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Distance education challenges: insight from a nationwide teacher-centric study post- COVID-19 for informed advancements

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Scholars persistently explore the enormous effects of the COVID-19 epidemic on schooling, striving to comprehend its intricacies and derive significant perspectives for forthcoming endeavors. The research-based conclusions and suggestions are deemed potentially effective in closing the gap between theory and practice in literature. This is one of the few studies that connects problems with remedies as proposed by teachers. This national teacher-centric study uses a mixed-method methodology with a random sample of teachers from public and private schools in the State of Qatar to look extensively into the problems faced during the pandemic. In the sample, there were 45 instructors who participated in semi-structured online interviews and 1,553 teachers who answered an online questionnaire. The study points out a number of issues, such as teachers' deficiency in pedagogical competencies, sophisticated technological proficiency in the classroom, curriculum density, inadequate teaching strategies, challenges with determining students' needs and obtaining an honest and realistic assessment that accurately represents the students' level of learning, and the lack of extracurricular activities. According to the findings, the challenges were influenced by a number of factors, including year of experience, gender, age, specialization, education level, and extracurricular activities. We need to leverage the lessons learned to shape the future course that distance education takes to move forward, guided by our observations and insights.

KEYWORDS

teacher-centric, COVID-19, distance education, challenges, distance learning

1 Introduction

In February 2020, the World Health Organization (WHO) officially recognized the onset of COVID-19; dramatically proliferating, the pandemic wasted no time in extending its repercussions to nations across the globe. Governments around the world implemented a variety of precautionary measures, such as travel restrictions, social distancing, quarantine, and lockdowns (Chinazzi et al., 2020). The unexpected pandemic compelled educational institutions all over the world to seek alternatives to ensure the continuation of the educational

process (Alsoud and Harasis, 2021). According to the United Nations Educational, Scientific, and Cultural Organization (UNESCO), more than 1.1 billion students from 80 countries began receiving their education online (UNESCO, 2020).

In the local context, the State of Qatar adopted a distance education model to maintain the continuity of education following the implementation of stringent measures aimed at ensuring the safety of its citizens. The fusion of technological progress and rapid institutional response positions Qatar as a remarkable case study, offering invaluable insights into crisis management within an ever-evolving digital paradigm. The Ministry of Education and Higher Education (MOEHE) made dedicated efforts to assist teachers and students during the sudden shift to distance education. Recording videos for all grade levels and subjects, as well as developing learning platforms, enabled students to gain access to educational resources and communicate with their teachers (Newsome et al., 2022). The technological development in Qatar, as well as the support the (MOEHE) provided to educational institutions during the abrupt transition to distance education, undoubtedly mitigated the repercussions of the pandemic on the educational institutions; however, challenges did emerge (Newsome et al., 2022).

Through a focus on the experiences and strategies of teachers, the study endeavored to comprehensively grasp the complexities of the encountered challenges and the corresponding mitigation efforts. It underscores innovation and collaboration as pivotal elements in fostering educational resilience and efficacy, not only within Qatar but also resonating globally. Timely in its execution, this research prompts profound introspection among educational stakeholders, facilitating proactive preparedness for future emergencies and enriching the global discourse on distance education (Qatar Career Development Center, n.d.; Saleem, 2021).

The aftermath of the COVID-19 pandemic offers a once-in-a-lifetime opportunity for educational institutions and stakeholders to engage in profound reflection on their collective experiences and serves as a critical juncture to meticulously evaluate the efficacy of implemented strategies, identifying avenues for enhancement and adaptation in anticipation of potential future challenges and underscoring the imperative for prioritizing issues concerning students, educators, and technology (Dhawan, 2020; Haleem et al., 2022).

The study was prompted by three primary questions:

1) What challenges did teachers face when providing distance education during the COVID-19 pandemic?
2) Are there any statistically significant differences ($p \leq 0.05$) in the mean responses of teachers to challenges faced during the COVID-19 pandemic based on gender, age, specialization, education level, stage level, school type, years of experience, and involvement in extracurricular activities?
3) From teachers' perspective, what insights have we gained that might influence the future direction of distance learning?

1.1 Literature review

The emergence of the COVID-19 pandemic prompted an abrupt shift to distance learning, forcing the use of educational technology into traditional classroom approaches. Educators, who were in the vanguard of this educational paradigm shift, found themselves confronted with a slew of challenge, a reality supported by several research studies (Alqurashi, 2019; Al Lily et al., 2020; Chen et al., 2020; Huang et al., 2020; Zhang et al., 2020). The complexities of adjusting to virtual instruction highlight the diverse character of the ongoing educational revolution. This process reveals the complex dynamics that educators must deal with, stressing their critical position as navigators in the ever-changing terrain of teaching. In such global circumstances, educators are at the vanguard, acting as the driving power for future educational growth and advancement, demonstrating their critical contributions to creating the trajectory of modern education.

1.2 Distance education challenges

The current body of literature defines several sorts of challenges in the subject of distance education. Ertmer's groundbreaking research (Ertmer, 1999) categorizes challenges into two main groups: extrinsic and intrinsic. Extrinsic challenges encompass deficiencies in resources, training, technical assistance, and time. On the other hand, intrinsic challenges involve teachers' beliefs, perspectives on technology integration, and a deficiency in confidence. Mungania (2003) added to this concept by distinguishing context, content relevance, technological, pedagogical, learning style, personal, and organizational challenge. Assareh and Bidokht (2011) addressed four crucial elements in greater depth: students' psychological challenges, instructors' e-learning ability, curriculum quality, and school support. While Sharin's (2021) work refined the perspective by classifying e-learning challenges into three main categories: students, teachers, and materials, Chen et al. (2022) research found shortcomings in external, intrinsic, classroom management, and design thinking as important problems in technology-integrated education. These numerous classifications emphasize the necessity of identifying and anticipating challenges in distance education environment.

The current literature emphasizes the significant psychological challenges that distance education teachers face, such as feelings of isolation and alienation, which have a negative impact on their motivation and general well-being. Furthermore, the burden of heavy workload and pressure associated with distance education exacerbates these challenges (Cui et al., 2020; Mulenga and Marban, 2020; Adedoyin and Soykan, 2023). Therefore, it is compelling for educators to investigate new communication methods, provide guidance, and encourage active student participation in distance education environments (Lam et al., 2018; Cunningham and Anzola, 2019).

