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Identifying and analyzing the challenges of virtual education during the Covid-19 pandemic in the first secondary school

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ABSTRACT

Background and Aim: virtual education is the intersection of distance education, computer-based education and internet technologies. The main purpose of this article was to identify and analyze the challenges of virtual education during the Covid-19 pandemic in the first secondary school. **Methods:** The research method is mixed (qualitative-quantitative). To conduct this research, in addition to document study, thematic analysis technique with MAXQDA12 software was used. The statistical population consisted of all experts in the field of educational management and primary education and teachers with high experience and work experience in education, after conducting 15 theoretical saturation interviews, and in the quantitative part of the statistical population, all university experts and teachers included 21 people. Dimtel technique has been used to determine the effectiveness and effectiveness of virtual education threats and opportunities **Results:** Qualitative findings showed that 7 components were extracted for threats and 6 components for opportunities; Quantitative findings showed that the criteria of economic components, parental involvement, educational-emotional and cultural, reduction of time and distance, evaluation and feedback, infrastructures and educational opportunities are effective components respectively. **Conclusion:** The components of economy, parental participation, educational-emotional and cultural, reduction of time and distance, evaluation and feedback, infrastructure and educational opportunities were the most effective. The components of preserving social and national resources, opportunities for evaluation and feedback, educational justice, attracting students, reducing costs, and learning quality are considered to be the most effective components, respectively.

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Introduction

Information and communication technology is a term that appeared in 1970 and included two subjects of mathematical calculations and logical communication of numbers. Various concepts and definitions have been mentioned in the field of information and communication technology. Information and communication technology is a technology that includes commercial and administrative information processing systems, etc. Computers and communication networks and special information of information technology and communication are components of information technology (Ahmadi, 2021). Information and communication technology is the basis of the movement of societies and the future generation in most fields and is considered as an important platform and tool for growth and development. The depth of the effects of this technology is such that ignoring it will lead to the loss of global status in new fields (Atshi et al., 2021). These technologies are a medium that allows the expression of a wide range of information, ideas, concepts and messages, and proficiency in information and communication technology means the ability to use it effectively. Proficiency in it enables a person to do different types of work, and to find different ways to do each work (Ghanbari Hamidabadi, 2021). Clark considers media communication tools and technology as inevitable and inevitable in educational topics. However, it should be noted that the amount of use of technologies and equipment depends on the attitude of users towards these tools, and the more positive their attitude is, the better the use of these trainings will be (Khademi & Sattari, 2021). Considering that communication technologies are used in education to develop interaction between all participants in educational activities, so interaction is considered a necessary part of the educational process. According to Wagner, interaction is a two-way event that requires at least two objects and two actions. Interaction occurs when these objects and events mutually affect each other. Interaction provides the possibility of doing various tasks and tasks in educational activities. Electronic learning has revolutionized traditional teaching and learning methods and played a significant role in its completion and development (Hosni et al., 2021). Even if we accept that "interaction" has a fundamental and important role in the teaching and learning process, e-learning, using emerging technologies, provides extensive interactions to access vast information and establish various types of communication. A possibility that existed in a very limited and insignificant way in the traditional learning process:

E-learning learners have 24-hour access to training courses; They study at their own pace; The need to travel to attend face-to-face classes is eliminated; There is no interference in the work schedule of the employees; The time required for learning is reduced by 25 to 30 percent (Pourghafar & Jafarzadeh, 2021). The results of the survey by Chatzirali et al. (2021) show that more than 97% of American universities and 95% of British universities and higher education institutions use virtual learning environments in a planned manner; For this purpose, they use one or more learning environment systems. Also, in some countries such as America, Canada, Australia, and England, every student is required to take at least two lessons of their academic courses virtually (Chetzirali et al., 2021). Therefore, with the help of information technologies based on the Internet, a huge revolution has been created in learning. In online education, learners are able to determine their learning speed and achieve educational goals according to their abilities. One of the techniques of electronic education is online education (WBI) (Rahbari & Saadatmand, 2021).

