An analysis of e-learning facilitating factors in elementary school education

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Abstract. *The present study made use of a descriptive analysis approach to examine the strategic factors that facilitate electronic learning among elementary school students in Hamadan, Iran, in 2023. The research community includes all of the principals and teachers employed in Hamedan's elementary schools (N = 917), who were selected using a stratified random sampling method and Cochran's formula with an error level of 0.05 calculated for 294 participants. The research instrument was a researcher created questionnaire whose validity and reliability were evaluated and confirmed. The data were analyzed using descriptive statistics, inferential statistics and exploratory factor analysis, Bartlett's sphericity test and the KMO sampling adequacy index. The data analysis identified several factors that affect e-learning: the creation of technological infrastructure and support services; a flexible education system; the empowerment of teachers to use electronic equipment; acceptance and incentives; support of principals and of innovative management; legal, administrative and financial systems; and teaching and learning strategies. Our findings indicate that these seven*

strategic factors that facilitate e-learning determined 64.75% of the variance of the entire test. The creation of technological infrastructure and support services was found to define 13% of variance; a flexible education system also 13%; the empowerment of teachers to use electronic equipment 10%; acceptance and incentives 9%; support of principals and of innovative management 7%; legal, administrative and financial systems also 7%; and, lastly, teaching and learning strategies 5%. Therefore, defining the strategic factors that facilitate electronic learning and striving to overcome obstacles to its implementation may improve learning among children.

Keywords: *E-learning; strategic factors of e-learning; elementary courses.*

Un análisis de los factores facilitadores del e-learning en la escuela primaria

Resumen. *El presente estudio se llevó a cabo con el propósito de analizar los factores estratégicos que facilitan el aprendizaje electrónico de los estudiantes de escuelas primarias mediante un análisis descriptivo en Hamadan, Irán, en 2023. La comunidad de investigación incluye a todos los directores y maestros de las escuelas primarias de Hamedan (N = 917) seleccionados mediante métodos estratificados. método de muestreo aleatorio y fórmula de Cochran y con un nivel de error de 0,05 calculado para 294 participantes. El instrumento de investigación fue un cuestionario elaborado por el investigador cuya validez y confiabilidad fueron evaluadas y confirmadas. Para analizar los datos se utilizó estadística descriptiva, estadística inferencial y análisis factorial exploratorio, prueba de esfericidad de Bartlett e índice de adecuación muestral de KMO. El análisis de datos mostró que la creación de infraestructura tecnológica y servicios de apoyo, sistema educativo flexible, empoderamiento de los docentes para el uso. Como resultados del e-learning se identificaron equipos electrónicos, aceptación e incentivos, apoyo a directivos y gestión innovadora, sistemas legales, administrativos y financieros y estrategias de enseñanza y aprendizaje. Los hallazgos indicaron que los 7 factores estratégicos que facilitan el e-learning determinaron el 64,75% de la varianza de toda la prueba. Creación de infraestructura tecnológica y servicios de apoyo, Sistema educativo flexible, empoderamiento de los docentes para el uso de formularios de equipos electrónicos, Aceptación e incentivos, apoyo a los rectores y gestión innovadora, el sistema legal y administrativo, y las estrategias de enseñanza y aprendizaje definen 13%, 13%,10%, 9%, 7%, 7% y 5% de la varianza, respectivamente. Como resultado, la identificación de los factores estratégicos que facilitan el aprendizaje electrónico y el intento de superar los obstáculos de implementación mejoran el aprendizaje de los niños.*

Palabras clave: *E-learning; factores estratégicos del e-learning; cursos de primaria.*

1. Problem statement

Today, electronic learning is recognized as a new approach in the modern education system and has brought about changes in many concepts about learning that were held in the past. E-learning can be used with educational content designed to strengthen critical thinking, with learning approaches based on cooperation and participation and in situations where learners are engaged in acquiring teamwork skills (Inan, Flores and Grant, 2010). E-learning is the provision and use of knowledge distributed through electronic media. It is mainly based on information and communication technologies such as satellite, video phones, and various computer networks (Mohammadi, Zaregi and Babaei Joybari, 2014). In other words, e-learning is the simultaneous or asynchronous delivery of educational materials to final users through the Internet. Dari and Akashi (2016) have defined the concept of strategic developments of e-learning by combining some factors and matching them with e-learning services provided in educational systems and schools.

