



Research article

Mothers' experience of virtual education during and after the COVID-19 pandemic: A qualitative study

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ARTICLE INFO

Keywords:

Mothers

Virtual education

Qualitative study

COVID-19

ABSTRACT

This qualitative study was conducted with the aim of investigating the experience of mothers in Tehran in the field of virtual education during the COVID-19 pandemic. The participants in this study were 17 mothers of school children who experienced virtual education in Tehran during the COVID-19 pandemic. Data collection was done through semi-structured interviews, over the phone, and lasted for approximately 30–45 min. The interviews were audio recorded with the permission of the participants, transcribed verbatim, and analyzed using the method of conventional content analysis. For this study, 17 mothers were interviewed. Of those, 7 had one school-age child, 8 had two, and 2 had three. All of the children lived with both their mother and father. The majority of the mothers (16 out of 17) held bachelor's degrees. On average, the students were 11.76 years old. Fourteen of the students attended public schools, while 3 attended private schools. Most of the mothers (14 out of 17) reported their financial status as average. Data analysis led to the identification of 3 main themes and 12 subthemes. The three main categories were family-related factors, student-related factors, and school-related factors. The 4 themes related to family included 1) the role of family as a teacher, 2) the importance of direct and indirect supervision in family education, 3) the cost, and 4) the peace of mind. Factors related to students included 5 themes; 1) the advantages and disadvantages of virtual learning environments, 2) time management in education, 3) the consequences of failing to acquire necessary skills and knowledge, 4) issues of indifference and fraud in education, 5) physical, mental, and social problems affecting students. Factors related to schools included 3 themes; 1) the role of the teacher in virtual teaching and learning, 2) the challenges of lack of prior experience in education, 3) inequality in access to education and opportunities. The findings of this study have several implications for policymakers. Paying attention to technological and educational challenges related to virtual education and providing adequate support to parents are important things that should be prioritized. In addition, psychological support services should be made available to parents so that they can cope with the emotional challenges of virtual education. Finally, the

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<https://doi.org/10.1016/j.heliyon.2024.e29532>

Received 18 March 2023; Received in revised form 4 April 2024; Accepted 9 April 2024

Available online 10 April 2024

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positive experiences reported by mothers suggest that virtual education can be an effective and flexible option for future education, provided that the challenges are adequately addressed. Moreover, no work has been done on this issue comprehensively and the few studies that have followed this method have had some limitations. Therefore, schools, parents, and policymakers should explore innovative ways of integrating virtual education into the educational system to provide flexible and effective learning opportunities for students.

1. Introduction

Education is a crucial aspect of the progress and development of individuals and society as a whole. It equips people with various skills, providing them with opportunities to be productive in their future lives [1]. However, the Covid-19 pandemic, which originated in Wuhan, China in December 2019, has affected all areas of life, including education [2,3]. The pandemic led to unprecedented changes in educational methods, with the closure of educational institutions to prevent the spread of the virus [4,5]. As a result, the education system in 188 countries, including over one and a half billion students, has been significantly impacted [6]. In response, many educational institutions have shifted to online learning, resulting in a massive unplanned transition from traditional learning to an exclusively online approach [7,8].

In Iran, like other countries, social distancing measures led to the closure of face-to-face classes, prompting educational authorities to adopt virtual teaching methods and online exams. Virtual education is a method of designing, compiling, presenting, and evaluating education that utilizes technology to facilitate learning. While virtual learning offers several advantages over traditional educational programs, such as access from anywhere at any time, asynchronous discussions with classmates, and immediate feedback on tests, its implementation is not always straightforward [9]. Virtual education is provided through television programs and social media on mobile phones. Although the pandemic has created an opportunity to test new educational solutions, the conditions for achieving virtual education in the coronavirus crisis are complex due to:

- Cultural and social contexts
- Lack of teacher preparation
- Limited access to infrastructure and equipment
- Preference for face-to-face classes
- Limited access to smartphones
- Insufficient media literacy and technological capabilities
- Inability to virtualize all courses
- Time constraints [10].

A systematic review suggests that improving relationships between families, students, and schools is essential for ensuring that all students receive the education and support they need during the COVID-19 pandemic and beyond. Schools must be proactive in communicating with families, providing resources and support, and addressing existing disparities to ensure that all students have an equal opportunity to succeed [11].

