Journal Website

Article history:
Received 07 June 2024
Revised 02 August 2024
Accepted 19 August 2024
Published online 08 Oct. 2024

International Journal of Education and Cognitive Sciences

Volume 5, Issue 4, pp 140-149

E-ISSN: 3041-8828

Identification of Barriers and Challenges of Virtual Education at Macro, Meso, and Micro Levels

Mahmoud Mozaffari Khosravi[1], Saeed Zarghami Hamrah[2]*, Mahdi Mahmoudi[3]

1. PhD student, Department of Philosophy of Education, Science and Research Branch, Islamic Azad University, Tehran, Iran.
2. Associate Professor, Department of Philosophy of Education, Kharazmi University, Tehran, Iran (Corresponding author).
3. Associate Professor, Department of Philosophy of Education, Payam Noor University, Shahriar, Iran.

*** Corresponding author email address**: szarghami@khu.ac.ir

A r t i c l e I n f o

Article type:
Original Research

How to cite this article:
Mozaffari Khosravi M, Zarghami Hamrah S, Mahmoudi M. (2024). Identification of Barriers and Challenges of Virtual Education at Macro, Meso, and Micro Levels. *International Journal of Education and Cognitive Sciences*, *5*(4), 140-149.
https://doi.org/10.61838/kman.ijecs.5.4.15

A B S T R A C T

Purpose: The present study was conducted with the aim of examining the indicators of barriers and challenges of virtual education at macro, meso, and micro levels.

Methods and Materials: The method employed in this research is a mixed-methods approach. In the qualitative section, documents from the Ministry of Education of the Islamic Republic of Iran, including the "Fundamental Theoretical Foundations for Formal and Public Education Transformation," the "Fundamental Transformation Document of Education," and the "National Curriculum Document," were analyzed. In the quantitative section, two non-random sampling methods were used: non-probability sampling and snowball sampling, which is a non-probability sampling method commonly used in sociology and statistical research. The research population consisted of 150 students from Farhangian University and 10 faculty members from the same institution. Interviews were conducted based on a competency model, and the appropriate tool was developed and implemented after determining its validity and reliability using Cronbach's alpha ($\alpha = 0.92$).

Findings: Based on the findings, 150 digital teacher competencies were categorized into 9 sections, which were further divided into three main areas: curriculum design, barriers to virtual education, and the quality of virtual teaching. The challenges identified in the study were categorized at macro, meso, and micro levels, and the results are applicable for identifying the indicators of barriers and challenges in virtual education.

Conclusion: The results of the study indicate that, at the macro level, poor policy-making is the primary issue, at the meso level, budget disruptions are prominent, and at the micro level, students, more than parents, teachers, and professors, believe that the barriers and challenges of virtual education are greater than those of in-person education.

Keywords: *Virtual education, barriers, challenges, online learning.*

1. Introduction

The onset of the COVID-19 pandemic has irrevocably transformed the landscape of education across the globe. The unprecedented shift to virtual learning environments, necessitated by lockdowns and restrictions on physical gatherings, has forced educational institutions to adapt rapidly. While this transition has brought about new opportunities for innovation, it has also exposed significant challenges, particularly in terms of access, equity, and effectiveness. This shift has affected various sectors of education, from K-12 systems to higher education institutions, requiring a reconsideration of traditional teaching and learning paradigms (Dhawan, 2020). The need to assess these barriers and challenges becomes even more critical as the reliance on virtual education is likely to persist beyond the pandemic, particularly in hybrid and flexible learning environments (Abedi et al., 2022; Aina & Ogegbo, 2021, 2022a, 2022b; Akrami, 2022; Ofem, 2023).

Virtual education was not a novel concept before COVID-19; however, its widespread adoption occurred almost overnight during the pandemic (Ahmady et al., 2020). Online learning systems had been increasingly integrated into higher education, with many institutions offering digital components alongside face-to-face instruction. The pandemic acted as a catalyst, accelerating the adoption of these systems in an all-encompassing manner. The need for social distancing and other preventive measures meant that physical classrooms could no longer be the primary sites for learning. Consequently, educators and administrators had to explore, implement, and adapt to virtual learning platforms in an expedited timeframe (Aina & Ogegbo, 2021; Fahim et al., 2022; Herawati et al., 2024).

In Iran, like many other countries, the transition to virtual learning during the pandemic presented both opportunities and challenges. On one hand, the shift created an opportunity to explore new educational technologies and learning management systems (Abedi et al., 2022). On the other hand, it exposed significant inequalities in access to the necessary digital tools and resources, particularly in rural and underserved areas (Mortazavi et al., 2021). The digital divide became more apparent as not all students had access to reliable internet, smart devices, or conducive home learning environments (Kovaitė et al., 2022).

