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Review Article

Challenges Faced by University Teachers in Virtual Education During Coronavirus Disease 2019 (COVID-19) Pandemic: A Systematic Review

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Abstract

Background: COVID-19 affected education systems around the world. Virtual education was chosen as a solution not to stop education in schools and universities. While the resolution was adopted to prevent education in the countries, it presented new challenges and complications for university teachers.

Objectives: This systematic review examines teachers' challenges during COVID-19 in virtual education.

Methods: The present study is a systematic review based on the PRISMA guideline. To conduct this study, Web of Science, PubMed, and Scopus databases were searched from 1 December 2019 to 11 November 2021. The inclusion criteria for this study were original research articles published in English that examined the challenges faced by professors in virtual education during COVID-19.

Results: Finally, 17 articles were included from the 2219 articles found in the initial search stage, which examined the challenges faced by Professors in virtual education. The results indicated that the most critical challenges facing Professors during the COVID-19 pandemic were as follows, in order of highest to lowest: 1) Limitations on Internet access and appropriate communication infrastructures, 2) lack of access to computer equipment and hardware, 3) low levels of familiarity and necessary training of teachers and students in working with virtual education systems.

Conclusion: According to the results of the present study, teachers have faced many challenges due to the existing circumstances and the rapid shift from face-to-face to virtual education. Relevant organizations and institutions should train teachers and students to apply virtual education tools properly.

Keywords: COVID-19, University Teachers, Virtual Education, Challenges, Problems

Background

The outbreak of Covid-19 in December 2019 (1) affected education systems worldwide and led to the temporary closure of schools and universities and the cancellation of in-person classes (2). Instead of canceling their classes, most educational centers encouraged the teachers to provide educational materials and hold classes through virtual education and virtual training (3). On this basis and considering the need to observe social virtually and break the chain of transmission, virtual education has become more prevalent than ever (4, 5). The WHO also identified virtual education, such as radio, television, the Internet, and other devices, as one of the best ways to continue education during the COVID-19 crisis (6).

Due to the growth of communication technologies, teachers have been encouraged to hold virtual classes to fill the face-to-face education gaps (7). Undoubtedly, virtual education has provided an extensive range of benefits in the COVID-19 conditions, the most important of which is the provision of the possibility for students and trainers to learn and train at any time

and place, creating discussions and virtual groups separate from the classroom, and holding virtual tests (8, 9). Nevertheless, virtual education has some challenges, including limited access to physical facilities such as laboratories, lack of practical classes, and loss of student interest in learning (8, 9).

In addition, at the beginning of the crisis and virtual education, teachers and students faced challenges such as a lack of familiarity of students and teachers with virtual education platforms and a lack of correct installation of related software on computers and smartphones (7). Keshavarzi et al. addressed the inadequate organizational culture, unsatisfactory infrastructure, neglect the intellectual property rights, and disregard for ethics as among the problems and challenges of virtual education during COVID-19 (10). Accordingly, Contreras et al. claimed that universities should have all the necessary facilities and components for online education and a formal regulation for virtual education (11). Another study also stated the challenges of virtual education, such as professors' inability to teach the material in virtual form, lack of proper feedback from students, lack of discipline, and the possibility of student cheating (12).

Limitation in practical exercises, such as weakness in virtual clinical simulation systems, has also been one of the important challenges in different fields, for example, nursing education (13, 14). In another viewpoint, sociocultural issues related to media and poor media literacy of parents are another major challenge in virtual education (15). Due to the unpreparedness of educational centers in the provision of suitable training platforms and the unfamiliarity of trainers with virtual education methods, the need for this kind of education during the COVID-19 crisis faced serious challenges (16, 17).

Objectives

Many studies have been conducted on virtual Education During Coronavirus Disease 2019 worldwide. Some studies have investigated the challenges students face during COVID-19, while some have reported challenges teachers face in virtual education. According to the research of the researchers, no comprehensive study was found that examined the challenges of professors during the corona epidemic and studied their challenges. Therefore, this study aims to systematically review the challenges experienced by teachers in virtual education during the COVID-19 pandemic.

Identifying the challenges of virtual education based on the point of view of teachers who were at the head of education during the Covid-19 era can help to increase the productivity of virtual education and solve the challenges. Therefore, this review study was designed and implemented to explain university teachers' opinions about the challenges of virtual education during the Covid-19 pandemic.