In addition, research shows that teachers lack the educational and technological competencies required for effective distance/remote teaching. This problem is exacerbated by a lack of understanding of how to create digital curricula (Le et al., 2021; Winter et al., 2021; Alqahtani et al., 2022; Adedoyin and Soykan, 2023). Distance education instructors must also deal with issues of student motivation, engagement, and focus, which are frequently caused by unequal access to education and a lack of self-directed learning (Akhtar et al., 2019; Azlan et al., 2020; Dhawan, 2020; Aldhafeeri and Alotaibi, 2022). This disparity is evident in students' limited self-directed learning abilities, where some students struggle to approach learning with the necessary

willpower, perceiving it primarily as an interpersonal endeavor (Al Lily et al., 2020).

Recent research shows that the curriculum length and density have emerged as significant challenges for educators (Rapanta et al., 2020; Alshwiah, 2021; Chiu, 2022). Notably, the misalignment of teaching strategies with the distance education setup posed a unique challenge (Aldhafeeri and Alotaibi, 2022). In addition, evaluating students during distance education presented a unique challenge because of the lack of direct supervision. As a result, teachers have been compelled to investigate novel evaluation methods in order to provide personalized instruction and monitor student engagement, ensuring that all students receive tailored support (Al Lily et al., 2020; Zhang et al., 2020; Chiu, 2022).

Additionally, the technological logistics of distance education introduces new challenges. Teachers faced issues such as limited internet access, hardware and software defects, download complications, installation challenges, and concerns about visual and audio quality. These technological impediments not only disrupt the learning process but also have a significant impact on the overall quality of education (Chen et al., 2020; Sharin, 2021; Alqahtani et al., 2022; Adedoyin and Soykan, 2023).

Addressing these challenges is critical to ensuring effective and high-quality distance education experiences for both educators and students, while adhering to the core tenets of educational pedagogy in adapting teaching methods to the diverse societal contexts in which learning occurs.

1.3 Factors influencing distance education

Teachers face a variety of challenges in the field of distance education, the nuances of which are influenced by a variety of factors. Extensive research illuminates this complication, shedding light on the multifaceted nature of these challenges. Chen et al. (2022) investigated gender as a factor, revealing that female teachers frequently find themselves juggling heightened workloads with the intricate balancing act of familial responsibilities, resulting in a pervasive sense of overwhelm. However, Zadok-Gurman et al. (2021) challenged the notion of gender specificity by demonstrating that challenges affect both male and female teachers equally.

Subject-specific disparities further complicate the landscape of distance education challenges. As Adedoyin and Soykan (2023) observed, teaching art, physical education, mathematics, and science online necessitates innovative strategies for facilitating direct communication and live experiments, which contrast sharply with subjects such as languages or history. These findings emphasize the importance of tailored pedagogical approaches for effectively addressing these diverse challenges.

Surprisingly, age and experience, which are commonly assumed to be influential, played nuanced roles in shaping teachers' interactions with distance education. These factors had no significant impact on the nature of the challenges encountered (Zadok-Gurman et al., 2021; Chen et al., 2022). However, further investigations revealed that teachers of various ages and experience levels exhibited varying degrees of familiarity with technology and adaptability to online learning environments. Alqahtani et al. (2022) shed light on the technological challenges that older teachers faced, emphasizing their struggles with adopting new technologies and developing digital literacy. Experienced teachers, on the other hand, expertly navigated the challenges of distance education, drawing on their expertise in curriculum management and extensive knowledge of educational content (Henriksen et al., 2017).

Finally, a thorough understanding of the challenges that instructors faced in distance education emphasizes the importance of specific support systems and instructional practices. Recognizing the various variables that shape these challenges is critical for establishing an inclusive and responsive educational environment in the digital age.

1.4 Theoretical framework

This study employs three theoretical frameworks to understand the challenges that teachers experienced when delivering distance education during the COVID-19 pandemic: the Technology Acceptance Model (TAM), self-determination theory (SDT), and the Technological Pedagogical Content Knowledge Framework (TPACK). These frameworks together provide a comprehensive approach to understanding the complex interplay of technology, motivation, and pedagogy in the rapidly evolving landscape of education during a pandemic.

Technology Acceptance Model (TAM) is utilized in this study to assess how teachers acquire and utilize new technology in the context of distance education during the COVID-19 pandemic. TAM focuses on two key factors: perceived utility and simplicity of use. It examines how teachers' perceptions of the usefulness and ease of using technology influence their attitudes and behaviors towards incorporating technology into their teaching methods (Marangunić and Granić, 2015).

Self-Determination Theory (SDT) explores the psychological aspects of teachers' motivation and adaptability to distance education during the COVID-19 pandemic. SDT emphasizes the role of psychological needs, such as autonomy, competence, and attachment, in shaping individuals' motivation and willingness to engage with technology and adapt to new educational environments. SDT helps analyze how these psychological factors influence teachers' responses to distance education, including their use of technology (Ryan and Deci, 2000).

The Technological Pedagogical Content Knowledge Framework (TPACK) is employed to address the challenges faced by teachers in the realm of distance education. TPACK combines three essential domains: technical knowledge (TK), pedagogical knowledge (PK), and content knowledge (CK). Effective teaching in the context of distance education hinges on the synergistic integration of these three domains, resulting in interactive learning experiences that enhance student learning and cater to diverse student needs. TPACK is used to examine how teachers' challenges in distance learning often arise from deficits in one or more of these domains and their inability to effectively integrate them in their teaching practices (Mishra and Koehler, 2006; Harris et al., 2009).

2 Materials and methods

2.1 Methods

This study employed the mixed-method approach. To collect quantitative and qualitative data, an online self-administered

questionnaire and semi-structured interviews were administered to a random sample of teachers from public and private schools in Qatar.