The benefit of using these new methods of electronic education is that they provide the possibility of access to education and learning and the elimination of geographical boundaries for society as a whole, without restrictions. With the introduction of computers into people's lives and the parallel expansion of the Internet, many definitions and services have changed or are moving towards a fundamental transformation in such a way that the effects of these changes are becoming more obvious in our daily lives.

Huge information networks, stores and large economic enterprises, powerful information search engines, virtual institutions and forums, etc. have led to great advances in electronic learning (Batula, 2021). In addition, the current era is characterized by the combination of communication and information, an era in which human beings need greater access to information and must establish communication to obtain the information they require. Today, the availability of various advanced information and communication technologies makes it possible to communicate and exchange information quickly. People, wherever they are, can instantly get up-to-date information in any field. Humans have always accessed and retained information, but due to the limited nature of human needs, this process has not been given much attention. With the establishment of communication between societies and the emergence of various human needs and inventions, the world has entered a period called the "information age" (Heroveux, 2022).

2. Purpose of the study

We believe that the consequences of e-learning must be identified, although it is clear that it constitutes a way of designing, compiling, presenting and evaluating education using electronic capabilities to facilitate learning and support new approaches to teaching and learning in order to achieve meaningful and valuable learning outcomes. Of course, various factors influence e-learning in today's world, especially in developing countries. Therefore, the primary aim of this research is to identify the strategic factors that facilitate electronic learning in the education of elementary school children in Hamadan, Iran.

3. Theoretical foundation

The advent of computers in the 1960s marked the beginning of e-learning. According to Alia and Otami (2021), e-learning is a highly sophisticated approach to acquiring knowledge through the use of web-based platforms or other technology-driven communication channels. E-learning is an educational invention in which content is delivered through electronic media, including the Internet, intranet, extranet, satellite broadcasting, audio-visual tapes, interactive two-way televisions, and compact discs. Information and communication technologies first affected the flow of learning and, later, gave rise to the emergence of electronic learning (Shaidi and Sadeghzadeh 2011). Early models of self-learning, distance learning, virtual learning and group learning were based on databases, time management and synchronous and asynchronous learning. At that time, educators were attentive to the potential capabilities of this type of learning. Today, evidence suggests that electronic learning will be the most significant component of future education systems, making the development of this method a definite and undeniable necessity.

As technology advances, it is not difficult to envision a future that pushes e-leaning towards more learner-centered, virtual, enhanced, and personalized learning methods. But it should also be noted that the success of e-learning depends on several basic requirements that stem from its precursors. Aljuda (2017) and Chai et al. (2014) believe that various factors, including technology, education and management, and organizational field are effective as drivers of e-learning. Rezaei Rad, Zarei Zavaraki, and Yousefi Saeedabad (2012) mentions strategic, legal and administrative, technical and technological, educational, economic, cultural and social factors, Sharifi and Islamieh (2011),

in prioritizing the leading incentives in the application and development of e-learning in the higher education system, point out effective factors in the success of e-learning, including the technology program, educational factors, factors related to educational design, factors related to the teacher and factors related to students.