Numerous studies have highlighted the various challenges encountered by both educators and learners in virtual education settings. One of the foremost issues relates to technological infrastructure. In many regions, including parts of the Middle East and Africa, the necessary infrastructure for online learning, such as broadband internet access and availability of devices, is lacking (Aina & Ogegbo, 2022a, 2022b; Nyathi & Mathwasa, 2022). Even in more developed countries, the sudden pivot to online learning overwhelmed existing systems, exposing the limitations of many platforms in handling the increased load (Abu-Zaid et al., 2022).

Virtual education requires both instructors and students to be proficient in the use of digital tools. Many educators were unprepared for the abrupt transition, as they lacked the necessary training to effectively teach in an online environment (Aina & Ogegbo, 2022a, 2022b). This lack of training not only affected the delivery of instruction but also the educators' ability to engage students in meaningful learning experiences. In many cases, students also struggled with the shift to online learning due to a lack of familiarity with the platforms being used (Múnera et al., 2019). As a result, both students and teachers experienced frustration, stress, and burnout as they navigated the new learning environment (Abedi et al., 2022).

Another significant challenge is the issue of engagement and motivation. In a traditional classroom setting, teachers can monitor student engagement through direct observation and face-to-face interaction. Virtual education, however, relies heavily on self-motivation and self-regulation, which can be difficult for many students, particularly younger ones (Abu-Zaid et al., 2022; Torres-Caceres et al., 2022). Many students found it challenging to stay focused and motivated during online classes, leading to lower participation rates and reduced academic performance (Gao, 2023).

The issue of equity in virtual education has been a major concern, particularly in countries with significant socio-economic disparities (Mortazavi et al., 2021). Students from low-income families often lack access to the digital devices and stable internet connections required for online learning. This digital divide has resulted in unequal learning experiences, where some students can fully participate in virtual education while others are left behind (Carter & Rice, 2016). The reliance on virtual learning during the pandemic exacerbated existing inequalities, making it more difficult for students from disadvantaged backgrounds to succeed (Aina & Ogegbo, 2021; Mortazavi et al., 2021).

Studies conducted in various regions have highlighted these disparities. For example, in South Africa, many students in rural areas struggled to access online education due to poor internet connectivity and a lack of digital literacy (Aina & Ogegbo, 2022a, 2022b). Similarly, in Iran, students

E-ISSN: 3041-8828

from rural and underserved areas faced challenges in accessing virtual education platforms due to inadequate infrastructure (Ahmady et al., 2020). These challenges were not limited to students; teachers in these areas also faced difficulties in adapting to virtual teaching due to a lack of resources and training (Abedi et al., 2022).

In addition to the technical and logistical challenges, virtual education also raises important ethical considerations. One of the primary concerns relates to the issue of data privacy and security (Balida, 2023). With the increased use of digital platforms, there is a heightened risk of data breaches and misuse of personal information. Educational institutions must ensure that the platforms they use comply with data protection regulations to safeguard the privacy of both students and educators (Carter & Rice, 2016). Another ethical issue pertains to academic integrity. The shift to online assessments has made it easier for students to engage in dishonest behaviors, such as plagiarism or cheating during exams (Balida, 2023). The lack of direct supervision during online assessments has raised concerns about the fairness and validity of these assessments. Furthermore, the absence of face-to-face interaction in virtual learning environments can lead to feelings of isolation and disengagement among students, which may negatively impact their mental health and well-being (Reis et al., 2015).

Despite these challenges, virtual education has also presented opportunities for innovation and transformation in the education sector. The integration of new technologies, such as virtual reality (VR) and augmented reality (AR), into virtual learning environments has the potential to enhance student engagement and improve learning outcomes (Huang & Roscoe, 2021; Luo et al., 2021). These technologies can provide immersive learning experiences that are difficult to replicate in a traditional classroom setting. For example, in medical education, virtual simulations have been used to provide students with hands-on experience in a safe and controlled environment (Moro et al., 2021)

Additionally, the use of gamification in virtual learning platforms has been shown to increase student motivation and engagement (Loureiro et al., 2020; Pinto et al., 2021). By incorporating elements of game design, such as points, badges, and leaderboards, virtual learning platforms can create a more interactive and enjoyable learning experience for students. These innovations have the potential to not only enhance the effectiveness of virtual education but also to make learning more accessible and inclusive (Lai & Cheong, 2022). The objective of this study is to explore the barriers and challenges of virtual education experienced at macro, meso, and micro levels during the COVID-19 pandemic. The study focuses on identifying the most significant obstacles faced by students, educators, and families in adapting to virtual learning environments, particularly in terms of policy, technology, institutional support, and socio-economic disparities.