2.2 Population and sample

The population of this study included all teachers in public and private schools in the State of Qatar during the academic year 2020–2021. Qatar has an advanced educational system that includes all levels, from kindergarten to university. Two different types of institutions deliver pre-university education: public schools and private schools. Public schools are subject to oversight by the Ministry of Education and Higher Education and offer national educational curricula, while private schools offer a wide range of international curricula, including those from the International Baccalaureate, British (IGCSE), and American. Community schools are a subset of these private schools that implement curricula inspired by their native countries (Ministry of Education, 2024).

The study sample consisted of 1,553 teachers who responded to the online questionnaire. Then, the researchers conducted 45 random interviews with teachers who volunteered to participate in the online semi-structured questionnaire (See Table 1).

2.3 Study instruments

2.3.1 Self-administered questionnaire

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A detailed two-part online self-administered questionnaire was meticulously developed for the current study. The first part included sociodemographic parameters, while the second featured a meticulously crafted scale aimed at assessing the challenges that teachers faced in the midst of the unprecedented COVID-19 pandemic. Following the quantitative phase, the semi-structured online interview was included in the research methodology.

The first section of the self-administered questionnaire covered gender, age, specialization, educational attainment, career stage, school classification, years of professional experience, and the presence of extracurricular activities in the school setting. Meanwhile, the second section of the questionnaire was devoted to investigating the numerous challenges that educators face in the field of distance education. To identify these challenges, the researchers meticulously devised a scale based on a review of the relevant literature, including works by Aguilar et al. (2020). This section included 17 distinct items, each carefully crafted to encapsulate various aspects of distance education challenges. Participants were asked to rate their level of agreement with each statement on a 5-point Likert scale ranging from (1) not challenging to (5) highly challenging.

TABLE 1 Distribution of the population according to different disciplines.

Type	Type of school		Total
	Public	Private	
Numbers of teachers	14,703	11,688	26,391

The newly developed scale items were rigorously back translated to ensure linguistic reliability. The items were meticulously translated into Arabic by professional translators fluent in both the source and target languages. Following that, a second bilingual expert meticulously cross-checked the Arabic rendition against the original English version, making minor adjustments as needed. This meticulous translation process was undertaken to ensure the questionnaire's integrity and accuracy across linguistic and cultural contexts.

2.3.2 Semi-structured interview

Following the quantitative findings, the researchers used semi-structured interviews to cultivate in-depth narratives. These interviews were meticulously designed, conducted, and analyzed in accordance with the established framework outlined by Spradley (1979) seminal methodology. The interview protocol was divided into two parts: the grand tour and the mini tour. A predefined set of questions aligned with the study's overarching inquiries was prepared for the grand tour. Concurrently, during the mini tour, researchers improvised a series of follow-up questions to elicit additional elucidation and clarification from the interviewee. Following that, each interview was meticulously transcribed for later analysis and interpretation using audio recordings.

2.4 Validity and reliability of the instrument

A group of experts in curriculum and instruction as well as educational technology assessed the content validity of both the English and Arabic iterations of the challenges scale. The experts systematically examined aspects such as linguistic accessibility, clarity, and the inherent coherence between individual elements and the overarching construct of the scale in question. Furthermore, the internal consistency, or reliability, of the challenges scale was tested on a group of 20 educators. The computed Cronbach's alpha coefficient for the section focusing on challenges yielded a robust reliability coefficient of 0.913.

2.5 Data collection

Researchers utilized Microsoft Forms to design a self-administered Arabic-English online questionnaire to target a wide range of teachers. Researchers worked with the Ministry of Education and Higher Education to randomly email the questionnaire to Qatari public and private school teachers. The Ministry sent reminders to enhance response. The questionnaire was available in Arabic and English, where each language version of the questionnaire took 10–15 min to complete. Online semi-structured interviews took 15–20 min and were recorded and transcribed to collect qualitative data.

2.6 Ethical approval

The Qatar University Institutional Review Board (IRB) authorized this research study (QU-IRB 1481-EA/21). The participants' information sheet as well as a declaration expressing their voluntary participation in the study were given to the respondents. All participants were promised confidentiality,

anonymity, and security, and they were informed that the information gathered would be utilized solely for scientific purposes.

2.7 Data analysis

2.7.1 Statistical analysis

The quantitative data was processed using the statistical software SPSS version 27.0. On a 5-point Likert scale, higher ratings imply greater difficulty (1 = not challenging, 2 = little challenging, 3 = moderately challenging, 4 = challenging, and 5 = high challenging). Descriptive analysis and analysis of variance were used.

The "average challenge score" (ACHS), which served as the dependent variable for data analysis, was derived using the average responses of each respondent to all challenge items. The sociodemographic factors were employed as independent variables. Depending on the category level of the variables, a one-way ANOVA and an independent sample t-test were employed to assess if means were equitable across the categories of each independent variable. If the statistical assumptions were refuted, the non-parametric Kruskal-Wallis and Mann–Whitney tests would be used instead of ANOVA and *t*-tests. *p*-values of 0.05 were used to evaluate whether a statistical test was statistically significant.

2.7.2 Thematic analysis

The researchers employed Spradley (1979) thematic analysis for qualitative data in three steps: Condensing and expanding the data, identifying significant themes and patterns, and carrying out the taxonomic analysis by subdividing each domain into subdomains that share common components.

3 Results

3.1 Characteristics of the study sample

Table 2 presents teachers' sample distribution and the demographic variables.

TABLE 2 Teachers' sample distribution according to the variables (N = 1,578).

Variables	Level	*N*	%
Age	<25	17	1.1%
	25_34	366	23.2%
	35_44	690	43.7%
	>45	505	32.0%
Gender	Male	673	42.6%
	Female	905	57.4%
Level of education	Bachelors	1,037	65.7%
	Master	425	26.9%
	PhD	46	2.9%
	other	70	4.4%
Type of school	Public	1,026	65.0%
	Private	552	35.0%
Specialization	Literary (Arabic-Islamic studies-social studies	563	35.7%
	English	286	18.1%
	Math	228	14.4%
	sciences (physics – biology – chemistry)	258	16.3%
	IT	91	5.8%
	Art	68	4.3%
	PE	82	5.2%
	Music	2	0.1%
Years of experience	1–5	268	17.0%
	6–10	362	22.9%
	11–15	346	21.9%
	16–20	231	14.6%
	>20	371	23.5%
Schools holding extracurricular activities	No	250	15.8%
	Yes	1,328	84.2%
Stage level	Elementary	611	38.7%
	Preparatory	325	20.6%
	Secondary	642	40.7%