Pourkarimi and Alimardani (2019) performed seven stages of meta-synthesis and reviewed 30 of 106 articles. They identified five main components and 35 sub-components as factors that influence interaction in the electronic educational environment. In other research, Portavakkoli, Alinejad and Daneshmand (2019) found that factors such as content, interaction, technology, instructor, service quality, design, and perceived ease of use, personalization, perceived usefulness, learner, perceived value, and self-efficacy were among the most important factors affecting e-learner satisfaction. Also, they found that the most important factors affecting the satisfaction of the e-learner in the interview section were the principles of content design, the learner, implicit consequences, attention to approaches related to learning and the role of the teacher in e-learning.

Latip et al. (2022) found that four exogenous variables (performance expectation, social influence, perceived enjoyment and self-efficacy) significantly affected students' acceptance and e-learning. However, only performance expectancy and social influence were moderated by self-efficacy towards e-learning acceptance, as self-efficacy was found to significantly strengthen the relationship between performance expectancy and social influence with e-learning acceptance.

Makizadeh et al. (2012) found that the acceptance of e-learning is directly related to behavioral intention and motivation to learn. Also, Mohammadian et al. (2020) established that the successful use of information and communication technologies, from simple systems to electronic learning programs, requires user acceptance. The results of several studies show that the attitude towards a new technology plays an important role in its acceptance and use (Wu and Tsai, 2006). Elizzi and Bamber (2021) found that a combination of synchronous and asynchronous developments allows educational institutions to promote e-learning and encourage ownership, independent learning, and creative thinking.

Roumezi, Hosseinpour, Behmai and Nasiri (2021) found that the marked and increasing trend towards electronic learning indicates the various advantages of this method compared to traditional methods of education in such a way that e-learning should be promoted by equipping schools with electronic attendance and absence systems, interactive voice response systems (IVR), smart boards and, in general, with technology management. Also, the use of information and

communication technologies and smart equipment in general helps to improve the quality of electronic learning and its related services in education systems and leads to improved learning.

4. Design and methodology

The current research is based on a descriptive-analytical approach and was carried out in Iran in 2023. The research community included all of the primary school principals and teachers in Hamedan: a total of 917 individuals. Data was collected using stratified random sampling method. The sample size was calculated using Cochran's formula with an error level of 0.05 for 294 subjects. In order to collect data, a researcher-made questionnaire was used, the face and content validity of which was confirmed by experts. The questionnaire included 45 items in the Likert scale format and one open-ended question about the outcomes of e-learning. In terms of scoring, the "very low" option was given the lowest score (1) and the "very high" option was assigned the highest score (4).

In the present study, to measure the reliability of the tool, the questionnaire was first given to 50 individuals from the statistical community. After confirming the completion and collection, the data was analyzed using SPSS 21 software and the reliability coefficient of the questionnaire was obtained using a Cronbach's alpha of 0.96. Then, 294 questionnaires were distributed among the target population to identify the outcomes of e-learning. Descriptive statistics, inferential statistics, exploratory factor analysis, Bartlett's test and a sampling adequacy index (KMO) were used to analyze the information.

5. Main results

Exploratory factor analysis was used to identify the strategic factors that facilitate electronic learning in Iranian primary school children in Hamedan. First of all, the presuppositions of the exploratory factor analysis were examined via the KMO and Bartlett's test. The KMO value in this study was 0.94. Keyser test set the minimum KMO at 0.60, meaning that the implementation of the factor analysis is unimpeded if the KMO is ≥ 0.60. Of course, the closer the KMO value is to one, the more adequate the sampling will be. Therefore, there is a direct relationship between the level of KMO and the level of sampling adequacy. One of the basic assumptions in factor analysis is that the variables are correlated with each other. In other words, there must be a correlation between the variables. If the variables are independent from one another, it is not appropriate to use the

factor analysis model. Using Bartlett's test, if H_0 is rejected, the use of the factor analysis model can be justified because there would be sufficient assurance of the establishment of a correlation between the items on the questionnaire, which is the basis of the factor analysis. But if H_0 is not rejected, one can conclude that the observed correlation matrix belongs to a society with independent variables (the correlation matrix between questionnaire items in the society is equal to zero).