Learner support is a critical factor in distance learning and virtual education. Studies have shown that using appropriate technical environments and supporting virtual learning systems can be successful in schools [12]. The internet and virtual space allow communities to exchange knowledge without direct contact, enabling many disadvantaged areas to access extensive online educational resources [13,14]. However, access to smartphones and virtual educational software requires spending money and facilities that only a fraction of people can afford. Additionally, most online education programs lack the necessary qualifications, as studies have shown that only 25 % of students in Iran have good educational quality with the virtualization of school classrooms [15].

Good education quality is education that provides students with the knowledge, skills, and abilities they need to succeed in life. It is education that is equitable, inclusive, and standardized, and promotes lifelong learning and the urge to gather knowledge. Good education quality requires the availability of qualified teachers who are trained to teach and have the necessary skills to help students understand everything taught. Education quality should be inclusive, without any barriers of gender, age, geographic or demographic characteristics. It should provide educational rights to all students.

It is necessary to pay attention to the challenges of virtual education in an era where many diseases, such as Covid-19 and monkeypox, threaten the world. It seems that this type of education has made significant progress after the Covid-19 pandemic and is now considered one of the primary educational or supplementary methods worldwide [16]. Virtual education has many positive and negative aspects, especially from the perspective of mothers who are directly involved in their children's online education. Eliminating the weaknesses and addressing the strengths of this type of education can lead to better educational outcomes and more effective social participation among students, as well as their interaction with teachers and parents of schools [3]. In this research, we aim to identify the positive and negative aspects of students' education by investigating the experiences of mothers with the virtual education of their primary, first, and second secondary school children in Tehran during the COVID-19 pandemic.

2. Methods

This qualitative research used the conventional content analysis approach.

2.1. Participants

The inclusion criteria for this study are mothers who have primary school children and reside in Tehran. Sampling was conducted in a targeted manner, where participants were selected based on their specific knowledge and information about their children's virtual education.

2.2. Design

The sampling method used was Maximum Variation Opportunistic Sampling, which aimed to capture a diverse range of perspectives from the participants. The desired variables for maximum variation included gender (boy, girl), school type (public/private), socioeconomic class level (high/low), and mother's occupation (homemaker or employed).

2.3. Data collection process

To collect information, both focus group discussions (FGDs) and in-depth individual interviews were conducted. These methods allowed for a deeper understanding of the participants' experiences and perspectives regarding their children's virtual education.

This research uses a qualitative content analysis with a conventional approach, which is a research method. The researcher analyzes the text and identifies key concepts, which are then coded, summarized, and classified into themes. This method is based on in-depth face-to-face interviews with mothers in Tehran who have children under diploma age. The participants were selected based on maximum diversity according to gender, type of school, socioeconomic class level, and mother's occupation. The interviews included open questions about the challenges, advantages, and disadvantages of virtual education during the pandemic, as well as suggested solutions. The research aims to provide valid and reliable results to create new insights and practical guidance for practice.

The researcher conducted interviews with participants to obtain their answers to the questions posed in the study. Follow-up questions and prompts such as "Can you explain more?" and "What is your opinion?" were used to clarify the concepts and gather detailed information. The interviews took place over the course of two to three months, with durations ranging from half an hour to 45 min. The researcher conducted all the interviews and continued them until obtaining sufficient data to reach the point of saturation.

3. Materials

The interviews were recorded with the participants' permission, and the text was transcribed word-for-word as soon as possible after the interview. This allowed for feedback to be obtained for subsequent interviews and ensured that the data collected was sufficient.

To ensure the validity and accuracy of the research, the researcher examined the credibility, dependability, confirmability, and transferability of the data. This involved collecting real data and increasing the number of interviews to increase the accuracy of the data. The researcher also presented the findings to the participants to confirm their validity and evaluate their experiences.

The inclusion criteria for participants were mothers with primary school-aged children who live in Tehran and have knowledge of their children's virtual education. To ensure transferability of the study, sampling was conducted using the maximum diversity method. To ensure internal validity, the interviewer refrained from imposing their opinions on the participants, and the researcher's relationship with participants was informal to create a comfortable and intimate environment for them to express their opinions freely. The study also employed member checking and repeated questioning to identify contradictions in the participants' responses.

To ensure dependability and confirmability, a member of the research team independently analyzed a subset of the interviews, and disagreements in coding were resolved through the input of a third party.

3.1. School type (public/private)

There are both public and private educations in Iran at all levels. Public education is provided free to all people by public schools and it is highly centralized and monitored by the Ministry of Education. Indeed, these schools are funded and operated by the government. They are generally more widespread and aim to provide education to a broader segment of the population. They have to follow the national curriculum set by the Ministry of Education. The curriculum is designed to provide a standardized education across the country.

