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CHALLENGES OF ONLINE EDUCATION FOR CHILDREN WITH HEARING IMPAIRMENT DURING THE COVID-19 PANDEMIC: TEACHERS' PERSPECTIVES FROM SPECIAL EDUCATION SCHOOLS IN LAHORE, PAKISTAN

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ABSTRACT

The COVID-19 pandemic disrupted education systems worldwide, compelling schools to shift rapidly to online learning. This transition posed significant challenges for children with hearing impairment due to their reliance on visual communication, sign language, and specialized instructional support. This study explored teachers' perspectives on the challenges of online education for children with hearing impairment in special education schools in Lahore, Pakistan. A convergent parallel mixed-methods design was employed, integrating quantitative survey data with qualitative interview findings. The quantitative data were collected from 150 teachers using a structured questionnaire, while qualitative data were obtained through semi-structured interviews with selected teachers. The findings revealed that inadequate technological infrastructure, poor internet connectivity, limited teacher training, communication barriers, and insufficient accessibility features significantly affected the effectiveness of online education. Teachers also highlighted the importance of parental support and institutional preparedness in ensuring students' participation and learning. The study concludes that improving digital infrastructure, strengthening teachers' professional development, and developing disability-inclusive emergency education policies are essential for enhancing online education for children with hearing impairment. The findings offer practical implications for policymakers, school administrators, and special education practitioners in improving inclusive education during future emergencies.

KEYWORDS: COVID-19, online education, hearing impairment, inclusive education, special education, teachers' perspectives, Pakistan.

1. INTRODUCTION

Education is widely recognized as a fundamental human right and a key driver of sustainable development, social inclusion, and economic progress. The principle of inclusive education advocates that all learners, regardless of their disabilities or individual differences, should have equal opportunities to access quality education within supportive learning environments (United Nations, 2015; UNESCO, 2020). This commitment is reinforced through Sustainable Development Goal 4 (SDG 4), which emphasizes inclusive and equitable quality education for all and promotes lifelong learning opportunities (United Nations, 2015). For children with disabilities, particularly those with hearing impairment, achieving educational inclusion requires accessible teaching practices, assistive technologies, and well-prepared teachers (Ainscow, 2020;

UNESCO, 2020). The COVID-19 pandemic severely disrupted education systems worldwide and resulted in one of the largest educational crises in modern history. According to UNESCO (2021), school closures affected more than 1.6 billion learners across over 190 countries, forcing educational institutions to adopt emergency online teaching. Although online learning enabled educational continuity, it also exposed significant inequalities in access to digital technologies, internet connectivity, and educational resources (UNESCO, 2021; UNICEF, 2021; World Bank et al., 2022). Studies have shown that the rapid transition to online education disproportionately affected students with disabilities because many digital platforms were not designed to meet their learning and communication needs (Pokhrel & Chhetri, 2021; Dhawan, 2020). Among children with disabilities, students with hearing impairment encountered unique educational challenges during online learning. Their learning primarily depends on visual communication through sign language, lip-reading, facial expressions, captions, and visual instructional materials. However, online classes often limited these essential communication modes because of unstable internet connectivity, poor video quality, inadequate assistive technologies, and limited accessibility features (Alqraini & Paul, 2021; Swanwick et al., 2021; Nacher et al., 2022). Previous studies have reported that these barriers reduced students' participation, communication, and academic engagement, ultimately affecting their learning outcomes (Mpofu, 2021; UNESCO, 2021). Teachers played a pivotal role in maintaining educational continuity during the pandemic by adapting instructional strategies and supporting students with diverse learning needs. In addition to delivering lessons online, teachers were required to prepare digital learning materials, communicate regularly with parents, integrate assistive technologies, and modify instructional approaches for students with hearing impairment. Nevertheless, many teachers lacked prior experience in online teaching and received limited professional training in digital pedagogy, creating additional challenges in delivering effective instruction (König et al., 2020; Trust & Whalen, 2021; Flores & Gago, 2020). Research suggests that institutional support, teacher training, and access to digital resources are among the most important factors influencing the success of online education for learners with disabilities (UNICEF, 2021; World Bank et al., 2022). In Pakistan, the implementation of online education faced additional challenges due to inadequate technological infrastructure, socioeconomic disparities, and unequal access to internet services and digital devices. Although several online learning initiatives were introduced to ensure educational continuity during the pandemic, these initiatives provided limited accommodations for children with hearing impairment (Ministry of Federal Education and Professional Training, 2020). Consequently, special education teachers had to rely on alternative instructional strategies, including sign language, visual teaching materials, recorded video lessons, and continuous collaboration with parents to facilitate students' learning. Despite the growing body of literature on online education during the COVID-19 pandemic, research specifically examining teachers' perspectives on educating children with hearing impairment in Pakistan remains limited. Most previous studies have focused on mainstream education or students with disabilities as a broad group, providing limited evidence regarding the unique communication, instructional, and technological challenges experienced by learners with hearing impairment (Alqraini & Paul, 2021; Swanwick et al., 2021). Furthermore, many existing studies have relied solely on quantitative approaches, leaving teachers' experiences and practical recommendations insufficiently explored. Therefore, this study investigates teachers' perspectives on the challenges of online education for children with hearing impairment in special education schools in Lahore, Pakistan. By adopting a convergent parallel mixed-methods design, the study integrates quantitative and qualitative evidence to explore institutional, technological, and instructional barriers and proposes practical strategies to strengthen inclusive online education during future emergencies.