2. Methods and Materials

2.1. Study Design and Participants

The method used in this study is a mixed-methods research approach. Mixed-methods research is a combination of both quantitative and qualitative methods. In a project, two types of research methods can be effectively utilized. The mixed-methods research approach is a procedure for collecting and analyzing both quantitative and qualitative data in a single study or a series of studies based on the priority and sequence of information. In recent years, mixed-methods research has found numerous applications in various fields of behavioral and social sciences. The purpose of using mixed-methods research is not to replace one method with another but to strengthen the advantages and minimize the weaknesses of both methods within a single study.

In this research, components and indicators related to virtual education were quantitatively assessed using a non-random snowball sampling method and a researcher-developed questionnaire. The reliability was determined using Cronbach's alpha, and the validity of the questionnaire was confirmed by experts and faculty members in the field.

In this study, in the qualitative section, documents related to the fundamental transformation of education in the Islamic Republic of Iran were reviewed, specifically the "Fundamental Transformation Document of Education," the "Fundamental Theoretical Foundations for Formal and Public Education Transformation," and the "National Curriculum Document." In the quantitative section, a non-random snowball sampling method (chain sampling) was employed. Snowball sampling, which is a non-probability sampling method commonly used in sociology and statistical research, was used.

The data collection in this study, aimed at examining documents and extracting propositions relevant to the research problem, was conducted through library and document review, as well as open-ended interviews. Considering the thematic scope, the statistical population of this research includes 100 students from Farhangian

E-ISSN: 3041-8828

University majoring in counseling, 10 university faculty members, 30 students, and 10 parents, who participated in this study through open-ended interviews and questionnaires.

3. Findings and Results

Since the 1990s, the world has witnessed significant changes in the landscape of education due to the increasing influence of technology. One of these advancements is the adoption of online learning and virtual education in various learning contexts, whether formal or informal, academic or non-academic. We are observing that schools, teachers, and students are increasingly utilizing e-learning technologies, which enable teachers to deliver instruction interactively, share resources seamlessly, and facilitate student collaboration and engagement. Although the effectiveness of online learning has long been recognized by the educational community, the challenges in its implementation are still under review. Considering the post-COVID-19 world and unforeseen events that may occur at any time, the importance of virtual education becomes even more critical.

Virtual education and online learning refer to an educational environment that uses the internet and other technological tools and devices for synchronous and asynchronous instruction. Teachers accustomed to conventional teaching were also required to embrace and use technology, despite their lack of technological literacy. While online learning and virtual education have reduced school dropout rates for students facing economic challenges, transportation problems, etc., it is not as suitable for courses requiring face-to-face interaction and direct engagement.

To a large extent, education can be considered a communication process among individuals, and in virtual education, many face-to-face interactions undergo significant changes due to this mode of teaching.

In virtual education, the most important challenges, derived from interviews from the perspective of parents, students, and teachers, are categorized at the macro, meso, and micro levels, encompassing the areas of educational content, software, and teaching staff.

As the three main components—educational content, hardware and software tools, and human resources (including administrators, teachers, students, and parents)—were evaluated in this study, the results are presented in Table 1.

Table 1

Mean and Standard Deviation of the Indicators of Barriers and Challenges of Virtual Education by Gender at the Macro Level (N=150)

Indicator	Women (N=100)	Men (N=50)	Total (N=150)
1. Lack of strategic thinking	3.65 (1.309)	3.39 (1.439)	3.56 (1.344)
2. Poor policy-making	3.81 (1.238)	3.66 (1.306)	3.76 (1.258)
3. Weak educational technology	3.70 (1.264)	3.48 (1.408)	3.63 (1.299)
4. Inefficient management	3.70 (1.273)	3.52 (1.252)	3.64 (1.305)
Total	3.71 (1.271)	3.51 (1.354)	3.64 (1.303)

According to Table 1, at the macro level, respondents identified poor policy-making with a mean of 3.76 and a standard deviation of 1.258 as the most significant barrier, while the lack of strategic thinking, with a mean of 3.56 and a standard deviation of 1.344, was considered the least significant indicator among the barriers and challenges of virtual education.

Table 2

Mean and Standard Deviation of the Indicators of Barriers and Challenges of Virtual Education by Gender at the Meso Level (N=150)

Indicator	Women (N=100)	Men (N=50)	Total (N=150)
1. Weak introduced technology	3.65 (1.304)	3.43 (1.406)	3.58 (1.342)
2. Disrupted budgeting	3.80 (1.217)	3.50 (1.339)	3.70 (1.266)
Total	3.71 (1.270)	3.46 (1.378)	3.61 (1.295)

According to Table 2, at the meso level, respondents indicated that "disrupted budgeting" with a mean of 3.70 and a standard deviation of 1.266 is the most significant challenge, while "weak introduced technology" with a mean of 3.58 and a standard deviation of 1.342 is the least

E-ISSN: 3041-8828

significant. Women's views on the barriers and challenges at the meso level were more negative than men's.