In comparison, private education is given by private schools with tuition fees. These schools are privately owned and operated. They may receive funding from tuition fees, donations, or other private sources. Private schools often have more autonomy in terms of curriculum and policies. Have the flexibility to design their own curriculum, although they still need to meet certain educational standards set by the government.

3.2. Data analysis process

The data were analyzed using Conventional Content Analysis to extract the mental model of the participants. Data collection methods included interviews, written responses, observation, and audio recording. All interviews were recorded, and primary codes (sentences and concepts) were extracted and grouped into categories and classes based on the questioning guide. MAXQDA software, available for testing on the MAXQDA website, was used for data analysis.

Verbal informed consent was obtained from all participants after clearly explaining the objectives of the study. Principles of confidentiality and the right to withdraw were observed during the study, and participants were given the choice to be audio recorded.

Ethical considerations: The study was conducted after obtaining necessary agreements and approval from the Ethics Committee of the Iranian University of Medical Sciences (IR.IUMS.REC.1401.748). All participants provided written and informed consent, and none of them were coerced into participating in the study. If a situation arose where the respondents needed to re-access or repeat the interview process, they were re-informed and given the option to participate or not. The researcher refrained from manipulating or falsifying any data. The interviewees were assured that their comments would remain confidential during the interview, and if necessary, these comments would be disclosed without revealing the individual's identity. If requested, the final results of the study were made available to the participants. Finally, the results of the study were reported without mentioning any names.

4. Results

This study interviewed 17 mothers, 7 of whom had one child, 8 had two children, and 2 had three children. All of these children lived with both their mother and father. All mothers had education beyond high school, with most (16) having a bachelor's degree. The age range of students participating in the study was 9–17 and average age was 11.76 years. Of these children, 14 attended public schools and 3 attended private schools. Fourteen mothers reported their financial status as average, while only three reported it as above average. Details of the interviewees can be found in [Table 1](#).

Qualitative analysis revealed 12 themes, which were categorized into three main categories: family-related factors, student-related factors, and school-related factors ([Table 2](#)).

Four themes were identified in the family-related factors category, including: the role of the teacher, the need for direct and indirect family supervision, the cost, and the peace of mind.

The student-related factors category included five themes: the advantages and disadvantages of online platforms, time management, lack of ability, disinterest and cheating, and physical, mental, and social problems.

Finally, the category of factors related to school included three themes, the teacher's role in virtual education and learning, challenges of lack of previous experience in education, inequality in access to education and opportunities with lack of previous experience as the main theme.

1. Family-related factors

The family played a prominent role in virtual education for students, and some participating mothers believed that this type of

Table 1
Number of participants in a study of virtual education during the pandemic in 2022 based, based on baseline profile characteristics.

Interview code	Educational qualification of the mother	Number of students in the family	Financial status	Public or Private schools	Age of the first child	Age of second and third child respectively	Number of children
P1	Bachelor of Accounting	2	Average	Public	17	11	2
P2	Bachelor of Graphics	2	Average	Public	11	8	2
P3	Hotel Management	1	Average	Public	11	–	1
P4	Bachelor of Accounting	1	Average	Public	15	–	1
P5	Bachelor's degree	1	Average	Public	14	–	1
P6	Bachelor's of Public Policy	2	Above average	Public	16	12	2
P7	Bachelor's degree	2	Above average	Private	12	8	3
P8	Bachelor's degree	2	Average	Public	13	9	2
P9	Bachelor's degree	1	Average	Public	12	–	1
P10	Bachelor's degree	1	Average	Public	12	–	1
P11	Bachelor's degree	1	Average	Public	12	4	2
P12	Bachelor's degree	2	Above average	Private	11	6	2
P13	Bachelor's degree	3	Average	Public	16	13	3
P14	Bachelor's degree	1	Average	Public	9	–	1
P15	Bachelor's degree	2	Average	Private	11	9	2
P16	Bachelor's degree	1	Average	Public	12	–	1
P17	Bachelor's degree	1	Average	Public	13	9	2

Table 2
Categories and themes extracted from mothers' challenges regarding virtual education.

