



## The Impact of Digital Divide on the Educational outcomes of deprived Children in Low-Cost Private Sector Schools in Lahore, Pakistan; Post COVID-19 Era

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### ARTICLE INFO

#### Article History:

Received: July 30, 2024

Revised: December 03, 2024

Accepted: December 04, 2024

Available Online: December 05, 2024

#### Keywords:

Post-Pandemic  
Digital Divide  
Private Sector  
Pakistan  
Low-Income  
Schools  
Lahore

#### Funding:

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

### ABSTRACT

The COVID-19 pandemic has deepened the existing inequalities in access to education, particularly for deprived children in Pakistan. Children drop-out rate from schools accelerated, learning level of students decreased and more than 10,000 low-cost private-sector schools were permanently closed in Pakistan due to pandemic emergency. These problems questioned the sustainability of schools in Pakistan and put the future of millions of students on stake. Therefore, this study aims to investigate the impact of the digital divide on the educational outcomes and psycho-social challenges for children in the post-COVID-19 period. With the help of mixed-methods approach, the research examines how limited access to digital resources has affected academic performance and created psycho-social challenges for the children. Furthermore, this study identifies specific challenges faced in accessing online education, and explores potential strategies to mitigate these issues. The study focuses on middle school children (grade 6-8) studying in low-cost private sector schools in Lahore, Pakistan. Five low-cost private sector schools from different areas of Lahore have been used to gather the data. It has been observed that underprivileged children confront major challenges while acquiring education. Children and their families lack basic skills to use digital devices, moreover, their inadequate internet access and several socioeconomic problems create hindrances in their educational progress. Similarly, teachers from deprived backgrounds are also fighting the same challenges. Therefore, this study highlights the significance of strategic and sustainable interventions in the field of school education for the progress of children belonging to deprived areas. The study pens the need for providing affordable devices, free digital literacy programs with expansion of internet infrastructure which can bridge the digital divide and improve educational outcomes as well as psychological and socioeconomic conditions of children in Pakistan in the post COVID'19 era.

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## 1. Introduction

During the COVID-19 pandemic, 191 countries worldwide applied school closure policies and converted to online distance learning. This abrupt shift in academia affected 91.3% of the students who were enrolled in school, which is approximately 1.5 billion students worldwide (UNESCO, 2020). These interruptions to the global education system intensified the existing digital inequalities and created new challenges for students and teachers (Daniel, 2020). As the virus spread rapidly, schools across the world kept their doors closed which left millions of students without access to traditional classroom learning (Tarkar, 2020). In response to the continuing health emergency, many educational institutions promptly adopted online distance education as the best solution to ensure the continuity of education (Rodríguez & Pulido-Montes, 2022).

### **1.1. Background**

Like all other countries globally, Pakistan also faced critical challenges due to the pandemic, and being a developing country socioeconomic and educational problems in Pakistan were more severe. The government of Pakistan ensured nationwide school closures further created obstacles for the education sector (Aslam et al., 2021). This sudden interruption was challenging for a country struggling with extensive educational inequalities (Idrees & Shah, 2018). The shift to online and distance learning exaggerated the digital divide in Pakistan, where major population is already deprived of essential digital resources, such as good internet connectivity and modern digital devices (Khan & Khan, 2021). This digital divide has particularly impacted on children belonging to low-income families and underprivileged areas, further widening the educational gap among different socioeconomic groups in the country (Jamil & Muschert, 2024). The socioeconomic conditions in which people live, work, learn and play are substantial factors of educational disadvantages. Several studies have revealed that the more individuals are exposed to various types of deprivation, be it social or material, the poorer their developmental outcomes become specifically in education. While digital education provided support for some, it also underlined severe gaps in access to technology and internet connectivity (Doyle, 2020). The gap between those with and without access to digital resources is known as the "digital divide", It became a major obstacle to education, especially for underprivileged children in marginalized and deprived communities where access to required digital tools was either nonexistent or very limited (Aslam et al., 2021). Therefore, this research investigates the impact of the digital divide on the educational outcomes of deprived children in low-cost private schools in Lahore, Pakistan, during the post-COVID-19 era. This study examines how the lack of digital resources has influenced educational outcomes and identify strategies to mitigate these effects. Furthermore, by highlighting the educational inequalities, this study aims to contribute to the formation of an equitable and inclusive approach to education in the post-pandemic world in the context of Pakistan.