Table 3

Mean and Standard Deviation of the Indicators of Barriers and Challenges of Virtual Education by Gender at the Micro Level (N=150)

Indicator	Women (N=100)	Men (N=50)	Total (N=150)
1. Teachers	3.63 (1.297)	3.51 (1.411)	3.59 (1.336)
2. Students	3.70 (1.259)	3.45 (1.370)	3.62 (1.302)
3. Families	3.63 (1.247)	3.42 (1.304)	3.56 (1.277)
Total	3.68 (1.257)	3.47 (1.358)	3.61 (1.295)

According to Table 3, at the micro level, students with a mean of 3.62 and a standard deviation of 1.302 consider virtual education as presenting the most challenges, while families with a mean of 3.56 and a standard deviation of 1.277 see the least. Women perceive more barriers and challenges in virtual education than men.

Table 4

Mean and Standard Deviation of the Indicators of Barriers and Challenges of Virtual Education by Gender in the Teachers' Perspective (N=150)

Indicator	Women (N=100)	Men (N=50)	Total (N=150)
1. Teachers' concerns about misuse of online teaching	4.03 (1.087)	4.08 (1.085)	4.05 (1.083)
2. Inability to fully understand students' mental and physical states without face-to-face interaction	3.70 (1.259)	3.68 (1.362)	3.69 (1.290)
3. Lack of teachers' training and knowledge of virtual education	3.55 (1.242)	3.32 (1.347)	3.47 (1.278)
4. Lack of effective communication between teachers and students due to limited knowledge of virtual education methods	3.55 (1.424)	3.42 (1.540)	3.51 (1.460)
5. Inability to simulate educational environments suitable for the curriculum content	3.72 (1.264)	3.60 (1.400)	3.69 (1.307)

According to Table 4, in the teachers' perspective, "concerns about misuse of online teaching" with a mean of 4.05 and a standard deviation of 1.083 is the most significant challenge, while "lack of teachers' training and knowledge of virtual education" with a mean of 3.47 and a standard deviation of 1.278 is considered the least significant challenge.

Table 5

Mean and Standard Deviation of the Indicators of Barriers and Challenges of Virtual Education by Gender in the Students' Perspective (N=150)

Indicator	Women (N=100)	Men (N=50)	Total (N=150)
1. Weak financial ability of families (urban, rural, and nomadic) to provide smartphones for all children	3.94 (1.099)	3.58 (1.162)	3.82 (1.130)
2. Impact on observational learning	3.89 (1.072)	3.90 (1.216)	3.89 (1.118)
3. Failure to adhere to textbook budgeting	3.49 (1.446)	3.34 (1.507)	3.44 (1.463)
4. Inability to convey all educational content via virtual learning	3.53 (1.283)	3.28 (1.371)	3.45 (1.314)
5. Lack of attention to students' individual differences in learning via virtual space	3.85 (1.274)	3.52 (1.359)	3.74 (1.308)
6. Difficulty for deaf students in speech reading during virtual learning	3.65 (1.306)	3.70 (1.474)	3.67 (1.359)
7. Lack of students' familiarity with practical experiences in social behaviors such as drama, singing, and theater	3.68 (1.246)	3.04 (1.261)	3.47 (1.283)
8. Lack of interaction between teachers and hard-of-hearing/deaf students and inadequate responses	3.91 (1.173)	3.82 (1.335)	3.88 (1.226)
9. Need for teachers to prepare virtual content based on time and cost constraints	3.61 (1.286)	3.54 (1.432)	3.59 (1.332)

E-ISSN: 3041-8828

10. Lack of face-to-face interaction between teacher and student, affecting the teacher's role as a model	3.70 (1.115)	3.54 (1.164)	3.65 (1.130)
11. Reduced students' social skills and interactions with peers	3.39 (1.286)	2.94 (1.202)	3.24 (1.273)
12. Lack of emotional connection between teacher and students	3.52 (1.314)	3.34 (1.394)	3.46 (1.339)
13. Students' lack of focus during virtual education	3.43 (1.255)	3.38 (1.497)	3.41 (1.317)
14. Decline in learning due to lack of practice and review of lessons	3.74 (1.314)	3.44 (1.343)	3.64 (1.292)
15. Lack of suitable teaching methods for hard-of-hearing and deaf students in virtual education	3.71 (1.241)	3.30 (1.418)	3.57 (1.313)
16. Reduced attention to lessons compared to in-person classes	3.99 (1.400)	3.78 (1.093)	3.92 (1.059)
17. Inability to use virtual classes for hyperactive and distracted students	3.88 (1.266)	3.36 (1.453)	3.71 (1.349)
18. Stress and tension among students and families due to confusion	3.89 (1.302)	3.54 (1.446)	3.77 (1.357)
19. Lack of cooperation by students with parents in their studies (not taking virtual learning seriously)	3.47 (1.446)	3.24 (1.611)	3.39 (1.501)