Category	Themes
Family-related factors	The role of family as a teacher The importance of direct and indirect supervision in family education The cost The peace of mind
Student-related factors	The advantages and disadvantages of virtual learning environments Time management in education The consequences of failing to acquire necessary skills and knowledge Issues of indifference and fraud in education
School-related factors	Physical, mental, and social problems affecting students The role of the teacher in virtual teaching and learning The challenges of lack of prior experience in education Inequality in access to education and opportunities

education imposed an additional burden on families, while others considered it an opportunity to learn about modern science and the modern world. The education network was an opportunity to learn about the world of virtual education, which will be examined in favor of two main themes in this category:

- **The role of family as a teacher:**

According to the participants in this study, the family played the role of the teacher in virtual education, and therefore performed the duties of a teacher during this time.

A mother who had two female students said about this:

"Their teacher used to send the classwork by sending a training file on WhatsApp without any teaching, which was not really useful, and the burden of teaching the lesson fell on the shoulders of the mothers." (Interview 1)

She continued:

"My time was as full as my daughter because I was participating moment by moment in sending assignments, downloading files, and worrying about his learning because he was unmotivated and did not show interest ... he left his learning to me that really bothered me" (Interview 1).

A mother who had two male students was very unhappy with this relationship and said:

"My boys have driven me crazy in these two years. They didn't learn. It was really painful. We didn't have money for a private tutor. I didn't have the nerve to fight with them. Their father was also at work ... Their teacher was not caring at all, he didn't teach ... just pointed and said that the class is over ... We protested several times, but they said we don't have a teacher ... Take your time." (Interview 8)

Another working mother also said the following about the problems faced by families during this period:

"One of the problems was the involvement of families, especially mothers, in learning that some mothers could not help their children because they were working" (Interview 6).

However, some mothers enjoyed teaching their children and considered it an opportunity to improve their knowledge about virtual education. A mother who had two students said:

"My older daughter was satisfied with virtual education because she could handle her lessons herself. But my younger daughter found it difficult, and I was by her side most of the time, explaining the lessons to her again, or if I didn't know, I would search and find an educational file for her ... This search and finding the file and making the clip made me familiar with online education."

- The importance of direct and indirect supervision in family education

One of the most important aspects of family involvement was monitoring learning during the COVID-19 era. One mother of a male student stated:

"I directly monitored my son's learning and knew his weaknesses for each lesson. I was able to help him overcome his weaknesses through practice." (Interview 2)

However, the mother of a student had a different experience:

"The lesson was really difficult for him because he did not learn the material well. I was an employee and could not be his teacher. In subjects like math, his father could help him because he was previously a teacher. However, subjects like science and Persian, he had to learn by himself." (Interview 3)

Another working mother said:

"Virtual education was really challenging for me as a working mother. I usually came home at 5 pm, so I could not monitor my son's lessons at least during school hours. It was even more difficult during the virtual era." (Interview 4)

Some mothers expressed fatigue due to constant supervision:

"I was exhausted from constantly monitoring my child's learning." (Interview 6)

- The cost

Some mothers talked about increasing costs, while others talked about decreasing costs during virtual education. Regarding the reduction of costs, said one of the mothers who had two female students:

"We didn't have jealousy between girls this year. Some families really couldn't afford different stationery, and virtualization really helped parents a lot ... School service was also a problem that we got rid of". (interview 1)

Another mother who had two school students said:

"There was also a cost reduction ... for me, who had two students and they were not close, it was very good. It is true that we had internet fees, but we were not bothered." (Interview 6)

Almost in Tehran (the capital of Iran), the school service imposes on average a fee of about 200–400 dollars on families for each student annually which may vary in different regions of the country. Nevertheless, during the pandemic, parents did not pay this fee due to the students' online education. Furthermore, the mother expressed her satisfaction with the cost reduction, stating:

"Another important point that everyone was satisfied with was the reduction of the costs of the virtual education period, which had been greatly reduced. One is the cost of school services, which we did not have during this period, and the cost of feeding at school, uniforms, stationery, school bags, etc. It was not at all" (interview 2).

However, one mother highlighted the need to support public schools due to the increase in costs during virtual education, stating that:

"Government schools should be supported more because we know that many families are left with the cost of internet and mobile phones for their children" (interview 7).

- The peace of mind

Regarding the peace of mind that virtual education brought, one mother who had a daughter studying said:

"Two years after the Covid-19 pandemic, we had a sense of security that my daughter was at home and there was no risk of illness" (interview 13).

Another mother said:

"We were no longer worried about the children getting sick, and because we were very careful ourselves, we felt a sense of calm" (Interview 6).

And another mother said:

"If he goes to school, he will get sick or he will make us sick! I was comfortable sitting in a warm house and studying ... I was satisfied that he would get sick less often" (interview9).