2. Research Gap

Although several studies have examined the impact of online education during the COVID-19 pandemic, limited research has specifically

examined the experiences of teachers educating children with hearing impairment in Pakistan. Existing studies have primarily focused on mainstream education or students with disabilities as a broad category, overlooking the unique communication and instructional challenges associated with hearing impairment. Furthermore, most previous studies have relied on quantitative methods, providing limited insight into teachers' lived experiences and recommendations for improving online education. Therefore, this study employs a convergent parallel mixed-methods approach to provide a comprehensive understanding of the challenges faced by teachers and to identify strategies for strengthening inclusive online education in special education schools.

3. Research Objectives

The study was guided by the following objectives:

1. To explore teachers' perspectives on the challenges of online education for children with hearing impairment during the COVID-19 pandemic in special education schools in Lahore, Pakistan.
2. To examine the institutional, technological, and instructional barriers affecting the effective delivery of online education for children with hearing impairment and identify strategies for improving inclusive online education.

4. Methodology

Research Design

This study adopted a convergent parallel mixed-methods research design, which combines quantitative and qualitative approaches to provide a comprehensive understanding of the research problem (Creswell & Plano Clark, 2018). Quantitative and qualitative data were collected during the same phase of the study, analyzed separately, and integrated during the interpretation of findings.

Population and Sample

The target population comprised teachers working in special education schools for children with hearing impairment in Lahore. For the quantitative phase, 150 teachers were selected using simple random sampling to complete a structured questionnaire. For the qualitative phase, 10 teachers were selected through purposive sampling based on their experience of teaching online during the pandemic and their willingness to participate in semi-structured interviews.

Research Instruments

Two research instruments were used. A self-developed questionnaire consisting of 30 items measured teachers' perceptions of online education challenges using a five-point Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). A semi-structured interview protocol was developed to explore teachers' experiences in greater depth. The questionnaire was developed after an extensive review of the literature and was evaluated by three experts in special education and educational research to ensure content validity.

Data Analysis

Quantitative data were analyzed using IBM SPSS Statistics (Version 22). Descriptive statistics, including frequencies, percentages, means, and standard deviations, were used to summarize the data. Qualitative data were analyzed using Braun and Clarke's (2006) thematic analysis. Interview transcripts were coded systematically to identify recurring patterns, which were then organized into themes. Finally, quantitative and qualitative findings were integrated to provide a comprehensive interpretation of the study.

Ethical Considerations

Ethical principles were observed throughout the study. Participation was voluntary, and informed consent was obtained from all participants. Confidentiality and anonymity were maintained by ensuring that participants' identities remained undisclosed. The collected data were used solely for academic purposes,
and participants were informed of their right to withdraw from the study at any stage.

5. Results

5.1 Demographic Profile of Participants

A total of 150 teachers participated in the quantitative phase of the study, while 10 teachers were interviewed in the qualitative phase. Among the survey respondents, 78% were female and 22% were male. Most participants had between 6 and 10 years of

teaching experience and were teaching in government special education schools in Lahore.