Online education is the intersection of distance education. The Internet is a popular tool for storing, presenting, collecting, sharing, processing and using information. The web has many advantages for learning. In other words, Internet-based education can be defined as: an educational program based on multimedia facilities that uses Internet resources to create a meaningful learning environment to provide growth and support for learning (Atashi et al., 2021). Internet-based education focuses on providing course content online and includes a variety of multimedia facilities such as visual, audio, drawing, demonstration, animation, and video (Sabzeh, 2021). On the other hand, the global pandemic of Covid-19 has caused drastic changes in our lives and our educational systems. Education has been affected in two ways: schools have been closed, and in some cases this closure is for the entire academic year; And economic production, which is the main source of funding

for education, has seriously decreased. Among the important approaches of the educational program of any country, face-to-face education is considered a priority. This priority manifests itself in different forms in the curriculum (Khademi and Sattari, 1400): in the form of formal planning and informal planning and hidden and implicit in the formal planning of what happens in the classroom; Education is teaching and learning and the process of education between teacher and student; In the hidden education of behavior and ethics and teacher-student relationships are also considered important, face-to-face training is of particular importance. For example: the active interaction between the student and the teacher with the student and the active role of the student in participating in communities and role-playing among people, as well as activities in which the act of creativity emerges in interaction with other students (Haji et al., 2021); They ultimately make the students' academic progress. By emphasizing face-to-face education, many styles and approaches have been active in face-to-face education until today. Other methods, including virtual training, have not been done in an operational manner, and with the spread of the Corona disease, virtual training became particularly evident with the declaration of an epidemic by the World Health Organization, and all the countries of the world were involved in this issue. Virtual education has many advantages and along with these advantages and disadvantages. The ones that were important in this research path of ours were lack of access to virtual education equipment and lack of communication and interaction and violating the principle of free public education for some students in the school. It made the researcher face the challenge of how the students who do not have virtual education equipment will progress in their educational program and also how the students' needs for social issues and individual and interpersonal interactions will be met when there is no face-to-face class. The only way to get out of it is to use the tools and equipment of health protocols to relieve stress and anxiety in order to attend classrooms both during the epidemic and after the epidemic is resolved. Therefore, students can send their students to school without fear and anxiety, as well as parents of students without worry, and the school environment is a safe environment for them. However, these alone are not enough to solve these problems because many economic, social, cultural and educational problems are effective in this process that virtual education sometimes causes its growth and development and sometimes causes stagnation and failure of education. In this regard, the researcher aims to answer the question of what are the challenges of virtual education in the era of the covid-19 pandemic in the first secondary school by studying the theoretical foundations and also with the help of education experts. And what are the effective factors on virtual education during the Covid-19 pandemic?

Method

This study is a mixed method study (qualitative and quantitative). In the qualitative phase, using research literature and semi-structured interviews, primary components were identified using thematic analysis method. The participants in the research are experts in the fields of educational management and human resources, as well as teachers of public and non-governmental schools of education in Tehran who have relevant academic degrees or have articles, books, authorships and teaching in this field. . The inclusion criteria were: At least three years of working experience in the university in the field of educational management and human resources management, specialists with at least a master's degree and a doctorate in the fields of human resources management, education and research-related titles, and managers of education regions. The sampling method was also targeted. Data collection method To collect quantitative data, a matrix questionnaire was used to examine the influential and influential variables using the decision making method of paired comparisons (Dematel) from the statistical community of experts, which consisted of 21 experts. The sampling method in this method was in the form of snowball. Interviews were conducted in the summer and fall 2021. The average time of the interviews was 73 minutes.

Implementation

After interviews, in order to analyze the data, the method of thematic analysis was used simultaneously with the data collection. Thus, after conducting the interviews, the tapes were first downloaded. After that, a copy of the extracted codes was sent to the interviewee and confirmed. In order to get familiar with the data and sink, the data was reread several times, in this way the primary themes were identified and similar primary themes were placed together in one class and the primary classes were formed. These layers were merged and formed the contents of the subjects. Also, to ensure the accuracy of the collected data, there was a long-