2. Student-related factors

- The advantages and disadvantages of virtual learning environments

Problematic use of cyberspace was one of the most important problems for parents, as one mother said:

"Children's dependence on the Internet, which has not yet disappeared from their heads, is worrying (Interview 16)."

Another mother added

"Being at home all the time ... we were constantly worried about how much time he spends on the phone ... (Interview 11)."

A concerned mother who did not agree with constant cell phone use stated:

"We didn't give her the phone ourselves, but due to the conditions of her education, we had to have the phone in her hand for three hours or more, and this caused our control over our daughter to decrease, and she developed some bad habits. Although it is no longer virtual, the effects of that time are still present (Interview 10)."

According to some mothers, virtual education had benefits. One mother mentioned the benefits of virtual education:

"During the lesson, we could search on Google to find educational videos related to the teacher's lecture, which was a reminder for me as a mother. My son was not stressed about learning and he learned more calmly at home ... He could also review the training files later. In fact, the biggest advantage of virtual training was the use of several models and teaching styles that are still used today (Interview 2)."

- The consequences of failing to acquire necessary skills and knowledge

Most of the mothers expressed dissatisfaction with the negative impact virtual education had on their children's learning. One mother said:

"All of the shortcomings of virtual education greatly harmed our children's education. It became apparent once they returned to school that their academic performance had suffered significantly" (Interview 14).

"Suddenly, we realized that our children's reading and learning abilities had declined. They didn't make an effort to learn and simply followed each other's lead. The quality of education and the level of literacy had plummeted" (Interview 14).

Another mother, who had a daughter in school, expressed her concerns about her daughter's literacy, saying:

"I noticed that my daughter was struggling with literacy, but her teacher didn't seem to care" (Interview 3).

- Time management in education

Some mothers believed that virtual education provided a suitable platform and prevented students' time from being wasted on daily commuting. One mother who had two daughters said:

"... Now that schools have returned to face-to-face, she still attends her language class virtually because it takes less time ... But before this, it was not like that and caused her a lot of fatigue. Thus, saving time and energy are some of the benefits of virtual education ... Also, in case of travel, we will not fall behind in the lesson and can have the class online" (Interview 6)."

- Issues of indifference and fraud in education

Most of the mothers in the study pointed out apathy, laziness, and cheating as problems associated with virtual education.

A mother who had two female students shared her experience of her daughters:

"... not putting in any effort for their exams." (Interview 1)

Another issue mentioned by the mothers was the loss of competitiveness and motivation among the students. A mother mentioned:

"the children had lost their motivation to be better and receive awards, and that their teacher did not try to motivate them or be creative in teaching." (Interview 8)

The problem of copying and cheating during exams was also discussed by the mothers. One mother said:

"my daughter was not interested in class and was just chatting with her friends, and the teacher was unable to supervise them effectively. My daughter was only copying homework. The sense of competition and superiority was lost in this environment." (Interview 9)

Lack of responsibility and commitment to learning was another important point raised by the mothers. One mother suggested:

"... the lack of continuous evaluation of the teacher and a fair and accurate exam were the root causes of weakness in the children's learning. My son and his friends were finding answers to questions during exams and sending them [to their classmates], which showed that cheating was rampant. (Interview 14)

Mothers also noted the inclination of students to not do their homework, lack of adherence to the rules and regulations of virtual class, inactivity, laziness, and distraction. A mother said:

"... virtual training provided familiarity with the virtual space of WhatsApp, and students formed friendship groups. Even during class time, [my child] was chatting with friends." (Interview 5)

Another mother suggested:

"... the teacher should use an online environment for elementary school students to help them retain their sense of responsibility and interest in studying through competition with their friends if the teacher was lawful, virtual education could be made attractive to students." (Interview 6)

- Physical, mental, and social problems affecting students

One of the challenges of virtual learning was paying attention to the numerous problems faced by students in this era.

Physical problems Physical problems were a major concern raised by mothers. As one mother stated:

"The most important thing was their eyes, which may lead to the need for glasses in the future The way they sit and use their devices for long hours can cause problems in the long run. Another issue is the children's dependence on the Internet, which is worrying." (Interview 16)

The non-optimal use of class time due to physical problems was also mentioned as a disadvantage of virtual education by some mothers. One mother stated:

"Physical problems such as back pain, shoulder stiffness, and hunching over the phone for extended periods made it difficult for my child to sit in class, and this affected the atmosphere and motivation." (Interview 15)

Social problems

Regarding the disturbance in social relations, one of the mothers said:

"The children do not have much contact with each other, they could not make friends" (Interview 1).