Methods

The present study is a systematic review based on the PRISMA guideline (18). This review aimed to investigate teachers' challenges in virtual education during the COVID-19 pandemic. For this purpose, PubMed, Scopus, and Web of Science databases were searched to retrieve English articles. The search of references in the mentioned scientific databases and based on the search strategy presented in table 1 was performed independently by three researchers. If there was a discrepancy, it was referred to the fourth person. The searches were conducted from 1 December 2019 to 11 November 2021.

Table 1. Reference search strategy in scientific databases

Time limitation	From 1 December 2019 to 11 November 2021	**Number of records**
Language limitation	English	
Database	PubMed, Scopus, Web of science	
PubMed	(((((("Problems") OR ("Challenges")) OR ("Barriers")) OR ("Obstacles")) AND (((((((("Remote learning") OR (" Online learning")) OR ("Tele education")) OR (" Virtual teaching")) OR ("Virtual university")) OR (" E-learning")) OR ("Virtual education"))) AND ((((((((((((("COVID-19 ")) OR ("COVID 19")) OR (" 2019-nCoV ")) OR ("2019 nCoV ")) OR ("Coronavirus Disease-19")) OR ("Coronavirus Disease 19")) OR ("2019 Novel Coronavirus ")) OR (" 2019-nCoV Disease")) OR ("Coronavirus Disease 2019")) OR ("SARS Coronavirus 2")) OR ("SARS-CoV-2")) OR (" SARS CoV 2"))	768
Scopus	TITLE-ABS-KEY-AUTH("Problems") OR TITLE-ABS-KEY-AUTH("Challenges") OR TITLE-ABS-KEY-AUTH("Barriers") OR TITLE-ABS-KEY-AUTH("Obstacles") AND TITLE-ABS-KEY-AUTH("Remote learning") OR TITLE-ABS-KEY-AUTH(" Online learning") OR TITLE-ABS-KEY-AUTH("Tele education") OR TITLE-ABS-KEY-AUTH("Virtual teaching") OR TITLE-ABS-KEY-AUTH(" Virtual university") OR TITLE-ABS-KEY-AUTH(" E-learning") OR TITLE-ABS-KEY-AUTH("Virtual education") AND TITLE-ABS-KEY-AUTH("Sars Cov 2") OR TITLE-ABS-KEY-AUTH("SARS Coronavirus 2") OR TITLE-ABS-KEY-AUTH("Coronavirus Disease 2019") OR TITLE-ABS-KEY-AUTH("Coronavirus Disease-19") OR TITLE-ABS-KEY-AUTH("2019 nCoV ") OR TITLE-ABS-KEY-AUTH((" 2019-nCoV ") OR TITLE-ABS-KEY-AUTH("Covid 19") OR TITLE-ABS-KEY-AUTH("COVID-19 ") OR TITLE-ABS-KEY-AUTH("2019 Novel Coronavirus ") OR TITLE-ABS-KEY-AUTH("SARS-CoV-2")	551

Web of science	TITLE: ("Problems") OR TITLE: ("Challenges ") OR TITLE: ("Barriers") OR TITLE: ("Obstacles") AND TITLE: ("Remote learning ") OR TITLE: (" Online learning ") OR TITLE: ("Tele education ") OR TITLE: ("Virtual teaching ") OR TITLE: ("Virtual university ") OR TITLE: ("E-learning ") OR TITLE: ("Virtual education ") AND TITLE: ("COVID 19") OR TITLE: ("COVID-19") OR TITLE: ("2019-nCoV") OR TITLE: ("2019 nCoV") OR TITLE: ("Coronavirus Disease-19") OR TITLE: ("Coronavirus Disease 19") OR TITLE: ("2019 Novel Coronavirus") OR TITLE: ("2019-nCoV Disease") OR TITLE: ("SARS Coronavirus 2") OR TITLE: ("SARS-CoV-2") OR TITLE: ("SARS CoV 2")	900

Table 2. PICOs, inclusion criteria and exclusion criteria applied to database search

PICOS	Inclusion Criteria	Exclusion Criteria
Population	university teachers	Student and other degrees
Intervention	COVID-19 pandemic	Other times
Comparison	-	-
Outcome	challenges in virtual education	Other outcome
Study design	original research articles	short articles, letters to the editor, conference abstracts, review articles

The criteria for inclusion and exclusion are state in table 2. After selecting the studies, according to the inclusion and exclusion criteria, data was collected using a data extraction form based on the study's objectives. The collected data were analyzed using the content analysis method.

