypothesis test. Using the Student's t-test at the 0.5 level, we test the hypothesis that "each subcomponent is related to the main component." More precisely, we compare the average score of each subcomponent with the theoretical average (the theoretical average for this test is equal to 2). If the test confirms that the average score of the subcomponents under study is less than the theoretical average, it is concluded that the subcomponents under study are not designed correctly from the perspective of the respondents to the questionnaire. If the equality of the average score of the subcomponents under study with the theoretical average is confirmed, it is concluded that the subcomponents under study are acceptable from the perspective of the respondents to the questionnaire. And if from the perspective of this test the average score of the subcomponents under study is greater than the theoretical average, it is concluded that the subcomponents under study are completely related and relevant to the developed component from the perspective of the respondents to the questionnaire.

The Friedman test was then used to rank the importance of each of the developed indicators in relation to the relevant component, and the index was weighted by dividing the rank of each sub-component by the sum of the total ranks of the co-dimensional indicators (cumulative ranking).

Conclusion

Based on the findings of this study and other studies such as the study by Rifai et al. (2018), Shahbazzadeh and Mehri (2021), the component of using objective tests in a scientific manner that emphasized the use of objective, matching, scrambled, and hotspot questions was selected because these types of questions measure the learner's knowledge and the learner can answer these types of questions only by memorizing and without really understanding the subject matter. Therefore, the set of questions has the ability to measure the first level of classification, that is, the learner's memory and knowledge. If open-ended and short-answer questions can be used intelligently in designing e-assessments, such questions can demonstrate the learner's understanding of the material being tested; however, to measure the learner's ability to apply what has been learned in new situations, questions based on performance tests in a simulated environment should be used. However, if multiple-choice questions are designed wisely in presenting the options and their number, four-choice questions can be effective up to the third level of Bloom's taxonomy.

Although measuring high levels of learning objectives using objective questions is also feasible, a review of digital tests in e-learning systems shows that these types of questions are not well utilized for various reasons. These types of questions are usually designed in a divergent way and place the learner in a conflict or evaluative situation so that the learner can provide an answer using brainstorming. The research presented in the background section of the subject shows that due to the difficulty and time-consuming correction of such questions, they are used less. For example, when the learner uses simulation software, it is possible to judge the learner's level of access to high-level learning goals. Simulators in the education process can take the learner to the last point of the Bloom-Anderson learning pyramid in the following order, by retrieving, recognizing and recalling relevant knowledge from long-term memory, they provide the learner with access to the recall level. By constructing meanings from oral, written and graphic messages through interpretation, classification, summary, inference, comparison and explanation, they create understanding and comprehension in the learner's mind,

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comparison, and explanation, they create understanding and comprehension in the learner's mind. Simulators bring the learner to the application level by performing or using a method through execution and implementation of experiments. Breaking down materials into constituent parts, determining the different parts related to a subject, understanding differences through differentiation, organization, and attribution, creates the ability to analyze in the learner. Judging based on criteria and standards by checking and critiquing the results of simulated experiments will place the learner in the evaluation skill and ultimately this type of educational software by putting elements together as a coherent whole or performance; organizing elements with a new pattern or structure through production, planning and guiding the learner to the stage of inventing a new experiment and will create the most excellent type of learning; therefore, this use of this type of software will be very effective in measuring the learner's achievement of the upper classes of the cognitive domain.

With the entry of digital technologies into educational environments, the instrumental view of technology has changed towards technology as a revolutionary phenomenon in the educational field. Although there were high expectations for this type of learning at first, it was not as popular as it should have been, as Carliner and Shank (2017) state, although it was expected that half of formal education would be provided electronically by 2012, about 15 to 20 percent of this prediction occurred. Research by Bowen et al. (2012), Scott et al. (2015), and Nguyen (2015) also confirmed the phenomenon of no significant difference that Russell found in 1999 for the lack of a significant difference between face-to-face education and education using technology in practice, and concluded that digital approaches to learning have failed and that 80 percent of learners and managers prefer this type of learning to electronic learning if face-to-face learning conditions are available. In fact, after a period of fascination and exaggeration about the benefits of e-learning that began in 2000. The dominant view until the end of 2008 was an increase in distrust of e-learning.

However, many researchers have tried to clarify the reason for the failure of e-learning despite all its benefits. For example, Siemens and Titenberg (2009), while pointing out the limitations of the research that supports the phenomenon of no significant difference, believe that the quality used in e-learning courses is not desirable and does not have the necessary effectiveness. In their opinion, the effectiveness of e-learning is based on providing excellent educational quality, which is not present in many e-learning courses and the necessary conditions for taking advantage of the benefits of e-learning are not provided. According to Siemens and Titenberg (2009), Draxler (2010), and Downs (2009), in most universities, digital technologies are mainly used to support the logistical and technical processes of e-learning and are not used in the educational and pedagogical aspects of this type of learning. Therefore, the expected educational changes in e-learning do not occur, and the results of research in this field lead to the absence of a difference between face-to-face learning and e-learning.

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