Table 1 (Demographics)

Variable	Category	Frequency	Percentage
Gender	Male	33	22%
	Female	117	78%
Experience	1–5 years	45	30%
	6–10 years	60	40%
	Above 10 years	45	30%

Table 2 Teachers' Perceptions Regarding Online Education Challenges (N = 150)

Statement	Frequency (n)	Percentage (%)
Poor internet connectivity affected online teaching.	124	82.7
Students had limited access to digital devices.	115	76.7
Teachers received insufficient training for online teaching.	108	72.0
Communication through sign language was difficult during online classes.	102	68.0
Schools lacked accessible online learning resources.	110	73.3
Parental support was essential for successful online learning.	126	84.0
Online education could not effectively replace face-to-face instruction.	131	87.3
Improved digital infrastructure would enhance online education.	112	74.7

The quantitative findings indicate that poor internet connectivity was the most frequently reported challenge (82.7%), followed by the limited availability of digital devices (76.7%) and insufficient teacher training (72.0%). Most teachers (84.0%) agreed that parental support was essential for successful online learning, while 87.3% believed that online education could not effectively replace face-to-face instruction for children with hearing impairment.

Qualitative Findings

Thematic analysis of the interview data generated four major themes.

Theme 1: Communication Barriers

Teachers emphasized that online learning reduced opportunities for effective visual communication. Poor internet connectivity frequently interrupted sign language interpretation and made lip-reading difficult.

"Sometimes students could not understand signs because the video froze during the lesson." (Participant 3)

Theme 2: Limited Access to Technology

Participants reported that many families lacked smartphones, laptops, or stable internet services, reducing students' attendance and participation in online classes.

"Many parents had one mobile phone that was shared by the whole family." (Participant 7)

Theme 3: Teacher Adaptation and Innovation

Teachers described using recorded videos, visual teaching aids, and WhatsApp groups to maintain communication and support students' learning.

"We prepared videos in sign language and shared activities through WhatsApp." (Participant 5)

Theme 4: Need for Inclusive Emergency Planning

Teachers recommended that future emergency education plans should include accessible technologies, teacher training, and disability-inclusive digital policies.

"Emergency education policies should consider the communication needs of children with hearing impairment." (Participant 9)

6. Discussion

The findings of this study demonstrate that online education for children with hearing impairment during the COVID-19 pandemic was influenced by several interconnected factors, including institutional support, technological accessibility, instructional practices, and communication barriers. Although special education schools made considerable efforts to continue educational activities through online platforms, the effectiveness of these initiatives was constrained by inadequate digital infrastructure, limited teacher preparation, and insufficient accessibility features. These findings support earlier studies indicating that the sudden transition to online learning exposed existing inequalities in educational systems, particularly for learners with disabilities who require specialized instructional support (UNESCO, 2021; UNICEF, 2021; World Bank et al., 2022). Similarly, Pokhrel and Chhetri (2021) argued that the rapid shift to emergency remote teaching created significant challenges for both teachers and students due to insufficient technological readiness and limited digital competencies. Technology emerged as the most significant challenge reported by teachers in the present study. The quantitative findings indicated that poor internet connectivity, limited access to digital devices, and the absence of accessible online learning platforms significantly reduced students' participation and engagement. The qualitative findings further supported these results, with teachers explaining that interrupted internet connections frequently disrupted sign language communication, making it difficult for students to follow classroom instruction. These findings are consistent with Alqraini and Paul (2021), who reported that learners with hearing impairment require accessible digital platforms that effectively support visual communication, captioning, and assistive technologies. Likewise, Swanwick et al. (2021) emphasized that online learning environments should be designed to accommodate the communication needs of deaf and hard-of-hearing students through appropriate technological adaptations. UNESCO (2021) also highlighted that limited digital accessibility disproportionately affected learners with disabilities during the pandemic, widening existing educational inequalities.