Therefore, by testing H_0 in Bartlett's sphericity test, the following two results can be inferred. If H_0 is rejected in the BTS test, the application of the factor analysis method is confirmed. If H_0 is not rejected in the BTS test, there is no reason to justify the use of the factor analysis method. In the present study, Bartlett's test with 96.6 is significant at the 0.05 level. Tables 1 and 2 show the amount of explained variance before and after Varimax rotation. This rotation causes the variance explained between the principal components to be adjusted. So, it can be said that the Varimax rotation has led to the simplification of the main components. As shown, seven factors or main components were extracted based on the determined special values, which have an explanatory power of 64/75.

The first factor comprises 13% of the variance, the second 13%, the third 10%, the fourth 9%, the fifth 7%, the sixth 7% and the seventh 5% of the variance. Table 3 presents factor loadings on each component or main factor. In the present study, the items that had a factor load of above 0.50 were taken into consideration (items 6, 11, 13, 37, 39 and 45 had a factor load below 0.50 and were excluded from the research). Table 4 also shows Cronbach's alpha of the extracted components to check the reliability of the determined components.

Table 1. Determining factors of the main components

Main components	Strategic factors facilitating e-learning	Variance explained	Percentage variance	Density percentage variance
first factor	Creating technological infrastructure and support services	19/47	43/28	43/28
second factor	Flexible educational system	2/12	4/73	48/01
third factor	Empowering teachers to use electronic equipment	1/94	4/32	52/34
fourth factor	Acceptance and incentives	1/80	4/01	56/36

fifth factor	Support of principals and innovative management	1/48	3/29	59/65
sixth factor	Legal, administrative and financial system	1/24	2/76	62/42
seventh factor	Teaching and learning strategies	1/04	2/32	64/75

Table 2. Determination of principal component factors after Varimax rotation

Factor	Main factors	Variance explained	Percentage variance	Density percentage variance
First	Creating technological infrastructure and support services	5/88	13/07	13/07
Second	Flexible educational system	5/70	12/66	25/73
Third	Empowering teachers to use electronic equipment	4/62	10/28	36/01
Fourth	Acceptance and incentives	4/09	9/10	45/11
Fifth	Support of principals and innovative management	3/27	7/27	52/39
Sixth	Legal, administrative and financial system	3/22	7/16	59/55
Seventh	Teaching and learning strategies	2/33	5/19	64/75

Table 3. Questionnaire items and components

Items	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7
12	0/71						
38	0/70						
16	0/67						
30	0/66						
29	0/66						
14	0/65						
34	0/50						
13	0/44						
23		0/71					

28		0/68					
24		0/67					
27		0/67					
25		0/63					
22		0/58					
21		0/53					
26		0/53					
20		0/53					
43		0/52					
45		0/44					
2			0/77				
3			0/74				
4			0/73				
5			0/63				
1			60				
8			0/52				
41				0/66			
42				0/63			
44				0/51			
40				0/51			
6				0/47			
39				0/47			
37				0/38			
35					0/70		
36					0/68		
31					0/58		
33					0/54		
19						0/59	
15						0/58	
18						0/58	
17						0/53	
9							0/72
10							0/58
7							0/53
32							0/52
11							0/48

Table 4. Checking the reliability of the components

Effective factors	Cronbach
Creating technological infrastructure and support services	0/91
Flexible educational system	0/90
Empowering teachers to use electronic equipment	0/86
Acceptance and incentives	0/79
Support of principals and innovative management	0/80
Legal, administrative and financial system	0/82
Teaching and learning strategies	0/76
Total	0/93

5. Discussion and conclusions

This research identified the seven main factors that facilitate e-learning. They are the creation of technological infrastructure and support services; a flexible education system; the empowerment of teachers to use electronic equipment; acceptance and incentives; management support and innovative principals, legal, administrative and financial systems; and teaching and learning strategies.