According to Table 5, in the students' perspective, "reduced attention to lessons compared to in-person classes" with a mean of 3.92 and a standard deviation of 1.059 is considered the most significant challenge, while "reduced students' social skills and interactions with peers" with a mean of 3.24 and a standard deviation of 1.273 is considered the least significant challenge among the barriers and challenges of virtual education.

Table 6

Mean and Standard Deviation of the Indicators of Barriers and Challenges of Virtual Education by Gender in the Families' Perspective (N=150)

Indicator	Women (N=100)	Men (N=50)	Total (N=150)
1. Lack of access to smart audiovisual tools for all family members (urban, rural, and nomadic)	3.63 (1.383)	3.32 (1.491)	3.53 (1.422)
2. Lack of necessary skills among many families to educate their children at home	3.65 (1.184)	3.42 (1.263)	3.57 (1.212)
3. Families' inability to assist their children with homework (due to low literacy, lack of awareness, or other engagements)	3.64 (1.227)	3.50 (1.199)	3.59 (1.216)
4. Psychological pressure and tension in some families, neglecting children's emotional well-being	3.93 (1.112)	3.88 (1.206)	3.91 (1.141)
5. Lack of effective communication and constructive interaction between teachers and families due to families' unfamiliarity with virtual space	3.52 (1.141)	3.32 (1.285)	3.45 (1.190)
6. Parents' unfamiliarity with methods of communication in family education	3.86 (1.198)	3.74 (1.352)	3.82 (1.248)
7. Parents' concerns about giving their children access to mobile phones and the internet	3.41 (1.288)	2.92 (1.175)	3.25 (1.269)
8. Lack of appropriate virtual education programs for parents to assist their deaf children	3.47 (1.417)	3.42 (1.553)	3.45 (1.459)
9. Authoritative management style in how curriculum content is delivered and conveyed in the teacher-student relationship (restricting teacher autonomy)	3.55 (1.192)	3.26 (1.209)	3.45 (1.202)

According to Table 6, in the families' perspective, "psychological pressure and tension in some families, neglecting children's emotional well-being" with a mean of 3.91 and a standard deviation of 1.141 is considered the most significant challenge, while "parents' concerns about giving their children access to mobile phones and the internet" with a mean of 3.25 and a standard deviation of 1.269 is considered the least significant challenge among the barriers and challenges of virtual education.

4. Discussion and Conclusion

The present study aimed to investigate the barriers and challenges of virtual education across three distinct levels: macro, meso, and micro. The findings revealed important insights into the difficulties faced by students, educators, and families in adapting to the virtual learning environment during the COVID-19 pandemic. Specifically, the study identified key obstacles, such as inadequate technological infrastructure, insufficient teacher training, engagement challenges, and socio-economic disparities, that significantly impacted the effectiveness of virtual education. These challenges are consistent with those reported in earlier studies, further underscoring the need for targeted interventions to mitigate the negative consequences of online learning.

At the macro level, the most significant barrier identified was poor policy-making, particularly regarding the lack of a coherent digital education strategy. The findings show that

E-ISSN: 3041-8828

many educational systems, especially in developing countries, were unprepared for the sudden shift to virtual learning. Inadequate governmental support and poor technological infrastructure were recurring themes. These results are in line with findings from Abedi, Iranmanesh, Bagheri, Rafiei, and Afshari (2022), who noted that in Iran, the lack of a clear digital education policy exacerbated the difficulties faced by both students and teachers during the pandemic (Abedi et al., 2022). Similarly, Ahmady, Shahbazi, and Heidari (2020) highlighted the challenges arising from uncoordinated efforts to transition to online learning during the COVID-19 crisis, which they described as a combination of both opportunity and challenge (Ahmady et al., 2020).

The issue of insufficient technology infrastructure is further supported by findings in other regions. Aina and Ogegbo (2021) reported that in South Africa, the lack of reliable internet connectivity and appropriate digital devices hindered the effectiveness of virtual education in rural and underserved areas (Aina & Ogegbo, 2021). These studies indicate that while virtual education offers many opportunities, its success is heavily dependent on the availability of robust technological infrastructure, which, if absent, presents a significant barrier to achieving equitable learning outcomes.