3.2 Question 1: what challenges did teachers face when providing distance education during the COVID-19 pandemic?

To identify the key challenges teachers faced in the context of distance education during the COVID-19 pandemic, an online self-questionnaire and interviews were conducted. Table 3 shows that teachers' mean responses ranged between (M = 3.83; S. D = 0.942) and (M = 2.67; S. D = 1.178), while the overall mean average for the challenges was (M = 3.09, S. D = 0.724). To facilitate the interpretation of the data, the researchers categorized challenges into five levels: high challenging (5.00–4.21), challenging (4.20–3.41, somewhat challenging (3.40–2.61), little challenging (2.60–1.81), and not challenging (1.80–1.00). A minimum score of 1 indicates no challenge, whereas a score of 5 indicates an extremely challenging level. Thus, the findings indicate that teachers experienced a variety of substantial to moderate challenges during distance education.

Item 1, 6, and 11 demonstrated the highest mean averages (M = 3.83, M = 3.48, and M = 3.41) respectively. This suggests that teachers encountered substantial challenges in distance education, especially due to the infrequency of interactions with students and colleagues, the difficulty of encouraging students to complete assignments, and the lack of instructional materials for remote participation. In contrast, items 10 "Distance instructions include some teaching content that is not suitable for distance instructions" and item 7 "Accessing distance education tools such as Microsoft Teams" had the lowest averages (M = 2.67) and (M = 2.78) indicating relatively fewer challenges in these specific areas (see Table 3).

TABLE 3 Challenges that teachers face during distance education.

Items	Mean	S. D
Not seeing my students \ colleagues as often	3.83	0.942
Access to technology, issues with Wi-Fi/connectivity	3.07	1.163
The Structure of the school day	3.02	1.139
Issues with technological devices	2.98	1.174
Being responsible for my schedule	2.83	1.295
Motivating my students to complete schoolwork	3.48	1.149
Accessing distance education tools such as Microsoft Teams	2.78	1.360
Maintaining connections with colleagues	2.88	1.207
Assisting my students with instructions or assignments	3.14	1.188
Distance instructions include some teaching content that is not suitable for distance instructions	2.67	1.178
Distance instructions include insufficient student participation	3.41	1.128
Distance teaching resources are sufficient for supporting courses	3.07	1.020
Teaching strategies and teaching methods are suitable for distance instructions	3.11	1.038
Distance instructions include no course assistant or insufficient quantity	2.95	0.969
Maintaining connections with students	3.28	1.063
Facilitating live sessions	3.07	1.163
Opportunities for collaboration with colleagues	3.02	1.138
Average challenges score	3.09	0.724

Participants' responses in the interviews indicated a notable consensus regarding the challenges they experienced throughout the shift to distance education. The findings identified three primary themes: teachers' challenges, students' challenges, and challenges associated with the educational process.

Initially, the teacher's personality was critical. The lack of enthusiasm among teachers to quickly adapt to emergency-driven distance education complicated the process. Teachers first struggled to manage their time effectively, striving to strike a balance between teaching commitments and their personal life under the strains of distance education. Second, significant social and emotional challenges emerged. Feelings of alienation and detachment from social groups were widespread. The lack of face-to-face interactions between instructors and students, the challenges of providing emotional support remotely, and the absence of nonverbal cues such as body language and facial expressions all hampered effective communication. These important features of meaningful learning were jeopardized. Third, instructors' educational expertise was critical. Many instructors lacked advanced technological skills, struggled with changing curriculum for distance education, and found it challenging to integrate technology effectively in the classroom. One of the teachers, for example, characterized her personal struggle during distance education as follows:

> "Finding a good time balance was always hard. It was hard to balance my personal life with my teaching duties and the demands of distance education. Being cut off from our friends and family and not being able to talk to them in person has made it hard to offer emotional support, which threatens the very essence of meaningful learning."

Another teacher described his challenges saying:

> "We didn't want to change, so it was hard to quickly adjust to emergency remote education. It was a big problem that made the whole process very hard, and many of us don't know how to use technology well enough for online schooling. We don't know how to change the curriculum to work with distance learning or how to use technology well in the virtual classroom."

Based on teachers' remarks, two noteworthy subthemes emerged relevant to students. First, students' unwillingness to study, difficulty keeping attention during live online classes, insufficient active involvement, and ignorance for assignments or assessments were identified as key issues. Furthermore, a significant number of students showed inconsistent attendance, both online and in face-to-face classes (when both modes were in rotation). Second, equity issues looked to be difficult. Distance education brought more challenges to students from low-income families and students with disabilities. These students faced a hard time seeking access to distance education resources. For example, one of the teachers said:

> "Sad to see that some students miss online classes, don't want to study, and have trouble focusing while they're online. It's very important for them to be involved in order to learn well."

Another teacher said:

> " It's hard to make sure that all the students have the same chance to learn and find ways to keep them interested. Also, it's hard for students from low-income families and people with disabilities to get to school supplies, which makes the educational gap bigger than it should be."

Teachers cited a slew of challenges in distance learning. The extensive curriculum that is incompatible with distance education posed challenges for teachers, making it impossible to achieve class

objectives within the timeframe provided. Adapting instructional strategies for practical skills and scientific experiments increased the complexity of distance education. Teachers, on the other hand, have found it difficult to deliver individualized education to students with varying levels of abilities, characteristics, and learning styles. These issues resulted in poor educational results, such as an increase in educational gaps, a decrease in student ability levels, inadequate topic mastery, and unmet educational objectives. For example, one teacher described the challenges with instructional content saying:

> "The students had a hard time with the lengthy online curriculum because the materials weren't appropriate for learning from a distance, and it was hard to include hands-on activities. Lessons had to be changed to fit the needs of each student in the virtual classroom as well, but the tools for online classes didn't always let this happen. Because of this, a lot of students fell behind, leaving big gaps in their knowledge and a general drop in their skills."

Another teacher, who struggled with instructional material, articulated her concerns as follows:

> "Not only did the online curriculum not always fit the needs of the students, but it also couldn't do the important experiments and research projects that are big parts of their education. They could only talk about ideas instead. They had trouble getting good grades and completing their schoolwork because they didn't have enough real-life experience."