One of the issues raised was the age of the students and their educational background, which had an important effect on the social relations of the students. One mother said:

"About virtual learning, I have to say that it depends a lot on the age of the child and the level of the children. For example, the first grade is really difficult for virtual learning, and how to teach the Persian alphabet to a first-grade child so that it becomes the basis of their learning" (Interview 15).

Not participating in group work at school was another disadvantage of virtual learning. One mother said:

"In face-to-face education, children worked in groups, went to camp, performed ceremonies. It helped a lot to learn social behavior and behavior with their peers, all of which had disappeared in the virtual era" (Interview 17).

"The teamwork that had completely disappeared, and the children did not learn to be social, especially in the elementary years" (Interview 6).

" Collaborative learning is crucial at this stage in school. For instance, engaging in activities such as creating crafts and innovating with classmates can greatly enhance students' creativity. The absence of group work and limited interaction with peers has been identified as a long-term issue stemming from the pandemic" (Interview 9).

A mother who had a female student said:

"The fact that they were not socializing (with a pause) means that, in my opinion, the practice of socialization starts at school, and the question and answer with the teacher and their friend would help them learn social behavior" (Interview 1).

Mental problems

One of the mothers who had 3 children said:

"Some of the children in the class lost their relatives and families, which caused depression and a bad mental state for them, and academic problems were added to it" (interview 13).

3. School-related factors

Some of the policies, plans, and actions taken by officials, managers, or assistants in schools during the pandemic caused a decrease or increase in the quality of virtual education.

- The challenges of lack of prior experience in education

One of the problems raised by the mothers was the lack of previous experience in dealing with the situation caused by the pandemic. One of the mothers said:

"In the early days of Corona, people did not believe and sent their children to school, and the few who did so caused us, who did not send our children, to fall far behind and be indecisive. After the nationwide shutdown, families and schools accepted that it should be online. ... No one had any idea or plan" (Interview 9).

Another mother also mentioned the inexperience of the educational system:

"In this era, we were all inexperienced, and before Corona, we didn't have any virtual training to know how to deal with it" (Interview 6).

- Inequality in access to education and opportunities

In these interviews, mothers pointed out the significant differences between public and private schools. Proper infrastructure, responsible teachers, and proper planning of private schools caused this huge gap between schools. One of the mothers said:

"Many parents like me did not have the time to pay attention to their children, and suddenly we realized that our children had a drop in education ... Families who hired private tutors did not have our problems, which was a kind of inequality in education ... , public school teachers didn't leave time and energy for children" (Interview 4).

"The children of private schools all used Adobe Connect programs and were online all class hours, and the teacher had a close relationship with the children ... If this condition applies to all schools, it will certainly have a great impact on the children's learning" (Interview 14).

The mother of a girl student who went to a private school said:

"My daughter goes to a private school. I wasn't very involved in my daughter's education; on the contrary, the rest of the family who went to public schools were very involved with their children. My daughter had online classes from 8:00 am to 3:00 pm. Like school, they even had to wear uniforms and sit at the system afterwards. Like face-to-face training, they were in contact with the teacher and had questions and answers, and they had to study and give a class presentation" (Interview 7).

"In private schools, many of their teachers were aware of the children's academic decline. By the way, they also had an online meeting with the mothers. I think the opportunities were more virtual, and I felt comfortable ... The same rules and regulations as the school were in place in online education. The focus of the girl was not reduced, while public schools had many problems" (Interview 7)."

- **The role of the teacher in virtual teaching and learning**

The lack of digital literacy and retraining of teachers in working with different software and teaching on multiple platforms was a problem in virtual education during the pandemic.

One mother said in this regard:

"A big problem in my opinion was that the teachers were illiterate ... they didn't have computer literacy and weren't familiar with working on the internet. For example, the Shad Keli program had the ability to be used by children, but the teachers, at least my child's teacher, did not know how to use it. Or for example, one of my child's friends who was a teacher asked an elementary school girl to make an educational file for her, and it was ugly" (Interview 1).

"To educate children, they should hire teachers who have more skills and digital literacy and are knowledgeable in the field of virtual education to work with students" (Interview 2).

Another mother said about the lack of skills in cyberspace:

"The teachers were uneducated and lacked skills, and the lack of skills and creativity in online courses caused my daughter to lose interest" (Interview 3).

According to the interviewees, not only did the teachers not have enough expertise in the field of virtual education, but also the lack of motivation and low-quality teaching were other obstacles to learning during the pandemic.