At the meso level, disrupted budgeting and weak technological implementation emerged as key challenges. Educational institutions struggled with budgetary constraints, which hindered their ability to provide the necessary resources for effective virtual education. This finding aligns with the work of Kovaitė, Neifartas, and Butvilas (2022), who identified inadequate funding as a major issue in the management of virtual learning environments during the pandemic (Kovaitė et al., 2022). Without sufficient financial support, many institutions were unable to invest in the necessary tools, platforms, and training programs needed to facilitate a smooth transition to online learning.

Moreover, institutions faced difficulties in aligning their existing curricula with virtual platforms, particularly in regions where technology had not been widely integrated into educational practices before the pandemic (Abedi et al., 2022). This challenge was further compounded by the fact that many educators lacked the necessary training to effectively teach in a virtual environment, a problem highlighted by Aina and Ogegbo (2022), who reported that educators in South Africa experienced significant difficulties in adapting to online teaching due to their limited digital literacy (Aina & Ogegbo, 2022b).

At the micro level, the study revealed several barriers related to student engagement, familial support, and teacher-student interactions. Students reported difficulties in staying focused during virtual lessons and expressed concerns about the lack of face-to-face interactions with their teachers, which they believed negatively impacted their learning experiences. These findings are consistent with the work of Abu-Zaid et al. (2022), who found that students in Saudi Arabia expressed lower levels of satisfaction with virtual learning platforms compared to in-person instruction. The lack of direct interaction with instructors and peers often led to feelings of isolation and disengagement, further reducing the effectiveness of online learning (Abu-Zaid et al., 2022).

Families also played a critical role in shaping the virtual learning experience. The study found that parents, particularly those from lower socio-economic backgrounds, struggled to provide adequate support for their children due to their own lack of digital literacy and financial constraints. This finding aligns with the research by Mortazavi, Salehabadi, Sharifzadeh, and Ghardashi (2021), who reported that parents in Iran faced significant challenges in supporting their children's online education due to the lack of access to digital devices and reliable internet connections (Mortazavi et al., 2021). The digital divide became more apparent during the pandemic, with students from disadvantaged backgrounds disproportionately affected by these issues.

Another critical finding of this study was the concern among teachers regarding the misuse of online teaching materials, such as recordings of lessons, without proper consent. Teachers feared that their intellectual property could be compromised, leading to a lack of trust in the virtual education system. This concern has been noted in previous studies, such as the work by Balida (2023), who identified ethical issues in online teaching and learning, particularly regarding data privacy and intellectual property protection (Balida, 2023). Furthermore, the lack of emotional connection between teachers and students in a virtual environment, as reported in the present study, echoes findings from Aina and Ogegbo (2022), who noted that the absence of face-to-face interactions made it more challenging for educators to establish meaningful relationships with their students, which in turn affected students' motivation and engagement (Aina & Ogegbo, 2022a, 2022b).

E-ISSN: 3041-8828

The challenges identified in this study are consistent with those highlighted in previous research on virtual education during the COVID-19 pandemic. Studies from various regions have underscored the difficulties posed by insufficient technological infrastructure, inadequate teacher training, and socio-economic disparities. For example, Dhawan (2020) described online learning as a "panacea in the time of the COVID-19 crisis," but also acknowledged the significant challenges that accompany its widespread adoption, particularly in terms of access and equity. Similarly, Torres-Caceres et al. (2022) conducted a systematic review of virtual education in higher education and identified many of the same barriers discussed in the present study, such as poor internet connectivity, lack of student engagement, and the digital divide (Torres-Caceres et al., 2022).

Despite these challenges, virtual education has also provided opportunities for innovation and the development of new pedagogical approaches. The integration of virtual reality (VR) and augmented reality (AR) technologies into online learning platforms, as described by Luo et al. (2021), has the potential to enhance student engagement and improve learning outcomes (Luo et al., 2021). These technologies can provide immersive learning experiences that are difficult to replicate in a traditional classroom setting. Similarly, Huang and Roscoe (2021) highlighted the potential of head-mounted VR displays to transform engineering education by providing students with hands-on experience in virtual environments (Huang & Roscoe, 2021). The present study's findings regarding the challenges of engagement and interaction in virtual education suggest that these innovative technologies could play a crucial role in addressing some of the key barriers identified.

Despite the valuable insights gained from this study, there are several limitations that must be acknowledged. First, the study relied on self-reported data from students, teachers, and parents, which may introduce bias into the findings. Respondents may have been influenced by personal opinions or external factors when providing their responses. Second, the study was conducted during the COVID-19 pandemic, a period of unprecedented disruption in the education sector. As such, the findings may reflect the unique challenges of this time rather than the long-term realities of virtual education. Third, the study focused primarily on the Iranian context, which may limit the generalizability of the findings to other regions with different socio-economic and educational systems.