External interferences in student assessments exacerbated evaluation-related challenges as teachers struggled to understand students' needs and measure real learning as it occurred. As the workload increased, it became important to swiftly adapt to new teaching methods, supply digital resources, and create electronic assignments. Furthermore, teachers had to adapt their teaching methods to match the needs of their students, while also aiming to avoid students from missing live sessions due to challenges accessing activities and assignments placed on learning platforms. Instructors may not have the time to adequately help students' learning owing to administrative and other commitments. Finally, teachers reported that power outages, slow Internet connections, difficulty installing interactive programs, and difficulty identifying or addressing technical challenges during distance education hampered the smooth implementation of distance education initiatives and increased the complexity of the educational environment in the distance learning environment. One of the teachers, for example, addressed her concerns about assessment by saying:

> "As an elementary school teacher, it is hard to figure out what my students need and how much they really understand. At this age, they also need support, presence, and direct guidance. Technical problems, like power outages and slow internet connections, make it hard to provide consistent learning experiences, teach at a slow pace, and keep students interested."

Another teacher noted assessment challenges:

> "The evaluation process needs to be strict and fair, but it's hard to be consistent when there are so many technological problems all the time. Some students do really well online, while others face a hard time. We need more help right away to close this digital divide between students with different needs and give everyone the same chances. "The load has grown because we have to keep changing and finding ways to make sure our students can get a good education."

3.3 Question 2: are there any statistically significant differences ($p \leq 0.05$) in the mean responses of teachers to challenges faced during the COVID-19 pandemic based on gender, age, specialization, education level, stage level, school type, years of experience, and involvement in extracurricular activities?

Researchers dug deep into the factors that contribute to such concerns in distance education to acquire a clear grasp of the challenges teachers faced and to find possible answers. Table 4 displays the findings of one-way ANOVA/Kruskal-Wallis and independent samples t-tests, which suggest significant differences in the degree of difficulty encountered by instructors in relation to the independent factors. The degree of difficulty varies statistically by gender ($p = 0.002$), age ($p = 0.025$), level of education ($p = 0.000$), specialization ($p = 0.015$), years of experience ($p = 0.000$), level stage ($p = 0.000$), and involvement in extracurricular activities ($p = 0.035$).

By analyzing the origins of variances in teachers' concerns based on main features, this study discovered intriguing patterns. First, female teachers faced more challenges than male teachers. Second, teachers at schools with no extracurricular activities encountered more challenges than their counterparts in schools with such activities. Third, teachers under the age of 25 had more challenges than those aged 25 to 34 ($p = 0.005$), 35 to 44 ($p = 0.005$), and 45 and older ($p = 0.013$). Fourth, bachelor's degree holders faced more challenges than master's degree holders ($p = 0.00$) or other degree holders ($p = 0.044$). Teachers with 1–5 years of experience had more challenges than those with 6–10 years ($p = 0.004$) and 11–15 years ($p = 0.003$). Similarly, teachers with 16–20 years of experience outperformed those with 6–10 and 11–15 years of experience ($p = 0.00$ and $p = 0.00$, respectively).

In terms of teacher specialty, the results showed that English ($p = 0.007$) and science ($p = 0.018$) teachers faced more challenges than their humanities colleagues. Teachers of English ($p = 0.007$) and science ($p = 0.011$) had more challenges than art teachers ($p = 0.007$). Furthermore, when the educational levels taught by teachers were investigated, elementary teachers faced higher challenges than preparatory and secondary teachers ($p = 0.009$ and $p = 0.000$), respectively. There were no statistically significant differences in average challenge scores of teachers based on the type of the institution they worked at.

3.4 Question 3: from teachers' perspective, what insights have we gained that might influence the future direction of distance learning?

The Silver line rises amongst the dark clouds; while discussing the challenges, teachers proposed many ideas to improve distance

TABLE 4 Differences in the average challenge score of teachers due to different variables.

Variables	Level	N	Mean	S. D	Test statistics[b]	*P*-value[a]	*Post hoc*
Gender	Male	673	3.025	0.727	0.887	0.002	Female > Males
	Female	905	3.139	0.717			
Type of school	Public	1,026	3.113	0.722	0.001	0.094	
	Private	552	3.049	0.723			
Holding school extracurricular activities	Yes	1,328	3.074	0.727	1.490	0.035	No > Yes
	No	250	3.176	0.693			
Age	< 25	17	3.565	0.669	3.120	0.025	Bellow than 25 > (25–34, $P = 0.005$), (35–44, $P = 0.005$), (> 45, $P = 0.013$).
	25_34	366	3.061	0.746			
	35_44	690	3.072	0.721			
	> 45	505	3.121	0.705			
Level of education	Bachelors	1,037	3.168	0.707	12.175	0.000	Bachelors > (Master, $P = 0.00$), (Other, $P = 0.044$)
	Master	425	2.925	0.742			
	PhD	46	3.028	0.767			
	Other	70	2.990	0.636			
Specialization	Literary	563	3.138	0.741	17.400	0.015	Literary < (English, $P = 0.007$), (Science, $P = 0.018$)
	English	286	2.997	0.792			
	Math	228	3.094	0.717			
	Sciences	258	3.023	0.683			Art > (English, $P = 0.007$), (Science, $P = 0.011$)
	IT	91	3.152	0.555			
	Art	68	3.239	0.581			
	PE	82	3.118	0.705			
	Music	2	2.206	0.957			
Years of experience	1_5	268	3.180	0.690	5.851	0.000	1_5 > (6–10, $P = 0.004$), (11–15, $P = 0.003$)
	6_10	362	3.010	0.724			
	11_15	346	3.000	0.757			16_20 > (6–10, $P = 0.00$), (11–15, $p = 0.00$)
	16_20	231	3.240	0.724			
	> 20	371	3.100	0.693			
Level stage	Elementary	611	3.195	0.731	11.456	0.000	Elementary > (Preparatory, $P = 0.009$), (Secondary, $P = 0.00$)
	Preparatory	325	3.067	0.707			
	Secondary	642	3.003	0.712			