### **1.2. Problem Statement**

The widespread closures of schools due to COVID-19 pandemic not only affected the academic performance of the students but also disrupted the teaching performance of the teachers resulting in low progress in educational processes and evaluation of student assessments. In Pakistan, this disturbance has been prominently articulated in low-cost private schools, which are catering a significant population of underprivileged children (Adnan, 2020). The shift from traditional classroom teaching to online and distance teaching and learning mode has initiated both opportunities and challenges. While online teaching and learning has enabled continued learning processes, it has also expanded the digital divide, leaving many students behind, without adequate digital skills and devices (Asher, 2021). This transition of online teaching in the education sector has unpleasantly affected learning and assessment methodologies. Many low-cost private schools have limited resources due to which they struggled to implement effective online teaching methods. Some schools opted for permanent closures and there were no online classes (Adnan, 2020). Additionally, the lack of access to e-learning solutions has created significant constraints for teachers and students and presented challenges for parents adapting to advance teaching methodologies (Pace, Pettit, & Barker, 2020). Resultantly, when the schools reopened in the Post pandemic era, they confront the crucial task of addressing academic losses and rebuilding educational settings (Darling-Hammond, Schachner, & Edgerton, 2020). Innovative assessments methodologies needed to be implemented to evaluate academic progress of the students, and effective policies must be developed to bridge the digital learning gap and support deprived students in low-cost private sector schools (García & Weiss, 2020). Furthermore, it has also been observed that the role of schools in building social skills and overall child development has been disordered. This highlights the urgent requirement for actionable strategies to mitigate these challenges, because online teaching and learning has also caused psychological distress and suffering among parents, teachers and students (McCarthy, 2020). This study assesses the gaps in access to online education and proposes strategies to mitigate these effects, ultimately contributing to a more equitable and inclusive educational environment.

### **1.3. Rationale of the Study**

Despite global attention to the digital divide, research specifically addressing its impact on low-cost private sector schools in the Pakistani context remains limited. In this study, "deprived" describes children in these schools in Lahore, who face heightened barriers to essential educational resources, further exacerbated by the post-COVID-19 era. Students in grades 6 to 8

are chosen for this study due to their critical developmental stage, where they encounter complex subjects and greater digital demands. This age group is particularly vulnerable to the impacts of the digital divide, which affects their academic engagement and psycho-social well-being. By focusing on this demographic, the study fills a gap in understanding how the digital divide influences educational outcomes in low-cost private schools within Lahore's diverse socio-economic landscape. The research aims to provide valuable insights into the specific challenges faced by these schools and to identify strategies for addressing them. The findings are intended to inform policymakers, educators, and stakeholders, supporting efforts to bridge the digital divide and improve educational outcomes for deprived students in Pakistan. There is little research and inadequate on the academic outcomes of low-cost private sector school students particularly in Lahore. This study focus on Lahore and the sample size clearly targets the student population of middle school.