Quality Evaluation and Extraction

Following selecting the relevant studies based on inclusion and exclusion criteria, the data was collected using a form according to the study objectives. The articles' titles, abstracts, and full texts were reviewed independently by researchers using the STROBE checklist (19). In this way, the articles confirmed in at least 20 of the 22 items in the checklist were included in the study; then, the desired data were extracted from eligible articles and recorded in Excel software.

The possible discrepancies were referred to another person. The data extraction table included the following parts: authors' name and year of the study, Research Type, Country, Statistical Population, Platforms, and Challenges.

Results

In the initial review of three databases, 2219 articles were retrieved and entered into a reference management software named EndNote Ver.20. After removing duplicate and irrelevant items based on the evaluation of the title, abstract and full text, finally, 17 articles were selected, which were published to introduce teachers' challenges in the COVID-19 period. Figure 1 shows the search and selection process of articles.

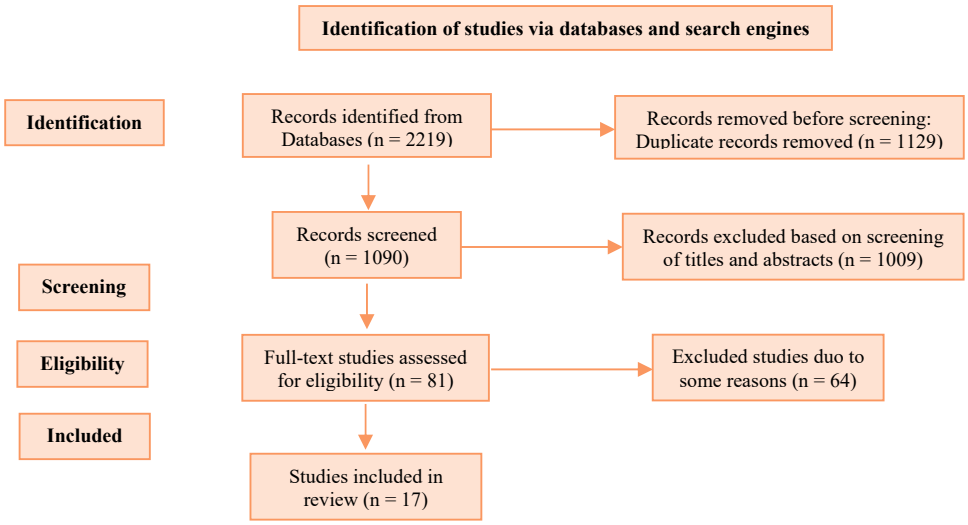

Figure 1. PRISMA flow diagram

Table 3. Results of reviewing the selected studies

Author/ Publication year	Country	Population	Challenges
(Zalat et al, 2021) (20)	Egypt	346 staff in both basic sciences (such as anatomy, physiology, pathology, histology, biochemistry, parasitology, pharmacology, microbiology) and clinical departments	Unstable internet connection
			Inadequate computer labs
			Limited number of computers/laptops
			Technical issues
(Yu et al, 2021) (21)	United States	18 faculty members	Lack of interaction and discussion
			Lack of familiarity with the teaching method
			Solutions: Technology support (100%), Advice from colleagues (66.7%), Holding workshops of Zoom software (61.1%)
(Thaheem et al, 2021) (22)	Pakistan and Indonesia	20 teachers (10 from Pakistan and 10 from Indonesia)	Feeling confused
			Not ready to change the face-to-face class to online method
			Lack of readiness to teach online
			Technological challenges, such as slow internet speed, power outages, and limited use of technology by students
			Lack of training the teachers to use technology
			Solutions: Both countries should focus on the needs and gaps of online education simultaneously or non-simultaneously. Administrators should consider the problems of teachers and students during online classes.
(Romaniuket al , 2020) (23)	Poland	Teachers working at the Maria Grzegorzewski University	Internet connection problems
			Hardware problems
			Software problems
			Lack of experience in online teaching
			Solutions: Renovating the existing solutions, Investing in technical infrastructures, such as digital library resources
(Singh et al, 2021) (24)	India	Faculty members of Punjab Medical Institutions (209 teachers at the university)	Limited internet access
			Lack of training in the use of digital platforms
			Not ready for e-learning
			Lack of sufficient devices/hardware
			Increased workload
			Lack of personal interaction with students
			Poor responses from students
			Difficulty in creating visual plans for courses
			Fatigue and anxiety/personal fear of e-learning
			Distraction while teaching
			Solutions: Changing interactive methods and content in online lectures, Providing the necessary infrastructures such as a strong Internet connection, hardware, and devices required for classes
(Muller et al, 2021) (25)	Singapore	14 instructors from a major university in Singapore	Decreased student participation
			Difficulty in meeting students' needs
			Lack of proper learning
			Increased workload of instructors
			Solutions: Promoting different ways of participation, integrating tests and videos into pre-recorded lectures/live polls, Developing social relationships with others, Proper education and planning
(Padhi et al, 2021) (26)	India	24 faculty members from AIIMS, Bhubaneswar, Odisha, India	Lack of controlled environment
			Network problems during online classes
			Lack of attention from students
			Limitation of practical activities by students