[a]*P*-values based on One-way ANOVA or Kruskal-Wallis tests and independent-samples *t*-test.
[b]Could be either F for the ANOVA test or T for the *t*-test.

education. For example, teachers suggested collaborating with the media to raise awareness about the importance of distance education and forming a cooperation agreement with telecommunication companies to increase network efficiency and reduce internet costs. Teachers also underlined the necessity for a system of education that is level-specific and accessible to all students, including students with disabilities. They also emphasized the need for fair and reliable assessment methods. Technologically, teachers emphasize the need for a robust educational platform that can withstand pressure without affecting the speed and quality of distance education. Furthermore, and to ensure the quality of teaching materials, teachers called for a high-quality computerized interactive curriculum that includes virtual field trips, podcasts, and films. Training and credentials are also essential: teachers should be trained in the use of technology, adapt curricula to distance learning, and use teaching strategies and methods appropriate to distance learning. Likewise, students should be trained to self-learn and manage time effectively. Finally, teachers should align formal education with distance education by implementing weekly online lessons, creating homework, and using interactive programs in regular classrooms. Teachers should be assessed in line with distance learning and develop fair and effective motivation strategies. One teacher suggested:

> "I stress the need for a strong platform for education that can handle a lot of stress without lowering the quality of the work. This means that companies that provide telecommunications must

> work together. This can enhance networks' performance and lower the cost of internet."

Clearly, three sub-themes emerged that teachers must master during distance learning: technological skills, personal skills, and leadership skills. Technological skills involve using interactive programs and applications, designing presentations, and choosing appropriate internet sources. Personal skills include speed, accuracy, patience, flexibility, seriousness, diligence, self-development, and readiness to adapt to emergency circumstances. Leadership skills are crucial for student-centered learning including effective communication, creative thinking, problem-solving, time management, and appropriate feedback. Teachers should also be prepared to adapt to emergency circumstances positively. These skills are essential for successful distance learning. One teacher, for example, underlined the importance of teachers having the following characteristics during distance education:

In the digital age, teachers need to learn how to use interactive programs, make presentations that are interesting, and pick reliable internet sources to make a dynamic virtual classroom that keeps students interested.

Another teacher emphasized the need of personal skills for distance education:

> "Personal skills like speed, accuracy, patience, and flexibility are very important for distance learning. For online interactions to work, teachers need to be aware of each student's learning pace, keep teaching standards high, and be ready for emergencies."

Another teacher highlighted the skills that students must have to study effectively when enrolled in distance education:

> "Helping students learn how to communicate well, think creatively, solve problems, manage their time well, and give and receive feedback is an important part of virtual learning."

4 Discussion

In today's fast changing technology, integrating technical skills into education is no more a luxury, but rather a need. Because of technological and artificial intelligence breakthroughs witnessed throughout the world, digital literacy has become crucial. The fast move to distance education during the COVID-19 pandemic underlined this demand. This study looked at the challenges that teachers had during the pandemic and investigated the factors that may influence the severity of those problems. It also included teacher-proposed solutions to such problems, with the objective of enhancing education delivery and ensuring its long-term survival. Understanding these problems is crucial as it directly relates to how teachers integrate technology into their teaching techniques in the context of distance education (Panigrahi et al., 2018; Klein et al., 2019).

4.1 Teachers' challenges during distance education

The findings of this study are similar to prior research, demonstrating the major difficulty instructors encountered when delivering distance education during the COVID-19 pandemic. While specifics differ, existing data indicates that instructors faced major challenges (Alqurashi, 2019; Al Lily et al., 2020; Chen et al., 2020; Huang et al., 2020; Zhang et al., 2020). Notably, the findings of this study are consistent with previous research, stressing the lack of direct connection between teachers and students, as well as the challenges in encouraging students to actively participate and engage in learning during distance education. Such concerns have been frequently identified as unfavorable elements, underscoring their crucial importance in the field of distance education (Azlan et al., 2020; Bisht et al., 2020).

This research divides the challenges experienced in the field of distance education into three distinct domains: challenges relating to teachers, challenges related to students, and challenges inherent in the educational process. The recognition of challenges in the educational environment aligns with earlier research, particularly in line with the findings declared by Sharin (2021). Two decades earlier, however, Ertmer (1999) proposed a different viewpoint that encourages a holistic understanding of the complex forces shaping education, emphasizing the need for educators to navigate and negotiate both external and internal factors while remaining attuned to the ever-changing nature of educational discourse.

The taxonomic structure described in this study goes beyond Ertmer's framework, as proven by Chen et al. (2022), which includes classroom management and teacher design thinking challenges. The comprehensive character of this categorization system exemplifies an ongoing scholarly discourse, which is broadening theoretical limits to cover a larger range of challenges experienced in the distance education setting. Notably, Mungania (2003) added to this debate by recognizing a varied range of seven unique kinds of issues, so enhancing the current awareness of the multiple challenge faced by teachers in the context of distance education.

4.1.1 Teacher-related challenges

Concerning the teachers' challenges, one noteworthy hindrance is their lack of motivation to properly adapt to the demands of distance education. According to numerous studies, this lack of motivation was affected by social and psychological problems caused by the pandemic, such as feelings of isolation and anxiety about the spreading disease (Cui et al., 2020; Hwang et al., 2020; WHO, 2020). The pandemic had a significant impact on people's emotional and physical health; stress and worry caused by social isolation and a lack of assistance compounded instructors' negative attitudes (Huang et al., 2020). Furthermore, the MOEHE's pressure during the abrupt shift to distance education may have reduced teachers' feeling of freedom and competence. According to the Self-Determination Theory (SDT), this interference lowered teachers' motivation and flexibility during distance education (Mulenga and Marban, 2020; Adedoyin and Soykan, 2023).