## **2. Review of Literature**

In response to the COVID-19 pandemic, the World Health Organization declared it a global emergency on March 11, 2020. Originated from Wuhan, China, the pandemic rapidly spread worldwide. School closures, as a non-pharmaceutical intervention, were employed by many countries, including those affected by previous pandemics such as the influenza pandemic (H1N1) outbreak in 2009 (Jhaveri, 2020). Similarly, the educational institutions were shut down during the outbreak of the Severe Acute Respiratory Syndrome (SARS) in China in 2003. Hong Kong closed nearly 302 schools, in result, approximately 1,000,000 children stayed at home, and 50,600 teachers faced difficulties in using technology to provide education to their students (Toquero, 2020). The closures during COVID'19 aimed to mitigate virus transmission, although their effectiveness and subsequent social and economic implications remain debated (Tarkar, 2020). Likewise, the Spanish education system has demonstrated extreme vulnerability to the consequences of COVID-19. Factors contributing to this vulnerability include high rates of socioeconomic segregation, school dropouts, and academic failure; poor culture of networking and collaboration; overcrowded classrooms; an outdated curriculum and the politicization of education hindered the quality of education and exacerbated existing disparities (Azorín, 2020). Thus, creating the need for enhanced bimodal education and improved digital competencies among teachers.

Moreover, the viral outbreak shuttered businesses, threw millions out of work, and sent unemployment surging (Tesso, 2020). The World Bank, in its draft India Development Update, warned that the country is at the "risk of losing its hard-won gains against poverty." It also cautioned that several households will "likely slip back into poverty due to income and job losses triggered by COVID-19" (Vishnoi, 2020). Due to the cut in family income, people have no intention of investing in mobile devices or internet connections for online studying. This also increases the drop-out rate for students as parents demand that children start earning to support family expenses (Maity, Sahu, & Sen, 2021). The pandemic's impact on education has been profound, disrupting traditional learning methods and assessment processes. Schools globally faced the challenge of shifting from in-person to online education (García & Weiss, 2020). This transition, while necessary, exposed and intensified existing inequalities, particularly for students from lower socio-economic backgrounds (Rehman & Khan, 2021). Evidence indicates that school closures and the shift to online learning can exacerbate educational disparities (Dorn et al., 2020). For instance, children from lower socio-economic status households have shown poorer educational outcomes compared to their more prosperous peers, with significant gaps in verbal ability scores observed from early childhood. Such disparities happen due to limitations on family contribution in education and the psychological conditions linked with poverty (Mani et al., 2013). The pandemic highlighted severe problems within the education sector of Pakistan. The decision by the Government of Pakistan to close the schools affected millions of the students particularly from low-cost private schools who were underprivileged (Aslam et al., 2021). These schools were already operating with limited resources and facing hurdles in adopting effective and advanced online teaching methods (Ahmed, 2016).

Additionally, the shift from traditional classrooms to distance education has created a considerable burden on parents as well, many of whom are not digitally literate to carry their children's learning effectively (Akram, Anjum, & Batool, 2020). Parents belonging to lower socio-economic households confront several challenges, including congested living conditions, lack of necessary devices, and the additional pressure of managing home schooling while engaged in

other necessary tasks of the house (Ichou, 2014). The role of schools is not only in academic instructions, but schools are also important for building the social skills of the students as well as schools significantly contribute in the personality development of a child (Oberle et al., 2020). Regular school attendance is mandatory for skill gain and personal growth of the child (Clark et al., 2005). Thus, the break caused by school closures has messed up this developmental process, leading to concerns about long-term impacts on skill growth and educational achievements (Engzell, Frey, & Verhagen, 2021). Low-income private and government schools, lacking robust e-learning solutions, have faced complete closures, further disrupting students' education and contributing to widening educational gaps (Ong, 2020). In many parts of South Asia and Africa, families are facing such dire economic conditions that parents are pressuring their children to abandon their education in favor of work or marriage (Rehman & Khan, 2021). The increasing internet penetration fueled a new wave of growth in the online education sector, leading to the emergence of innovative teaching models, expanded access channels, and technological advancements that empowered the industry, but to achieve optimal results, it is imperative to provide everyone with equal opportunities for access (Aslam & Rao, 2018). According to the World Bank (2021), at one point during the pandemic, 1.6 billion students were out of school due to closures, a figure that was already at 258 million before the pandemic, many of whom were from the developing world. Pakistan alone had over 22 million children out of school, significantly contributing to these numbers (Unicef, 2021). While both governments and private educational organizations implemented tech-based solutions to maintain some level of learning during the pandemic, these efforts were largely overshadowed by the profound digital divides, as highlighted by this study.