(Tsai et al , 2020) (27)	Pennsylvania State	576 faculty members from Pennsylvania State University	Lack of learning resources
			Challenges related to technology
			Not coincidence of distance courses with face-to-face ones
			Lack of performance evaluation of classroom participation and communication
			Challenges related to technology
			Increased psychological load and other stresses
			Solutions: Need for more organizational support, More support for students and teachers
(Smith et al, 2021) (28)	Midwestern United States	15 faculty members from a Midwestern state university	Lack of proper technology
			Increased workload
			Limited self-efficacy
			Lack of resources
(Sedaghatjou et al, 2020) (29)	Multiple countries	101 Faculty Members of STEM International	Training problems
			Evaluation problems
			Problems related to technology
(Shidiq et al, 2020) (30)	West Java Indonesia	55 chemistry teachers	Limited access to electronic devices and the Internet in some areas
			Difficulty in performing laboratory activities
			Challenges related to evaluation of students' learnings
			Lack of proper understanding of the student's situations
			Decreased interaction between teacher and student
(Ng et al, 2020) (31)	Hong Kong	Three instructors from primary, secondary, and higher education institutions	Digital gap
			Technical concerns
			Lack of student motivation
			Privacy
			Solutions: Borrowing digital devices, Increasing parental support, Use of combined education methods, Training technology literacy
(Alsobhi et al, 2021) (32)	Saudi Arabia	213 University teachers	Problems with internet connection
			Slow internet speed during online lectures
			Lack of access to computers, smartphones, and tablets
(Elberkawi et al, 2021) (33)	Benghazi, Libya	101 faculty members from 6 faculties of the University of Libya	Time-consuming processes of file sharing
			Not easy to upload educational files
			Difficulty of student evaluation methods
			Problems with accessing the Internet
			Problems with working with applications
			Power outage
			Lack of access to necessary facilities
			Solutions: Providing a suitable infrastructure for the Internet**,** Providing appropriate tools, information, and education platforms for teachers
(Almazova et al, 2020) (34)	Russia	87 University teachers	Low level of computer literacy
			Problems with electronic environments of universities and their support services
			Lack of readiness of teachers to teach online
			Lack of readiness of students to learn online
			Inability to use the facilities of online and offline classes
			Limited communication with students
			Solutions: Dealing with psychological barriers while holding online educational activities, Development of hardware and software infrastructures, Organizational support and providing recommendations related to the implementation of educational activities in a digital educational environment, developing some applications for professional improvement of teachers, providing supervisory support from the university by focusing on determining the workload of teachers while working online

(Elshami et al, 2021) (35)	United Arabic Emirates	70 Faculty members	A great deal of workload
			Time-consuming processes of preparation and presentation of distance education materials
			Technical issues
			Solutions: Institutional support and appropriate organizational policy to increase teachers' satisfaction
Alzubaidi et al, 2021 (36)	Multiple countries	111 colleges of pharmacy from 28 countries, among which, 46 colleges were selected from 21 countries, which included 42 faculty members and 26 managers	Lack of integration of evaluations
			Impossibility of holding practical and laboratory classes
			Increased work-related stress
			No use of appropriate technology and preparation of high-quality educational materials
			Problems with online lectures
			Lack of interaction with the student

Table 3 shows that the population of these studies is from the countries of United States (3 studies), India (2 studies), and finally, the countries of Poland, Indonesia, China, Egypt, Singapore, United Arab Emirates, Saudi Arabia, Libya, and Russia have been one study each. Also, three studies were conducted in several different countries. The population of these articles included university professors and higher education teachers. The sample size also had been in the range of 3 to higher than 576 samples in articles. Zoom Meeting, Google Meeting, and social media applications such as Skype, WhatsApp, Telegram, Facebook, and YouTube are the most commonly used platforms for virtual education.