Furthermore, this study confirms previous research findings (Chung et al., 2020; Chen et al., 2021; Winter et al., 2021), which recognized teachers' lack of pedagogical abilities, mastery of advanced technology skills, and effective application of these skills as major problems. According to relevant research, these deficiencies have a significant influence on teachers' views throughout distance education (Le et al., 2021; Adedoyin and Soykan, 2023). This might be due to the rapid shift to this form of schooling without enough preparation or teacher training (Mulenga and Marban, 2020; Alomari, 2023). Furthermore, as Tsai and Chai (2012) pointed out, a lack of design

thinking adds to the complexity of challenges. Design thinking is a critical thinking talent that helps teachers to produce ideas creatively, use technology to handle complicated educational challenges, and build innovative learner-centered teaching techniques (Henriksen et al., 2017; Primus and Sonnenburg, 2018). Finally, the lack of personal interaction between teachers and students made it difficult to provide education based on their preferences and abilities, a finding that is consistent with numerous research studies highlighting the extent to which this challenge affects both teachers and students, compounding the challenges associated with distance education (Lam et al., 2018; Cunningham and Anzola, 2019; Bisht et al., 2020; Sharin, 2021).

4.1.2 Student-related challenges

This study confirmed findings from previous research, focusing on students' concerns with motivation, engagement, and attention in the setting of distance learning (Akhtar et al., 2019; Aldhafeeri and Alotaibi, 2022). The causes of these challenges are multifaceted: some students saw distance education as a passing fad, while others, given access to electronic devices, indulged in distractions such as online gaming and social networking apps (Al Lily et al., 2020). Furthermore, differences in students' possibilities posed serious challenges for teachers, owing to insufficient educational resources, restricted internet access, or disability-related problems. These barriers have observable repercussions on students' educational experiences and interactions with teachers and classmates, according to multiple research investigations (Azlan et al., 2020; Bisht et al., 2020; Dhawan, 2020).

4.1.3 Education-related challenges

Concerning educational process and content issues, the findings of this study are similar with earlier research (Rapanta et al., 2020; Alshwiah, 2021; Aldhafeeri and Alotaibi, 2022) showing the challenges experienced by teachers in covering the curriculum during distance education. This issue derives from the challenges associated with administering virtual classrooms, as well as a mismatch between the distance education timeline and the breadth and intensity of the program (Markova et al., 2017; Chen et al., 2022). Furthermore, the findings of Chiu (2022), Jaakkola and Veermans (2020), and Leszczyński et al. (2018) demonstrate that traditional teaching approaches are usually inadequate for distance education, particularly when practical skills and scientific experiments are involved. As the digital divide between curriculum and teachers' technological abilities grows, the issue of adopting these tactics and ensuring student understanding exacerbates educational inequities (Rapanta et al., 2020).

Assessment challenges emerged as a prominent concern among instructors in this study, a feeling mirrored by other academics (Al Lily et al., 2020; Chiu, 2022). It was challenging to identify students' needs and complete reliable assessments, especially in areas such as writing, reading, and practical abilities. Direct monitoring was lacking, making it impossible to avoid cheating and ensure legitimate student answers (Zhang et al., 2020). Furthermore, teachers were tasked with designing teaching approaches to accommodate students who did not have access to computers, assuring their involvement in live lessons.

Furthermore, technological constraints such as power interruptions, sluggish Internet connections, and difficulties installing interactive applications and dealing with technical issues posed considerable challenges. These disruptions, identified in this study and mirrored in existing literature (Alqurashi, 2019; Azlan et al., 2020; Bisht et al., 2020; Chen et al., 2020; Sharin, 2021; Alqahtani et al., 2022; Adedoyin and Soykan, 2023), cause delays in distance education delivery, underscoring the system's reliance on technology and its tools. Factors contributing to distance education challenges.

The findings of this study, except for school type, provide insight on the influence of demographic variables on the challenges encountered by instructors in the context of distance education. Existing research has consistently demonstrated that women feel higher levels of stress and anxiety than men (Alshwiah, 2021; Chen et al., 2022). According to Sharin (2021) and Liu et al. (2020) the challenges faced by female instructors outnumber those faced by their male counterparts due to the many activities done by women, such as childcare, domestic chores, and professional commitments (2020). These findings contrast those of Zadok-Gurman et al. (2021), who reported no discernible gender effect on distance schooling challenges.

Furthermore, the absence of extracurricular activities was identified as a factor that aggravated complications for teachers during distance education. Such activities are essential for strengthening learners' intrinsic motivations and offering opportunities for direct social relationships and hobby pursuits (Galea et al., 2020; Chiu, 2022).

The results of this study differ from prior studies in terms of age and years of experience (Zadok-Gurman et al., 2021; Chen et al., 2022), indicating that these demographic variables did affect instructors' challenges during distance education. The rapid transition to distance education had a comparable effect on teachers of all ages and levels of experience, highlighting the necessity of adaptation across various groups (Maheshwari, 2021). Notably, the study found that teachers with more than 16 years of experience face more challenges than others, possibly because teachers' problem-solving and adapting skills depend not only on their teaching experience, but also on their ability to generate ideas and innovate to find the best solutions to complex problems, as well as on their technological skills in such situations (Primus and Sonnenburg, 2018). Both the TAM model and the TPACK theory agree that ease of use impacts people's acceptance and use of technology, but teachers' inability to integrate technical skill with pedagogical understanding and instructional content complicates matters. Teachers with less than 5 years of experience and poorer educational qualifications, according to Chen et al. (2022), may have technology abilities but lack the capacity to adjust their teaching to changing student demands and revise instructional content.

Moreover, teachers of scientific and practical subjects had more challenges than those of humanities. The necessity for practical demonstrations and hands-on experiences, as well as the teacher's responsibilities to monitor students' progress, assess their work, and provide feedback, exacerbated the challenges (Leszczyński et al., 2018; Adedoyin and Soykan, 2023). Primary school teachers faced greater challenges than secondary school teachers due to younger children's shorter attention spans, greater reliance on teachers, and weaker technical skill (Pokhrel and Chhetri, 2021; Shagiakhmetova et al., 2022). Surprisingly, because of the ever-changing nature of information technology, this type of school had little influence on the challenges teachers faced. Teachers face the same challenges regardless of the type of school they work in (Chen et al., 2022).

4.2 Reshaping the future of distance learning

The challenges posed by the COVID-19 pandemic have prompted teachers to propose potential solutions for the enhancement of distance education. One key lesson derived from the pandemic is the pressing need for a robust educational platform capable of withstanding pressure without compromising the quality and speed of distance education. Teachers have emphasized the importance of collaboration with telecommunication companies to improve network efficiency and reduce internet costs. The implementation of a high-quality computerized interactive curriculum, encompassing virtual field trips, podcasts, and films, has been proposed to ensure the quality of teaching materials.