Another important finding of this study relates to institutional support and teacher preparedness. Participants reported limited opportunities for professional development and inadequate institutional guidance for implementing online education effectively. Many teachers indicated that they had to develop digital teaching skills independently while adapting instructional materials for students with hearing impairment. These findings align with König et al. (2020), who found that teacher preparedness significantly influenced the effectiveness of online teaching during school closures. Similarly, Trust and Whalen (2021) concluded that continuous professional development in digital pedagogy is essential for improving teachers' confidence and competence in emergency remote teaching. Flores and Gago (2020) further argued that institutional support plays a critical role in enabling teachers to respond effectively to unexpected educational disruptions. Despite these challenges, the qualitative findings revealed that teachers demonstrated remarkable resilience and adaptability by employing innovative instructional strategies to support students' learning. Teachers reported using sign language, visual learning materials, recorded video lessons, and regular communication with parents to facilitate educational continuity. These strategies helped maintain student engagement despite technological and communication barriers. Similar observations were reported by Dhawan (2020), who emphasized that teacher creativity and flexibility were among the key factors contributing to the success of online education during the COVID-19 pandemic. Furthermore, UNICEF (2021) stressed that collaboration between teachers, parents, and schools is particularly important for ensuring meaningful learning experiences for children with disabilities in online settings. The study also highlights the critical role of parental involvement in supporting online education for children with hearing impairment. Teachers acknowledged that parents frequently assisted students in accessing online classes, understanding instructional content, and completing learning activities. However, participants also recognized that many families experienced financial constraints, limited digital literacy, and restricted access to technological

resources, reducing their ability to provide consistent educational support. Similar findings were reported by the World Bank et al. (2022), which emphasized that socioeconomic inequalities significantly affected students' access to quality online education during the pandemic. UNESCO (2023) further recommended strengthening partnerships between schools and families to improve inclusive digital learning environments for learners with disabilities. Overall, the findings suggest that improving online education for children with hearing impairment requires a comprehensive and collaborative approach involving policymakers, educational institutions, teachers, parents, and technology providers. Investment in reliable digital infrastructure, accessible online learning platforms, assistive technologies, and continuous teacher professional development is essential for ensuring equitable educational opportunities during future emergencies. These findings support the recommendations of UNESCO (2023), the Higher Education Commission (2021), and the World Bank (2024), all of which emphasize the importance of developing disability-inclusive digital education policies that address the diverse learning needs of students with disabilities. The present study contributes to the growing body of literature on inclusive online education by providing evidence from the Pakistani context and highlighting practical strategies for strengthening educational resilience during future crises.

7. Limitations of the Study

Despite providing valuable insights into the challenges of online education for children with hearing impairment, this study has several limitations. First, the study was conducted only in special education schools in Lahore, which may limit the generalizability of the findings to other regions of Pakistan. Second, the study focused solely on teachers' perspectives; the views of students, parents, and school administrators were not included. Third, the study examined experiences during the COVID-19 pandemic, and the findings may not fully represent current online teaching practices. Future studies should include participants from different provinces, involve multiple stakeholders, and explore the long-term impact of online and blended learning on children with hearing impairment.

Practical Implications

The findings of this study suggest that policymakers should prioritize the development of disability-inclusive emergency education policies and invest in accessible digital learning technologies for students with hearing impairment. Educational institutions should provide regular professional development programs to enhance teachers' digital pedagogical skills and effective use of assistive technologies. Furthermore, schools should strengthen collaboration with parents and ensure that online learning platforms incorporate accessibility features, such as captioning, sign language support, and visually accessible learning materials, to promote equitable participation and learning outcomes.

8. Conclusion

The COVID-19 pandemic significantly transformed the delivery of education and highlighted the challenges of providing inclusive online learning for children with hearing impairment. The findings of this study revealed that inadequate technological infrastructure, poor internet connectivity, limited teacher training, communication barriers, and insufficient institutional support adversely affected the effectiveness of online education. Despite these challenges, teachers demonstrated resilience by adopting innovative teaching strategies, including the use of sign language, visual learning materials, recorded lessons, and regular communication with parents to support students' learning. The study concludes that improving online education for children with hearing impairment requires coordinated efforts from educational institutions, policymakers, and families. Strengthening digital infrastructure, providing continuous professional development for teachers, integrating accessible educational technologies, and developing disability-inclusive emergency education policies are essential to ensure equitable learning opportunities during future crises. The findings contribute to the growing body of knowledge on inclusive education and provide practical recommendations for improving the quality and

accessibility of online education for learners with hearing impairment in Pakistan.

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