Table 3 presents university teachers' most important challenges during the COVID-19 pandemic. Accordingly, limitations related to Internet access and appropriate communication infrastructure (7 studies), lack of familiarity and necessary training of teachers and students in working with virtual education platforms (6 studies), lack of access to computer equipment and hardware (5 studies), the prevalence of physical and mental problems in teachers and students, lack of proper interaction between students and teachers, increased workload of teachers, and impossibility of holding practical classes are an important challenge in virtual education during COVID-19.

Discussion

The results of the study indicated that the most critical challenges facing teachers during the COVID-19 pandemic were as follows, in order of highest to lowest: 1) Limitations on Internet access and appropriate communication infrastructures, 2) lack of access to computer equipment and hardware, 3) low levels of familiarity and necessary training of teachers and students in working with virtual education systems, 4) prevalence of physical and psychological problems in teachers and students, 5) lack of proper interaction between students and teachers, 6) increase in the workload of teachers, and 7) impossibility of holding practical classes.

That one of the most important challenges that teachers faced during this crisis was related to internet access. According to the definition of virtual education, the internet and intranets are considered the main technology (37). In this regard, it has been stated that during the COVID-19 pandemic, many universities also lacked the necessary infrastructure and tools for virtual education (38). The limitations related to the infrastructures for virtual education, such as internet bandwidth limitations, have resulted in poor efficiency in audio, video, and animations and have wasted time (39). Other studies also stated challenges, including internet bandwidth and mobile data prices (40, 41).

The present study's findings also demonstrated that the limitation of students' and teachers' access to hardware and software systems had been another challenge in virtual education from the teachers' perspective during the COVID-19 pandemic.

Other studies also stated challenges like lack of access to computers or laptops (42, 38). This study's results are consistent with the present study's results. Some other research pieces have discussed that the lack of access to cyberspace and electronic equipment for all students, especially in remote areas, caused inequality in educational opportunities, and many students were disregarded (43, 44). Moreover, due to the home quarantine programs for other occupations, computers and IT equipment at home might be in demand by parents and other household members; therefore, home education could be difficult for students and teachers (45).

It was also concluded that the lack of technical knowledge and inability to work with virtual education systems had been another challenge for teachers during the COVID-19 pandemic. Since the outbreak of COVID-19 and the closure of classrooms occurred suddenly. Without prior planning, training teachers

and students and making proper plans for selecting virtual education platforms was impossible. In this regard, previous studies have shown that a forced shift to virtual education has caused stress, uncertainty, and anxiety. It has been difficult for teachers to change mindsets, become accustomed to online tools, and learn new skills, such as speech recording (25). This study's results are consistent with the present study's results. Posey & Pintz (2017) stated that virtual education changed the roles and responsibilities of educators (46). For this purpose, and to design and deliver virtual education effectively, educators need to be aware of the features necessary to design and present this type of education. In this regard, they must first improve their technical skills to protect themselves against technological advances (47).

According to the results, another challenge was increased physical and mental problems during the virtual education. Alhosseini Abolmaali claimed that during the COVID-19 pandemic, students have suffered from many psychological problems. On the other hand, physical problems have occurred due to the inactivity of students and teachers, and they have become overweight, which has caused serious damage to their physical health (48). Numerous studies in this context have also indicated that virtual education during the COVID-19 pandemic has had different academic and educational consequences, including burnout (49, 50), anxiety, and stress (51). This study's results are consistent with the present study's results.

Lack of classroom interactions has been another challenge of virtual education during the COVID-19 crisis (41). Communication and interaction play important roles in teaching, learning, and achieving its purposes (52).

Furthermore, the present review indicated other challenges in virtual learning, such as problems related to parents and family, low quality and limited learning resources, lack of necessary instructions and regulations regarding virtual education, and privacy concerns. Examining the challenges of virtual education from the point of view of university professors was one of the limitations of the present research. Also, this study only examined studies published in English.

Conclusion

Virtual education has replaced face-to-face education during the COVID-19 pandemic; however, teachers have faced many challenges due to the existing circumstances and the rapid shift from face-to-face to virtual education. The results of the present study demonstrated that the lack of access to the appropriate equipment and limited access to the Internet had been the main challenges of virtual education from the teachers' perspective. Moreover, teachers' and students' lack of sufficient ability and experience was another important challenge that teachers faced during the COVID-19 pandemic. Accordingly, educational officials and administrators should consider the ability of students and teachers to access equipment, and to increase equality and educational justice, physical and financial facilities should be supplied to provide appropriate equipment and infrastructure for people who cannot access these platforms and infrastructures. Moreover, it is suggested that to improve the quality of virtual education and learning, the necessary training be provided to increase the skills of educators in using virtual learning platforms.

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