term and deep engagement of the data. In addition, two other researchers participated in data analysis in addition to the main researchers. The researcher read the manuscripts to confirm the coding and categories. To increase the verifiability, you refer to the participants again. Having maximum diversity in sampling and long interviews were other ways to increase the validity of the data. From the initial interview, themes and subclasses were formed, and then data reduction continued in all analysis units (themes) until themes emerged. The interviews continued until the theoretical data saturation stage. Qualitative content analysis was done with MAXQDA12 software. Pairwise comparison decision making (Dematel) is a method that is used to investigate the effect of each variable on other variables and to distinguish the effective from the effected components in the desired variable in order to achieve the general goals of the research. The paired decision model is able to determine the relationship between indicators that are dependent on each other individually or as a group. Dimtel analyzes the relationship between indicators by breaking down criteria into two parts, influential and influential. (Kanan et al., 2008). In this research, obtaining informed consent, maintaining identity information and maintaining confidentiality in implementing the content of the interviews were considered as ethical considerations.

Results

In the qualitative part, interviews with semi-structured questions were designed and conducted by experts and also managers of education regions. Out of a total of 15 experts who participated in this research, 7 were faculty members in the fields of educational management and human resource management, and 8 were teachers of different levels of government and non-government schools in Tehran. The process of qualitative content analysis was used to identify the challenges of virtual education during the Covid-19 pandemic. In this process, 408 primary codes were extracted (162 codes from 15 interviews and 246 open themes from the examined contents). By multiple review and integration of codes based on similarity and through several steps, 7 components and 59 indicators were discovered for virtual education threats and 6 components and 52 indicators for virtual education opportunities. A total of 111 indicators and 13 components were extracted for the challenges of virtual education during the 2019 Corona pandemic (according to Table No. 1).

Table 1. Final themes extracted from theoretical foundations and interviews

Indicators	Components	Dimensions	**The main variable**
Low student motivation	Educational-emotional and cultural	Threats	**Challenges of virtual education during the Covid-19 pandemic in the first secondary school**
Students' dependence on virtual space			
Teachers' stress			
Decreased attention of students during virtual education			
Creating anxiety for students			
The teacher's inability to understand the non-verbal language of all students			
The teacher's inability to understand the material in a tone of voice to the students			
It is the lack of knowledge of the teacher and the general about the copyright laws			
Virtual space can never establish strong human bonds between people			
Cultural differences between students and parents			
Cultural differences between parents and the culture of using virtual space			
Lack of internet with proper speed and infrastructural problems of virtual education	Infrastructures		
Not everyone has access to virtual education like Shad			
Hardware and software infrastructure			
Internet access and purchase of appropriate hardware and Internet			

Wide bandwidth		
Fluctuations of the global Internet network in different regions		
Inadequate computer knowledge of students		
Lack of teachers' computer knowledge		
Lack of access of all students to virtual education systems and tools		
Minimum computer knowledge required		
High cost of required infrastructure	Economic	
The high cost of mobile phones, tablets and...		
The heavy cost of high-speed internet		
Electricity used to charge and connect systems		
Lack of interaction and consensus among teachers	Quality of learning	
Stereotyped and inappropriate teaching methods		
Inconsistency between old books and new educational environment		
Content production difficulties		
Inefficient in-service courses		
There is no guarantee of receiving the same learning during virtual training		
The difference in the quality of online and offline virtual education		
Lack of proper and face-to-face feedback		
Stereotyped and inappropriate teaching methods		
Electronic learning and training is limited to simple text and images		
Overshadowing the quality of the training course		
Intensive supervision of organizational supervision on teachers' performance	Evaluation and feedback	
Lack of strict monitoring and occurrence of fraud phenomenon		
Lack of ability to conduct group assessments and encourage students to work in groups		
The possibility of a problem in the Internet connection		
It is not possible to use it in real tests in absentia		
The need for internet and a personal computer for each person		
Lack of proper and face-to-face feedback		
Helping parents to students without cooperating with the teacher	Parent involvement	
Lack of proper cooperation of parents		
Insufficient knowledge of parents in the field of computers and hardware		
Having too many children and not having enough time for each child		
Preventing parents from using cyberspace for students		
The impossibility of everyone using virtual training	Educational Justice	
Students not using free education according to the principle of the constitution		
Lack of the same quality of education for everyone		
Lack of free public education on how to use virtual space facilities		
More students are attracted to educational spaces	Student recruitment	Opportunities
Group learning with diverse ethnicities		
The possibility of designing a curriculum by each student according to personal needs		