The first factor: Our results showed that before e-learning in primary education, it is necessary to create technological infrastructure and support services. This result is consistent with those of Roumezi et al. (2021), Portokli et al. (2019), and Abbasi Kani and Shams (2018). It involves creating technological infrastructure and support services, including suitable hardware as well as the required software, and connecting the school to the Internet with the appropriate bandwidth and speed, video communication for the purpose of electronic education, teacher and student access to the appropriate software and content, and a dedicated website maintained by a website manager.

The second factor: We found that electronic learning brings flexibility to primary education. This result is in agreement with those found by Romsey et al. (2020), Portokli et al. (2019), Abbasi Kani and Shams (2018) and Elizy and Bamber (2021). A flexible education system is characterized as having a specific, defined, comprehensible and flexible structure. If the structure of the education system has a closed, centralized and inflexible structure, teachers cannot make changes outside of that structure. If the educational structure is flexible and decentralized, teachers can implement different educational approaches and organize their classes in virtual forms and video conferences, school classrooms can be equipped with video projectors and smart boards, SMS sending systems,

electronic attendance systems, IVRs, etc. Special educational workshops and seminars can even be held to implement the electronic education system in order to familiarize parents and students with electronic education and learning (Mazloum Ardakani, Mansoori and Akhawat, 2017).

The third factor: The results showed that electronic learning enables teachers to use electronic equipment in primary education. This result is consistent with those of Romsey et al. (2020), Portokli et al. (2019), Mohammadian et al. (2020) and Abbasi Kani and Shams (2018). Empowering teachers to use electronic and smart equipment is necessary to implement an electronic education system. It is possible to help strengthen educational-executive structures in schools by developing information and communication technology skills in teachers and providing educational catalogs regarding electronic education and holding educational seminars. The ability to communicate with others through continuous technologies, time management in order to respond to students and their parents, as well as basic computer skills and internet search skills are necessary to access information. Teachers are expected to chat with others over the Internet and have the ability to hold continuous conversations through typing. Regarding important factors for success in e-learning, regular contact with teachers is very important in these schools, and teachers are constantly participating in online courses. Also, factor three requires teachers to use previous experiences related to learning technologies.

The fourth factor: The results showed that electronic learning causes acceptance and motivation in primary education. This result is consistent with the results of several other researchers (Roumezi et al., 2021; Pourkrimi et al., 2019; Portokli et al., 2019; Mohammadian et al., 2020; Abbasi Kani & Shams, 2018; Makizadeh et al., 2012; Latip et al., 2022; Elysee & Bamber, 2021). Acceptance of e-learning by users results in its effective use. The successful use of information and communication technologies, from simple systems to electronic learning programs, requires user acceptance (Mohammadian et al., 2020), and acceptance of e-learning has been directly related to behavioral intention and motivation (Makkizadeh et al., 2012). Several studies have shown that a person's attitude towards a new technology plays an important role in its acceptance and use (Tsai & Wu, 2006).

The motivational factor in this field is significant, as it implies that learners can maintain their motivation to learn continuously, even when teachers are not present. It also includes the ability to finish work and assignments despite disturbances and the presence of disruptive factors at home. Another factor we considered was the ability to learn through media, in which teachers enable students to

draw relationships between the content of video clips, take notes while watching the video, and finally understand the content of video lessons and create online group discussions. Also, principals can create the necessary motivation for teachers to participate in e-learning courses and provide motivational and encouraging opportunities for them to participate in training courses. Principals can motivate teachers to participate in e-learning courses and provide motivational and encouraging opportunities for them to participate in training courses. Teachers' enthusiasm when teaching using electronic learning tools is one of the characteristics that affects the success of electronic learning.

As a result, the greater the instructor's interest and passion for technology and its use in the teaching process, the more effective his or her performance in e-teaching is, because enthusiasm motivates teachers to share their knowledge with learners, use innovative methods and approaches in the virtual teaching process, and helps them play a facilitating role in the learning process.