One mother said:

"Really, the teaching methods were inappropriate, and the children learn from all this lack of planning that it is not important to try hard, and they start cheating and lying ... If the teacher is committed, the children will also learn, and virtual education will become attractive to them" (Interview 6).

Another problem for families was the lack of understanding of students by teachers. The indifference of teachers to virtual education caused mothers to complain in this regard. One mother said:

"About the teachers' morals in the virtual world, we just realized how badly they behaved ... and how unimportant it was for them to educate the children ... " (Interview 8)."

"... their teacher didn't even check the assignments ... the children didn't get any feedback from the teacher either, and that was very bad. In fact, I can say that virtual education was useless" (Interview 3).

One mother whose daughter went to a public school said:

"Teachers also spent less energy due to less conflict with a large number of students" (interview6).

"The personality characteristics of the teacher are an important issue that affects the students' education."

And another mother said about the skills of teachers:

"If we have skilled teachers, the negative points of virtual education will not be seen much, and by the way, it can be very helpful in improving the media literacy of children, teachers, and families" (interview 9).

5. Discussion

Online education is an essential need in the learning and teaching process, and it has many benefits that require management and executive solutions to solve the challenges posed by the COVID-19 pandemic and beyond. Qualitative research from other countries has identified 29 fields that have challenged the successful implementation of virtual education, and our study highlighted similar issues [3]. These include the lack of teachers' ability, inadequate planning by school administrators, inadequate internet speed, and unreliable and invalid evaluations [3]. Many mothers in our study also complained about the lack of feedback from teachers and the limited evaluation tools used, which only included assignments and periodic online tests [17].

Mental, physical, and social damage were additional problems mentioned by the participants in our study, as virtual learning resulted in the occurrence of mental and psychological distress and disruptions in social interactions. These factors contributed to the prevalence of mental health problems among students who studied through distance education, which has been reported in other studies [18].

In Serbia, after one year of virtual learning, professors improved their knowledge of online technology and educational equipment, and students were satisfied with the quality of online education. However, they also noted that nothing can replace traditional education and socializing with peers [19]. The findings of our study are largely consistent with other studies on virtual education [20,21].

Other studies have shown that in virtual education, teachers prefer not to design their own materials and mainly use pre-existing resources [22]. The participants in our study also mentioned the lack of appropriate content or copying of videos or links to lessons [17]. Moreover, students' participation and their learning and evaluation were affected [21,23].

The results indicated that time management and past online learning experiences were related to satisfaction and the usefulness of online learning [24]. The advantages of virtual learning in the present study include acquaintance with modern science and the modern world of education, time management, durability of video and course topics, and not forcing students to face-to-face class. Past research has also found a positive relationship between students' self-efficacy and their satisfaction with online learning. In addition to self-confidence, they also implement and apply their learning skills in an online environment. The results showed that self-efficacy, time management, and past online learning experience are other factors that are related to the satisfaction and usefulness of online learning, and students' trust in online learning is the strongest positive predictor of satisfaction and usefulness of online classes [20].

Most of the challenges associated with virtual learning between teachers and students were mainly due to the infrastructure and lack of proper preparation, lack of teacher skills in virtual education, and inadequate facilities in public schools. Virtual learning opportunities include the convenience and appropriateness of virtual learning, the possibility of participating in a virtual class, and holding a virtual class from anywhere and at any time, educational access, and the learning aspect of virtual technology. If the challenges are solved properly, virtual learning offers great potential for the future [25].

Mothers whose children go to private schools have better financial conditions and fewer problems and tensions. Students' tasks and assignments were more related to the schools' responsibilities than to the students' mothers or families. Mothers assumed multiple roles during the pandemic, which led to tension. In more severe cases [26], these tensions and the demands of multiple roles put a lot of pressure on mothers [26,27]. These tensions were more intense in families with lower socio-economic status, and mothers experienced more negative interactions with schools. Mothers with more children were exposed to higher pressure. Other studies have pointed out that there are not many possibilities for e-learning in the country at present, but there is significant potential to improve the education system accordingly. This would not only retain students in their own countries but also attract students from other countries to continue their studies [28].

6. Conclusion

The findings of this study have several implications for policy makers. Prioritizing attention to the technological and educational challenges related to virtual education, and providing adequate support to parents are important factors that should be considered. Additionally, psychological support services should be made available to parents to help them cope with the emotional challenges of virtual education. Finally, the positive experiences reported by mothers suggest that virtual education can be an effective and flexible option for future education, provided that the challenges are adequately addressed. Therefore, school officials and policy makers

should explore innovative ways of integrating virtual education into the educational system to provide flexible and effective learning opportunities for students.