Training is done individually, it has a very high interactive capability	
The possibility of teaching and learning for the general public	
Determining the speed and process of teaching and learning according to individual needs	
24/7 availability of electronic education	
Learning without the same prerequisites	
Individual learning along with cooperative learning	
Learning anytime, anywhere and with any context	
Saving time	Reduce time and distance
24-hour training available to everyone	
Quick and easy access anytime and anywhere in the world	
Road and air hazards that occur in scientific trips far and near (from going to another city to	
The meaning of participating in traditional classes to going to another country)	
Elimination of commuting time to the place of class and tests	
Participation in the test at desired times	
Time Management	
The need for the least amount of hardware to respond to the largest number of participants per unit of time	
Reducing the costs of producing equipment	reduction in costs
Save money on commuting to school	
The high cost of the required infrastructure (school, water, electricity, school equipment (tables and chairs, boards, plaster, etc.)	
Reducing the costs of holding an online test	
No need for physical space	
Universality of electronic learning	Educational opportunities
Teaching and learning in two ways	
Get quick results in teaching and learning	
Learning more (using multimedia facilities)	
Set the learning curve	
Delete duplicate content	
Increase the power of information retention	
Increasing the possibility of pursuing comprehensive work	
The possibility of using multimedia files, accurate timing, various questions	
The possibility of displaying different questions for each participant	
Ability to save history and get progress reports	
Increasing educational efficiency	
User profile to view personal history	
self-evaluation	Opportunity for evaluation and feedback
Online test in virtual education	
The possibility of using multimedia files, accurate timing, various questions	
The possibility of displaying different questions for each participant	
The possibility of holding an unlimited number of personal tests	
The possibility of holding short quizzes for educational applications	
Announcement of the test result immediately after the end of the test	

Quick access to answer letters and detailed answers to questions	
Participation in the test at desired times	
Increasing information security and testing	
Support for test and descriptive tests, multiple options	
The possibility of participating in the exam through a mobile phone (responsive design)	
The possibility of creating an automatic test based on elective courses	
The possibility of holding a survey after the end of the test	
Possibility of immediate viewing of report card after the end of the exam	
The possibility of immediate viewing of the answer sheet after the end of the online exam	
Ability to pay online and purchase access to exams	
Management section with full control over users, tests, lessons and questions	
Social and national savings	Preservation of social and national resources
Conservation of resources and reduction of environmental and noise pollution and...	
Environmental Protection	
Positive cultural and social effects	

DEMATEL technique process

Step 1– Calculating direct correlation matrix (D)

In this step, the average opinions of research experts can be seen in Table 2.

This table is a compilation of the opinions of 21 experts based on arithmetic mean. For example, in cell c12, it is calculated as follows.

$$c_{12} = \frac{1+2+2+3+2+3+4+3+4+\cdots}{21} = 2.14$$

Table 2. Direct correlation matrix (D) (average opinion of 21 experts)

	Infrastructures	Economic	Quality of learning	Evaluation and feedback	Parent involvement	Educational Justice	Educational-emotional and	Reduce time and distance	Reduce costs	Educational opportunities	Opportunity for evaluation and	Preservation of social and national	Student recruitment
Infrastructures	0.00	2.14	2.71	2.29	1.71	2.71	2.14	2.00	2.71	2.71	2.57	3.14	2.14
Economic	2.00	0.00	3.43	1.86	2.29	2.86	2.14	2.00	3.14	3.43	3.00	3.43	3.14
Quality of learning	1.86	2.29	0.00	2.14	1.57	2.57	1.71	2.43	2.86	2.57	3.00	3.29	2.57
Evaluation and feedback	1.86	2.57	2.57	0.00	2.00	2.86	2.14	2.14	2.71	3.00	3.14	2.71	3.14
Parent involvement	2.43	2.00	3.00	2.43	0.00	3.14	1.86	2.29	3.00	2.71	2.86	3.14	2.57
Educational Justice	2.29	1.86	2.71	2.14	2.14	0.00	2.00	1.86	2.29	1.71	2.86	3.00	2.43
Educational-emotional and cultural	2.00	1.57	2.71	2.57	2.14	2.86	0.00	2.14	2.86	2.57	3.43	2.43	2.57
Reduce time and distance	1.86	2.14	2.71	2.71	2.00	2.57	1.57	0.00	2.57	2.71	3.43	2.71	2.71
Reduce costs	2.00	1.57	2.43	2.29	2.14	2.57	1.86	2.00	0.00	2.29	2.86	3.00	2.86
Educational opportunities	2.14	2.57	3.00	2.00	1.86	3.00	2.57	1.86	2.57	0.00	2.57	2.86	3.14
Opportunity for evaluation and feedback	2.29	2.00	2.86	2.14	1.86	3.14	2.29	1.86	2.14	2.00	0.00	2.71	2.29