The fifth factor: The results showed that electronic learning causes the support of managers and innovative management in primary education. This result is consistent with the results of several other researchers (Romsey et al., 2020; Pourkrimi et al., 2019; Portokli et al., 2019; Elizi & Bamber, 2021). The factor called innovative management and supportive managers implies that the teachers of this school have been able to gain the trust of school managers and that these officials have developed a positive attitude towards using e-learning and support the use of this type of education in their schools. In addition, students trust this approach towards learning as well. In schools with e-learning, the support of administrators is necessary in order to benefit from electronic education and to employ system and website designers. The principals in these schools are able to cooperate with other organizations, and electronic education is a priority in the current situation. Therefore, the presence of flexible and open-minded principals towards technological changes in education, as well as the supportive and innovative nature of principals play an important role in providing e-learning courses. Administrative support is essential in the creation and development of e-learning and its success. The application and monitoring of supportive management and the provision of e-learning can help learners to use this system successfully (Tavallaee, 2020).

The sixth factor: The results showed that the legal, administrative and financial system affect the success of electronic learning in elementary education. This result is consistent with the results of several other researchers including Romsey et al. (2020), Portokli et al. (2019) and Makizadeh et al. (2012). The legal, administrative and financial factor implies that schools and educational

institutions should set the rules and regulations of e-learning. E-learning contexts require regulations and rules that govern them as well as legal and executive policies related to e-learning. The lack of rules and regulations for e-learning and education in educational centers, as well as the impossibility of employing technology experts and the necessary management support, leads to inattention and the unwillingness of school teachers to embrace electronic learning.

The provision of electronic education is a financial factor in smart organizations and schools. Therefore, in order to prepare the educational materials and content for this type of education, it is essential to make funds and materials available and spend considerable time on it. However, officials do not show much enthusiasm in using the electronic learning system. As a result, teachers, administrators, and relevant officials should take the necessary measures by managing appropriate and efficient financial resources in order to provide sufficient funds to equip schools and also to update electronic education hardware and software. Schools should have enough credit for basic equipment, e-learning should be provided and schools should have the financial means to support e-learning.

The seventh factor: The results showed that teaching and learning strategies affect electronic learning in elementary education. This result is consistent with those found by Roumezi et al. (2021), Pourkrimi et al. (2019), Portokli et al. (2019) and Mohammadian et al. (2020). In the learning factor, the teacher is effective in the success of electronic learning. Research shows that the teacher is the most important factor affecting e-learning and teachers should present lessons friendly and energetically to create a positive e-learning environment; therefore, teachers' characteristics also affect e-learning (Chen, Liao & Chen 2010).

This factor suggests that schools should coordinate the current curriculum and e-learning programs. The condition of employment in this type of school is that the teachers are familiar with information and communication technologies, and the educational and curriculum planners and officials are familiar with electronic education. The lack of a general strategy regarding e-learning, as well as the lack of clear strategies for teachers, the laxity of policies and executive laws, etc. culminates in human actions, especially teachers' neglect of e-learning. Therefore, in order to promote electronic services in schools and educational centers, it is crucial to pay attention to the existing strategies regarding special electronic specifications. Also, teachers are expected to be aware of the acceptance rate of teaching methods in e-learning and participate in in-service training course on e-learning, strategic antecedents of teaching and learning include coordination of current curriculum with e-learning programs, familiarization of educational and lesson planners with e-learning, recognition of e-learning officials, cooperation

of other organizations by administrators, priority of e-learning in current conditions, compliance with copyright law regarding electronic content producers, and finally, changing the teaching and learning paradigm.

In general, identifying the effects of electronic learning and implementing the factors that contribute to its success can greatly enhance educational opportunities and strengthen a positive attitude towards the learning process. At the same time, efforts are needed to remove the obstacles to its implementation in order to help children improve learning.