Future research should seek to expand on the findings of this study by conducting longitudinal studies that track the long-term impacts of virtual education on student outcomes. Such research could provide valuable insights into how students, teachers, and families adapt to the virtual learning environment over time. Additionally, future studies should explore the effectiveness of specific technological interventions, such as VR and AR, in improving student engagement and learning outcomes in virtual education. Comparative studies across different regions and socio-economic contexts would also be beneficial in understanding how virtual education can be adapted to meet the diverse needs of learners worldwide. Finally, more research is needed to examine the ethical challenges associated with virtual education, particularly in terms of data privacy and intellectual property protection, to ensure that online learning platforms are both effective and secure.

To address the challenges identified in this study, educational institutions and policymakers should invest in improving technological infrastructure, particularly in rural and underserved areas. Providing reliable internet access and digital devices to all students is essential to ensure equitable access to virtual education. Additionally, teachers must receive comprehensive training in digital literacy and online pedagogy to effectively engage students in virtual environments. Schools should also consider adopting innovative technologies, such as VR and AR, to enhance the virtual learning experience and make it more interactive and engaging. Finally, schools should foster strong communication and collaboration between teachers, students, and families to support students' learning and well-being in the virtual environment.

Authors' Contributions

All authors significantly contributed to this study.

Declaration

In order to correct and improve the academic writing of our paper, we have used the language model ChatGPT.

Transparency Statement

Data are available for research purposes upon reasonable request to the corresponding author.

Acknowledgments

E-ISSN: 3041-8828

We hereby thank all individuals for participating and cooperating us in this study.

Declaration of Interest

The authors report no conflict of interest.

Funding

According to the authors, this article has no financial support.

Ethical Considerations

In this study, to observe ethical considerations, participants were informed about the goals and importance of the research before the start of the interview and participated in the research with informed consent.

References

Abedi, P., Iranmanesh, F., Bagheri, S. H. S., Rafiei, M., & Afshari, H. (2022). Virtual Medical Education During COVID-19 Pandemic in Iran: A Qualitative Study of Perspectives on Challenges and Strategies. *Journal of Medical Education*, *20*(4). https://doi.org/10.5812/jme.121204

Abu-Zaid, N., Bani-AlDomi, S., Hassan, K., & Hakami, A. (2022). Measuring the Degree of Satisfaction Among Preparatory Year Students Regarding the Virtual Lessons and Educational Platforms in the Universities of the Kingdom of Saudi Arabia During the COVID-19 Pandemic. *Journal of Education and E-Learning Research*, *10*(1), 7-18. https://doi.org/10.20448/jeelr.v10i1.4315

Ahmady, S., Shahbazi, S., & Heidari, M. (2020). Transition to Virtual Learning During the Coronavirus Disease–2019 Crisis in Iran: Opportunity or Challenge? *Disaster Medicine and Public Health Preparedness*, *14*(3), e11-e12. https://doi.org/10.1017/dmp.2020.142

Aina, A. Y., & Ogegbo, A. A. (2021). Change Management: Experiences of Private Tvet College Educators Regarding Virtual Learning During Covid-19. 250-254. https://doi.org/10.36315/2021end054

Aina, A. Y., & Ogegbo, A. A. (2022a). Exploring the Experiences of TVET College Educators Regarding Virtual Learning During COVID-19 in South Africa. 206-216. https://doi.org/10.36315/2022ead16

Aina, A. Y., & Ogegbo, A. A. (2022b). Investigating TVET College Educators' Experiences While Transitioning From the Traditional Classroom to the Virtual Classroom During the COVID-19 Pandemic. *Perspectives in Education*, *40*(1), 129-142. https://doi.org/10.18820/2519593x/pie.v40.i1.8

Akrami, S. (2022). Evaluation of the Effectiveness of Acceptance and Commitment-based Education on Emotional Self-disclosure and Marital Commitment of Women Referring to Gonbad Kavous Clinics. *International Journal of Education and Cognitive Sciences*, *3*(2), 23-29. https://doi.org/10.22034/injoeas.2022.160610

Balida, D. A. R. (2023). Ethical Challenges in Online Teaching and Learning: A Case Study of a Virtual Class. *Russian Law Journal*, *11*(3). https://doi.org/10.52783/rlj.v11i3.1959

Carter, R. A., & Rice, M. (2016). Administrator Work in Leveraging Technologies for Students With Disabilities in Online Coursework. *Journal of Special Education Technology*, *31*(3), 137-146. https://doi.org/10.1177/0162643416660838