Additionally, teachers have underscored the necessity for an education system that is level-specific and accessible to all students, including those with disabilities. This involves the development of fair and reliable assessment methods to accommodate diverse learning needs. Furthermore, the importance of aligning formal education with distance learning through the incorporation of weekly online lessons, interactive programs, and homework assignments has been emphasized.

Further, the importance of empowering teachers with the prerequisite knowledge and skills for distance education has been highlighted. In specific, three overarching sub-themes have emerged, emphasizing the essential skills teachers must master during distance learning: technological skills, personal skills, and leadership skills. Technological skills encompass the adept use of interactive programs, designing engaging presentations, and selecting reliable internet sources. Personal skills, such as speed, accuracy, patience, flexibility, and readiness to adapt to emergency circumstances, are deemed crucial for successful online interactions. Leadership skills, including effective communication, creative thinking, problem-solving, time management, and appropriate feedback, are identified as imperative for fostering student-centered learning. Teachers' professional development should focus on the use of technology, curriculum adaptation, and the implementation of effective teaching strategies tailored to the unique demands of distance learning. Similarly, students should be provided with training to enhance self-learning and effective time management skills. In today's.

4.3 Implementation and contribution

This study provides an in-depth analysis of the difficulties faced by teachers during the sudden shift to remote learning during the COVID-19 epidemic. Theoretically, it builds upon important insights from important publications that addressed important issues in remote education, such as Akhtar et al. (2019), Alshwiah (2021), Winter et al. (2021), and Aldhafeeri and Alotaibi, (2022). The results of this study contribute to the field by classifying difficulties into three key areas: teachers, students, and the educational process itself. The study clarifies the complex dynamics involved in adjusting to virtual learning and highlights the crucial role that educators play in determining the direction of education in the future.

Practically speaking, the study offers doable suggestions, aligned with the reviewed literature, that emphasize the urgent need to strengthen learning environments, give teachers technology proficiency and efficient teaching techniques, and encourage students to learn on their own and manage their time well. The study draws attention to research from the literature review, such as Al Lily et al. (2020), which shed light on the various difficulties educators encounter when adjusting to virtual learning environments and show how the suggested interventions can enhance such learning setting.

Based on previous research by Ertmer (1999) and Mungania (2003), the study's recommendations emphasize the need to overcome both foundational and external challenges by strengthening technology infrastructure, enhancing teachers' e-learning skills, and developing curricula that are specific to the needs of distance learning. It emphasizes the need of addressing psychological issues with teachers and students, as supported by studies like those by Adedoyin and Soykan (2023), which encourage the provision of school support services and the promotion of efficient communication methods to promote engagement and well-being.

Regarding educator challenges, the study emphasizes the need to develop technological and pedagogical competencies for effective remote learning, similar to the findings from Winter et al. (2021) and Alshwiah (2021), which highlight inadequacies in educator support and preparation. In terms of learner problems, the study emphasizes that differences in access to self-directed learning pose major obstacles to motivation and engagement; this is consistent with studies conducted by Akhtar et al. (2019) and Al-Zafferi and Al-Otaibi (2022).

In the end, this study contributes to the scholarly conversation on remote learning by providing thoughtful analyses of teacher obstacles and a compilation of empirically supported suggestions to improve the effectiveness of pedagogical approaches for remote learning.

5 Conclusion

Understanding the difficulties teachers have in the context of distance education, especially in light of the COVID-19 epidemic, was the main goal of this study. The study's research-based results and conclusions have the potential to significantly improve distant education in the future by bridging the gap between theory and practice. This study stands out in particular since it not only identifies barriers but also provides workable remedies as imagined by educators who are facing similar difficulties.

Acknowledging that distance learning has evolved from being a choice to an essential requirement, this study highlights new learning paradigms that are emerging in the face of current challenges and sees unusual situations as sources of innovation in education. This study is notable for its pragmatic approach and forward-looking perspectives, which are intended to enable educators in Qatar and elsewhere to improve the caliber of digital education. This emphasizes the critical importance of the research findings.

The study results highlight how crucial it is for educators, educational technology experts, legislators, and academics to continue working together throughout time. Distance education, in spite of its inherent challenges, becomes essential as it creates an atmosphere that is conducive to experimenting with different teaching approaches and, in turn, creates a lively learning environment.

Ultimately, our work supports comprehensive teacher preparation programs that give equal weight to pedagogical skill, subject matter competence, and technical proficiency. To guarantee

that teachers are suitably prepared to successfully traverse the constantly changing educational landscape, pre-service teacher education programs must incorporate digital learning competencies and remote education methodology.

5.1 Limitations

One of the limitations of the study is its focus on the issues teachers faced during the rapid and unanticipated switch to distance education caused by the COVID-19 outbreak. As a result, instructors were unable to effectively prepare for this change, which may have influenced their feedback. Future study might look at teachers' and students' opinions, attitudes, and challenges when taking blended courses. Future research may include additional nations to corroborate the findings, investigate possible differences and similarities, and learn from global experiences, in addition to the need for studies that distinguish the challenge faced by instructors and students based on age, stage, and subjects taught.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

The studies involving humans were approved by The Qatar University Institutional Review Board (IRB) authorized this research study (QU-IRB 1481-EA/21). The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study. Written informed consent was obtained from the individual(s) for the publication of any potentially identifiable images or data included in this article.

Author contributions

YA: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Project administration, Supervision, Validation, Writing – original draft, Writing – review & editing. MA: Data curation, Formal analysis, Investigation, Methodology, Project administration, Resources, Validation, Writing – original draft, Writing – review & editing. AA-T: Data curation, Formal analysis, Investigation, Methodology, Project administration, Validation, Writing – original draft. NG: Data curation, Investigation, Methodology, Project administration, Resources, Supervision, Writing – original draft. TS: Data curation, Formal analysis, Investigation, Methodology, Validation, Writing – original draft.

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Conflict of interest

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Supplementary material

The Supplementary material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/feduc.2024.1374641/full#supplementary-material

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