Table 5. Questionnaire extracted from this studies factor analysis
Question: In your opinion, to what extent do the following items facilitate the electronic learning of elementary school students in Hamadan?

Factor	Item Number	Item	Very low	Low	High	Very high
Creating technological infrastructure and support services	12	The possibility of connecting to the Internet (intranet) with a suitable speed and bandwidth				
	34	The possibility of continuous technical support in matters related to e-learning				
	16	The possibility of video communication (face-to-face communication) for e-learning				
	30	The possibility of student access to educational content at the appropriate time				
	29	The possibility of accessing the site with computers connected to the Internet (network)				
	14	The ability to access suitable software for e-learning by teachers				
	23	Having a dedicated school website				

Flexible educational system	28	Equipping the school with SMS sending system					
	27	Equipping the school with an electronic attendance system					
	25	Equipping classes with video projectors and smart boards					
	22	Flexibility of teaching methods in education					
	21	Classrooms equipped with smart boards					
	26	Flexibility of training time and place					
	7	The level of mastery of English language teachers					
	8	The ability of teachers to produce electronic content					
Empowering teachers for e-learning	9	Teachers' understanding of electronic education					
	10	Teachers' ability to use computers and electronic equipment					
	24	Ability of teachers to use digital resources					
Acceptance and motivational incentives	35	Eagerness of teachers to participate in e-learning courses					
	20	Acceptance of e-learning by teachers					
	44	Acceptance of electronic learning by students					
	43	Teachers' interest in producing electronic content					
	38	Teachers' enthusiasm for teaching through virtual education					

Management support and innovative managers	42	Eagerness of teachers to participate in e-learning courses				
	41	Acceptance of e-learning by teachers				
	40	Acceptance of electronic learning by students				
	36	Teachers' interest in producing electronic content				
	19	Teachers' enthusiasm for teaching through virtual education				
Legal, administrative and financial system	15	Policy making, setting policy and executive rules related to e-learning				
	18	Financing the holding of in-service courses with the titles of electronic education				
	17	Sufficient credit for basic school equipment				
	33	Regulation of e-learning rules and regulations				
	31	Funding the costs of upgrading and updating electronic education hardware and software				
	2	The existence of educational and disciplinary rules and regulations appropriate to this method of education				
Teaching and learning strategies	32	The priority of electronic education instead of traditional education				

	3	Using information and communication technology in electronic learning				
	4	Changing the teaching and learning strategy				
	1	Acquaintance of educational and lesson planners with electronic education				
	5	Officials' knowledge of electronic training				

Based on the results of this study, we recommend that the quality of e-learning system programs are measured in terms of factors such as speed, content, etc. Additionally, the ease of using the e-learning system by teachers should be taken into consideration. Also, online support and error tracking of the e-learning system should be available to avoid wasting time and money for teachers and students. School managers and officials can use the benefits of optional computer science courses and include the materials needed by teachers in text and image files in order to master computer concepts.

We also recommend using experienced and digitally literate professors to provide training in e-learning along with motivated staff to improve teachers' attitudes towards such courses. Also, because the professors of these courses can play a big role in motivating teachers, they must be committed to providing this training and providing it well. The necessary platform and background for discussion regarding the content should be provided, and chat environments can be used during certain hours of the day and night for this purpose. Teachers' comments, criticisms and suggestions should be considered and teachers should be given the necessary feedback in this regard.

A few limitations should be mentioned with regard to the statistical population of this research; It only included elementary school students in Hamadan city. Therefore, caution must be taken when generalizing the results to other educational levels and cities. Also, factors such as social and cultural indicators, financial facilities, etc. were not considered in our study. Despite these limitations, this research opens up a new and growing field of study. In this regard, some factors were identified in the framework of this article for future research. Electronic learning at other levels of education, system quality, content quality, teachers' characteristics and social and cultural indicators all merit deeper investigation.

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