Fahim, A. U., Liza, S. J., Lina, S. J., & Salim, M. A. A. (2022). Study of Mental Stress Related with Lifestyle During COVID-19: A Case Study of Bangladesh. *International Journal of Education and Cognitive Sciences*, *3*(2), 30-41. https://doi.org/10.22034/injoeas.2022.160611

Gao, Y. (2023). Research on the Learning Experience of Virtual Simulation Class Experimental Teaching and Learning Based on the Perspective of Nursing Students. *BMC Nursing*, *22*(1). https://doi.org/10.1186/s12912-023-01534-z

Herawati, N., Jafari, M., & Sanders, K. (2024). Teachers' Perceptions of the Efficacy of Positive Behavior Support Systems. *International Journal of Education and Cognitive Sciences*, *5*(2), 8-15. https://doi.org/10.61838/kman.ijeas.5.2.2

Huang, W., & Roscoe, R. D. (2021). Head-mounted Display-based Virtual Reality Systems in Engineering Education: A Review of Recent Research. *Computer Applications in Engineering Education*, *29*(5), 1420-1435. https://doi.org/10.1002/cae.22393

Kovaitė, K., Neifartas, S., & Butvilas, T. (2022). Transformation of Education Policy Strategies and the Management of Virtual Learning Environment During Covid-19. https://doi.org/10.3846/bm.2022.878

Lai, J. W., & Cheong, K. H. (2022). Adoption of Virtual and Augmented Reality for Mathematics Education: A Scoping Review. *IEEE Access*, *10*, 13693-13703. https://doi.org/10.1109/access.2022.3145991

Loureiro, S. M. C., Bilro, R. G., & Angelino, F. (2020). Virtual Reality and Gamification in Marketing Higher Education: A Review and Research Agenda. *Spanish Journal of Marketing - Esic*, *25*(2), 179-216. https://doi.org/10.1108/sjme-01-2020-0013

Luo, H., Li, G., Feng, Q., Yang, Y., & Zuo, M. (2021). Virtual Reality in K-12 and Higher Education: A Systematic Review of the Literature From 2000 to 2019. *Journal of Computer Assisted Learning*, *37*(3), 887-901. https://doi.org/10.1111/jcal.12538

Moro, C., Birt, J. R., Štromberga, Z., Phelps, C., Clark, J., Glasziou, P., & Scott, A. M. (2021). Virtual and Augmented Reality Enhancements to Medical and Science Student Physiology and Anatomy Test Performance: A Systematic Review and Meta-Analysis. *Anatomical Sciences Education*, *14*(3), 368-376. https://doi.org/10.1002/ase.2049

Mortazavi, F., Salehabadi, R., Sharifzadeh, M., & Ghardashi, F. (2021). Students' Perspectives on the Virtual Teaching Challenges in the COVID-19 Pandemic. *Journal of education and health promotion*, *10*(1), 59. https://doi.org/10.4103/jehp.jehp_861_20

Múnera, C. A. A., Hincapié, J. E. G., & Ramírez, L. J. G. (2019). Virtual Classrooms as Pedagogical Mediation in Teaching-Learning Processes. https://doi.org/10.15405/epsbs.2019.04.02.125

Nyathi, V. S., & Mathwasa, J. (2022). Educational Preparedness for Virtual Teaching and Learning During COVID-19 Lockdowns: Implication for Policy Innovation. *Randwick International of Education and Linguistics Science Journal*, *3*(2), 210-220. https://doi.org/10.47175/rielsj.v3i2.473

Ofem, U. J. (2023). Adjustment Tendencies Among Transiting Students: A Mediation Analysis Using Psychological Wellbeing Indices. *International Journal of Education and*

E-ISSN: 3041-8828

Cognitive Sciences, *4*(3), 1-19. https://doi.org/10.61838/kman.ijecs.4.3.1

Pinto, D., Peixoto, B., Melo, M., Cabral, L., & Bessa, M. (2021). Foreign Language Learning Gamification Using Virtual Reality—A Systematic Review of Empirical Research. *Education Sciences*, *11*(5), 222. https://doi.org/10.3390/educsci11050222

Reis, P., Faser, K., & Davis, M. (2015). A Framework for Web-Based Interprofessional Education for Midwifery and Medical Students. *Journal of Midwifery & Women S Health*, *60*(6), 713-717. https://doi.org/10.1111/jmwh.12331

Torres-Caceres, F. d. S., Vergaray, J. M., Arellano, E. G. R., Cuadros, M. J. L., Huayta-Franco, Y. J., & Flores, E. (2022). Virtual Education During COVID-19 in Higher Education: A Systematic Review. *Tuning Journal for Higher Education*, *9*(2), 189-215. https://doi.org/10.18543/tjhe.2217

E-ISSN: 3041-8828