Preservation of social and national resources	1.86	1.86	2.57	1.86	2.00	2.57	1.71	2.29	3.14	2.00	2.29	0.43	2.71
Student recruitment	1.86	1.86	2.57	1.57	2.14	2.43	1.71	1.86	2.86	2.14	2.57	2.57	0.00

Step 2- Normalizing the direct correlation matrix

To normalize the obtained matrix, mathematical relations have been used with the help of writing formulas in excel software. That is, first, the sum of the rows and columns of the matrix of direct communication should be obtained, then the highest value should be calculated from among the total numbers, which is given in Table 3.

Table 3. Total row and column of direct relasionship matrix

	Sum of row	Sum of Column
C1	24.42857	29
C2	24.42857	32.71429
C3	33.28571	28.85714
C4	26	30.85714
C5	23.85714	31.42857
C6	33.28571	27.28571
C7	23.71429	29.85714
C8	24.71429	29.71429
C9	32.85714	27.85714
C10	29.85714	30.14286
C11	34.57143	27.57143
C12	35.42857	27.28571
C13	32.28571	26.14286
	35.42857143	

Then, in order to normalize all the rows of the direct correlation matrix (Table 2), we divide by the number 35.42857143. The normalized matrix is given in Table 4.

Table 4. Normalized matrix of DEMATEL method

	Infrastructures	Economic	Quality of learning	Evaluation and feedback	Parent involvement	Educational Justice	Educational-emotional and	Reduce time and distance	Reduce costs	Educational opportunities	Opportunity for evaluation and	Preservation of social and national	Student recruitment
Infrastructures	0.000	0.060	0.077	0.065	0.048	0.077	0.060	0.056	0.077	0.077	0.073	0.089	0.060
Economic	0.056	0.000	0.097	0.052	0.065	0.081	0.060	0.056	0.089	0.097	0.085	0.097	0.089
Quality of learning	0.052	0.065	0.000	0.060	0.044	0.073	0.048	0.069	0.081	0.073	0.085	0.093	0.073
Evaluation and feedback	0.052	0.073	0.073	0.000	0.056	0.081	0.060	0.060	0.077	0.085	0.089	0.077	0.089
Parent involvement	0.069	0.056	0.085	0.069	0.000	0.089	0.052	0.065	0.085	0.077	0.081	0.089	0.073
Educational Justice	0.065	0.052	0.077	0.060	0.060	0.000	0.056	0.052	0.065	0.048	0.081	0.085	0.069
Educational-emotional and cultural	0.056	0.044	0.077	0.073	0.060	0.081	0.000	0.060	0.081	0.073	0.097	0.069	0.073
Reduce time and distance	0.052	0.060	0.077	0.077	0.056	0.073	0.044	0.000	0.073	0.077	0.097	0.077	0.077
Reduce costs	0.056	0.044	0.069	0.065	0.060	0.073	0.052	0.056	0.000	0.065	0.081	0.085	0.081
Educational opportunities	0.060	0.073	0.085	0.056	0.052	0.085	0.073	0.052	0.073	0.000	0.073	0.081	0.089
Opportunity for evaluation and feedback	0.065	0.056	0.081	0.060	0.052	0.089	0.065	0.052	0.060	0.056	0.000	0.077	0.065

Preservation of social and national resources	0.052	0.052	0.073	0.052	0.056	0.073	0.048	0.065	0.089	0.056	0.065	0.012	0.077
Student recruitment	0.052	0.052	0.073	0.044	0.060	0.069	0.048	0.052	0.081	0.060	0.073	0.073	0.000

Step 3- Calculating the total relationship matrix (T)

To calculate the complete correlation matrix based on the formula written in excel software, first the same matrix (I_(13*13)) is formed. Then we subtract the same matrix from the normal matrix and invert the resulting matrix. Finally, we multiply the normal matrix by the inverse matrix. The total relationship matrix is given in Table 5.