7. Limitations

This study has limitations that should be considered. First, the sample size was relatively small, and the participants were only from Tehran. Therefore, the findings may not be generalizable to other contexts or populations. Second, this study relied on self-reported data, which can be subject to bias. Finally, this study did not explore the perspectives of fathers or other family members, which could provide additional valuable insights into the virtual education experience during the pandemic.

Suggestions for future research

Further research is needed to investigate the effect of virtual education on children's academic performance and social development. Longitudinal studies can investigate the long-term effects of virtual education on children's education and mental health. Additionally, other qualitative research could explore the perspectives of fathers and other family members to provide a more comprehensive understanding of the virtual education experience during the pandemic.

Data availability statement

Data will be made available on request.

Additional information

No additional information is available for this paper.

CRedit authorship contribution statement

Monireh Faghir Ganji: Writing – review & editing, Writing – original draft, Validation, Methodology, Investigation, Conceptualization. **Narjes Abdolmohammadi:** Writing – original draft, Methodology, Investigation. **Maryam Nikbina:** Writing – review & editing, Methodology, Investigation. **Alireza Ansari-Moghaddam:** Writing – review & editing, Methodology. **Arash Tehrani-Banihashemi:** Writing – original draft, Supervision, Methodology.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgements

Student Research Committee, Iran University of Medical Sciences provided financial support for this study (Grant number: 24783; Ethics Code: IR.IUMS.REC.1401.748).

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.heliyon.2024.e29532>.

Appendix 1

"A Guide to Conducting In-Depth Individual Interviews"

Prior to the start of the interview, subjects may ask any questions they have and their verbal consent to participate in the study will be recorded.

This guide provides instructions for conducting an in-depth individual interview. The questions will be asked in the order provided below, along with a set of guiding questions.

The interview will begin with a brief explanation of the ground rules:

- F020There are no right or wrong answers in this interview. We want to hear your opinion, so please feel free to express yourself honestly, even if you disagree with our views.
- Your responses will be kept confidential and will not be shared outside of this study.
- To start, please introduce yourself. (Research team members will also introduce themselves and explain their role to participants).

What is your opinion on the topic of mothers' experiences with virtual education in Tehran during and after the pandemic?

(Guideline: After the interview, we will provide a brief overview of education during and after the pandemic, its advantages and disadvantages, and current programs for mothers with school-aged children. We will also explain why this topic is important to us and how conducting such studies helps to measure the impact of preventative programs and improve educational services for policy makers.)

Questions in this section:

1. Are there any virtual education facilities available in Iran?
2. What do you perceive as the disadvantages and advantages of virtual education as a mother?
3. What issues have virtual education caused for students?
4. As a mother of a student, what challenges have you faced during this period?
5. Have you experienced feelings of aggression, depression, or exhaustion due to virtual education? Please explain.
6. If virtual education continues, what recommendations do you have to improve it?
7. What is an effective solution to the problems caused by virtual education during the pandemic?
8. How have external factors, such as cultural norms, virtual education costs, or a large number of students in the household, affected your family during the pandemic?

To summarize our discussion, is there anything else you would like to add or any further questions you have? Thank you for taking the time to speak with us.

“Appendix 2 Personal Profile Form Used in the Qualitative Study”

1. Interview code
2. Date of information collection
3. Name of the school
4. Age: or Date of Birth
5. Gender: Female/Male
6. Type of school:
 - a. Government
 - b. Private
7. How many family members are there?
 - a. Three people
 - b. Four people
 - c. Five people
 - d. More than five people
8. What is your occupation?
9. How many students are there in your family?
 - a. One person
 - b. Two people
 - c. Three people
 - d. More than three people
10. Who does the student live with?
 - a. Parents
 - b. Grandmother or grandfather
 - c. Only father or only mother
 - d. Relatives of father or mother
 - e. Other (please specify)
11. Father’s last educational qualification:
 - a. Illiterate
 - b. Elementary school
 - c. Middle school
 - d. Diploma
 - e. University education
12. Mother’s last educational qualification:
 - a. Illiterate
 - b. Elementary school
 - c. Middle school
 - d. Diploma
 - e. University education
13. If the student does not have a father or mother, what is the last degree of the person who lives with them?
 - a. Illiterate
 - b. Elementary school

- c. Middle school
- d. Diploma
- e. University education

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