Table 5. The matrix of the total relationship of the criteria

(T)	Infrastructures	Economic	Quality of learning	Evaluation and feedback	Parent involvement	Educational Justice	Educational-emotional and	Reduce time and distance	Reduce costs	Educational opportunities	Opportunity for evaluation and	Preservation of social and national	Student recruitment
Infrastructures	0.241	0.298	0.392	0.314	0.282	0.392	0.291	0.297	0.388	0.357	0.399	0.419	0.370
Economic	0.323	0.269	0.447	0.333	0.324	0.434	0.319	0.326	0.436	0.408	0.448	0.466	0.431
Quality of learning	0.289	0.299	0.319	0.309	0.277	0.387	0.279	0.306	0.390	0.351	0.407	0.420	0.378
Evaluation and feedback	0.306	0.323	0.408	0.268	0.303	0.415	0.305	0.315	0.407	0.381	0.433	0.429	0.413
Parent involvement	0.324	0.313	0.424	0.337	0.254	0.428	0.302	0.323	0.420	0.379	0.431	0.446	0.404
Educational Justice	0.288	0.276	0.374	0.296	0.279	0.303	0.274	0.280	0.360	0.316	0.387	0.397	0.359
Educational-emotional and cultural	0.301	0.289	0.400	0.328	0.299	0.405	0.240	0.307	0.400	0.361	0.429	0.410	0.388
Reduce time and distance	0.297	0.303	0.399	0.330	0.294	0.397	0.282	0.249	0.392	0.364	0.427	0.416	0.391
Reduce costs	0.285	0.274	0.372	0.304	0.283	0.376	0.275	0.287	0.305	0.335	0.392	0.402	0.375
Educational opportunities	0.307	0.316	0.411	0.316	0.294	0.411	0.310	0.302	0.396	0.296	0.411	0.424	0.406
Opportunity for evaluation and feedback	0.290	0.283	0.380	0.299	0.274	0.388	0.284	0.282	0.359	0.326	0.316	0.393	0.358
Preservation of social and national resources	0.277	0.276	0.370	0.289	0.276	0.370	0.267	0.290	0.381	0.323	0.373	0.330	0.366
Student recruitment	0.268	0.267	0.358	0.272	0.270	0.355	0.258	0.271	0.362	0.316	0.368	0.374	0.283

Step 4- Creating a causal diagram

In order to form the causal diagram, we obtain the sum of the rows (D) and the sum of the columns (R) of the total relationship matrix and then calculate D+R and D-R.

Table 6. Importance and impact of criteria

		D	R	D+R	D-R
Infrastructures	C1	4.44026	3.796374	8.236634	0.643886
Economic	C2	4.963899	3.786223	8.750123	1.177676
Quality of learning	C3	4.410883	5.054057	9.46494	-0.64317
Evaluation and feedback	C4	4.706845	3.994921	8.701765	0.711924
Parent involvement	C5	4.783967	3.707406	8.491373	1.076562
Educational Justice	C6	4.188196	5.061039	9.249235	-0.87284

Educational-emotional and cultural	C7	4.557021	3.686387	8.243408	0.870634
Reduce time and distance	C8	4.542111	3.835044	8.377155	0.707067
Reduce costs	C9	4.263597	4.996578	9.260175	-0.73298
Educational opportunities	C10	4.599358	4.510931	9.110289	0.088427
Opportunity for evaluation and feedback	C11	4.232821	5.22064	9.453461	-0.98782
Preservation of social and national resources	C12	4.186672	5.326109	9.512781	-1.13944
Student recruitment	C13	4.02344	4.923363	8.946803	-0.89992

According to Table 6, the higher the D value of a criterion, that criterion is highly effective. Based on this, the criteria can be arranged based on the effectiveness rating as shown in Table 7.

Table 7. Impact ranking of sub-criteria

		D	Rank
Infrastructures	C1	4.44026	7
Economic	C2	4.963899	1
Quality of learning	C3	4.410883	8
Evaluation and feedback	C4	4.706845	3
Parent involvement	C5	4.783967	2
Educational Justice	C6	4.188196	11
Educational-emotional and cultural	C7	4.557021	5
Reduce time and distance	C8	4.542111	6
Reduce costs	C9	4.263597	9
Educational opportunities	C10	4.599358	4
Opportunity for evaluation and feedback	C11	4.232821	10
Preservation of social and national resources	C12	4.186672	12
Student recruitment	C13	4.02344	13

According to table 7, the higher the value of R of a criterion, it means that the criterion has high effectiveness. Based on this, the criteria can be arranged based on the ranking of effectiveness as shown in table 8.

Table 8. Effectiveness ranking of sub-criteria

		R	Rank
Infrastructures	C1	3.796374	10
Economic	C2	3.786223	11
Quality of learning	C3	5.054057	4
Evaluation and feedback	C4	3.994921	8
Parent involvement	C5	3.707406	12
Educational Justice	C6	5.061039	3
Educational-emotional and cultural	C7	3.686387	13
Reduce time and distance	C8	3.835044	9
Reduce costs	C9	4.996578	5
Educational opportunities	C10	4.510931	7
Opportunity for evaluation and feedback	C11	5.22064	2
Preservation of social and national resources	C12	5.326109	1
Student recruitment	C13	4.923363	6

According to the table above, the variables in column D indicate influence and the variables with a higher number in column R indicate effectiveness. Finally, the addition and subtraction of each of them shows the final effectiveness of each component, as shown in figure 1.

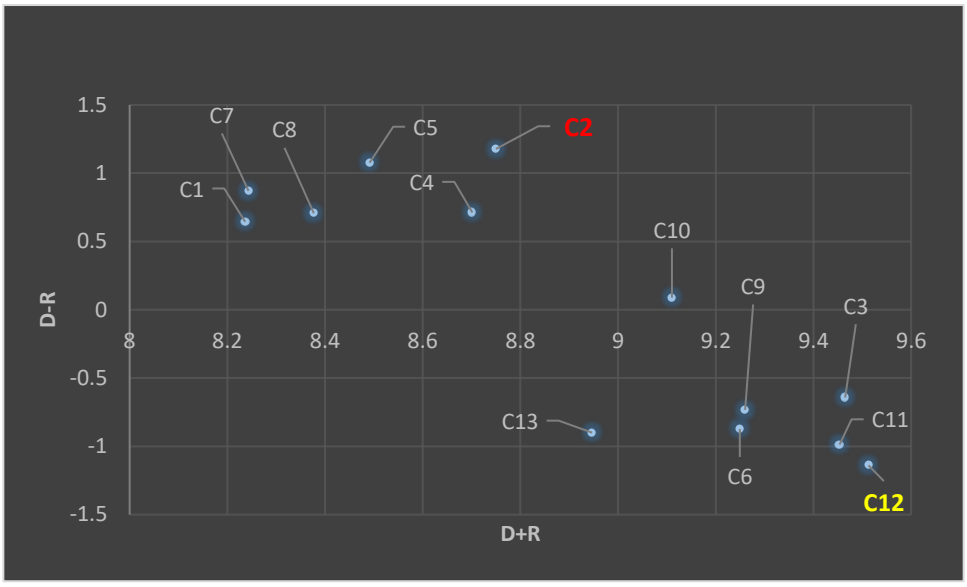

Figure 1. Position of criteria based on D+R and D-R

The criteria that are above the X axis have a positive D-R. These criteria have a causal aspect and their effectiveness is greater than their acceptability. Economy, parental participation, educational-emotional and cultural, reduction of time and distance, assessment and feedback, infrastructure and educational opportunities are the effective components, respectively.

The criteria that are at the bottom of the X axis have a negative D-R. In the research, they have a disabled aspect, that is, they have a higher effectiveness. The components of maintaining social and national resources, evaluation and feedback opportunity, educational justice, student attraction, cost reduction, and learning quality have the most impact.

Conclusion

The purpose of the current research was to identify and analyze the challenges of virtual education during the Covid-19 pandemic in the first secondary school. Along with the development of virtual and offline education, attention to the elements of this type of education has become more visible. Today, from the lowest to the highest levels of education, virtual education is used, so it is important and inevitable to pay attention to the nature of virtual education. Among the important elements and actors of virtual education are students and teachers. Therefore, paying attention to the experiences of these elements is very necessary and undeniable. During the outbreak of the Corona virus, the Ministry of Education ordered the closure of schools, so that after the New Year holidays, the spread of the disease may decrease and schools can start working (Shomali Ahmadabadi et al., 2021); It has many consequences for society. The economic, social and cultural consequences of the epidemic of this virus are visible in all aspects of people's lives around the world. One of the national functions that is heavily affected by the current crisis is education (Ministry of Science, Research and Technology, 2020). Following the spread of the Corona disease, virtual education has gained double importance all over the world and has entered the field of formal school education and alternative teaching. However, despite all the opportunities created in the field of education, teachers, parents and students faced serious challenges and the entry of technology into the field of information and the emergence of information technology transformed all aspects of human life; The process of doing things has changed quantitatively and qualitatively in the not so distant past, and as a result of these changes and developments, educational centers faced a new phenomenon called education technology. This phenomenon has changed education from the traditional state and given it a special flow (Jani et al., 2020). It seems that Iran, based on the existence of software and hardware infrastructure, the possibility of accessing the network, the penetration rate of the Internet and the infrastructure factors in the development of the learning network that has been measured, is in the initial stage; However, in the level of stakeholders, the ratio of teachers and custodians of virtual learning statistics to the knowledge of basic software and educational software is in the

progress stage. This is despite the fact that the extent of teachers' utilization of this knowledge and its impact on the development of information and communication technology-based learning is due to cultural infrastructure issues and the lack of codified laws at the elementary level (Rezapour & Moharramzadeh, 2021). Educational methods based on virtual space have been introduced by UNESCO as the most effective teaching method in 2005. The experience gained in this field is very useful; Education can no longer provide education with the previous model, and they must put structural and digital changes at the top of their agenda and make it widespread throughout the country. Therefore, in the situation of creating a crisis such as the spread of Corona disease in the world and in Iran and the long-term closure of schools, the need to pay attention to virtual and electronic education is felt more than ever (Salimi, 2020). Of course, it should be kept in mind that virtual teaching has created problems for teachers and educational centers, including unfamiliarity with new technology and unknown challenges (González Galva et al., 2021). Virtual space is a new generation of social relations space, which, although they do not have a very long life, have been able to make a good place in people's lives. Many people of different ages from different social groups have come together in virtual space and communicate with each other from far distances in the real world. Today, the methods of communicating with others through the Internet have increased, electronic mail, short messages, chat rooms, web bases and games have become ways to expand and maintain social relationships. Since being in the virtual space is a time-consuming activity, it reduces the amount of interaction and communication between people in the real space, and in the meantime, young people devote more time to using the virtual space than adults in terms of their free time. (Nunley et al., 2021). One of the reasons for not addressing this issue in recent researches is the smallness of many researches. In most researches, positivist paradigms are more visible and it is the most widely used scientific view of recent researches. We believe that if the research is carried out qualitatively and if first-rate scholars in human sciences and familiar with the issues of education and sociological sciences and familiar with decision-making are used, virtual education will change into a measurable and tangible word. And will lead to the explanation of the theory in this regard. Among the innovative aspects of this research, we can mention the methods of extracting meaning and concepts related to virtual education, because in most researches more than quantitative aspects have been used to extract concepts. While this research is based on semi-structured interviews with professors and managers of education districts. Also, the use of Max QDA and Excel software can be considered as the use of modern technology in the construction of the theories of this research. On the other hand, extracting practical dimensions and components for how to teach virtual in the era of Covid-19 is operational.

Conflict of Interest

According to the authors, this article has no financial sponsor or conflict of interest.

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