## **2.1. Research Objectives**

This study is guided by the following research objectives:

- To examine the impact of the digital divide on the academic performance of underprivileged children in Lahore, Pakistan, during the post-COVID-19 period.
- To identify and highlight the specific challenges that these children face in accessing online education.
- To explore strategies that can mitigate the negative effects of the digital divide on their educational outcomes.

## **2.2. Research Questions**

1. How has the digital divide influenced the academic performance of deprived children in Lahore, Pakistan in the post-COVID-19 period?
2. What are the specific challenges faced by deprived children in Pakistan in accessing online education post-COVID-19 era?
3. What strategies and interventions can mitigate the negative effects of the digital divide on the educational outcomes of deprived children in Lahore, Pakistan in the post-COVID-19 era?

## **3. Research Methodology**

This study adopts a mixed-methods approach, combining both qualitative and quantitative research methods to comprehensively address the research objectives. The target population consists of deprived children attending low-cost private sector schools in Lahore, Pakistan. The study focuses on a representative sample of 100 students in grade 6-8 from five selected low-cost private schools in Lahore, with an equal distribution of male and female students. Moreover, 5 teachers from each school also participated in the study, which helped to measure the student academic performance comprehensively. A stratified random sampling technique was employed to ensure that schools from different socioeconomic areas within Lahore are included. Factors such as , school size, school's access to digital resources, and student demographics were carefully considered while selecting the schools.

### **3.1. Data Collection Methods**

#### **3.1.1. Quantitative Data**

The data was collected from students and teachers from low-cost private sector schools. The questionnaires focused on the access of teachers and students to digital devices, availability of internet connection, and the impact of these factors on students' academic performance on post COVID'19 era. The surveys also assessed challenges in accessing online learning platforms and resources for schools and their students. Furthermore, categorical questions and Likert-scale

were used to measure the availability of digital tools, as well as students' educational outcomes before and after the pandemic. In addition, school records of students' assessments and their test scores from before, and after the pandemic were examined. A comparative analysis was conducted to assess how the digital divide influenced academic outcomes across these periods.

### 3.1.2. Qualitative Data

Semi-structured interviews were conducted with teachers and students belonging to low-cost private sector schools to highlight the challenges they face during pandemic with limited technological resources. The interviews were also used to examine the coping methodologies adopted by students and schools and the impact of limited digital access on students' academic performance and overall psycho-social well-being. Besides, focus group discussions were also conducted with students in grades 6-8, separated by their age group, and gender to discuss their experiences with online and distance learning during COVID'19. These focus group discussions helped in providing deeper understandings of how students directed the problems of online learning and employed the most appropriate methodology for learning.

## 4. Findings

The findings of this study exposed that the digital divide during the COVID'19 pandemic had prominent and persistent impacts on both students and teachers belonging to low-cost private sector schools in Lahore, Pakistan. The lack of digital resources, poor internet access, and socioeconomic challenges hindered effective online education, leading to declines in academic performance, loss of student engagement, and negative impacts on well-being. Even after the return to physical classrooms, students continue to struggle to regain their academic footing, and the digital divide continues to hinder their educational outcomes. One of the students stated "It was very difficult for me to understand the lesson online especially in mathematics and science subjects, my mother was also unable to guide me she is always busy in-house chores, my father is busy watching Television" A science teacher of 6<sup>th</sup> grade mentioned "I felt helpless, the school pressurizes me to complete the term syllabus, sometimes I tried to open a laptop can tried to connect students, but I feel like talking to ghosts students does not appear or often they are not responsive"

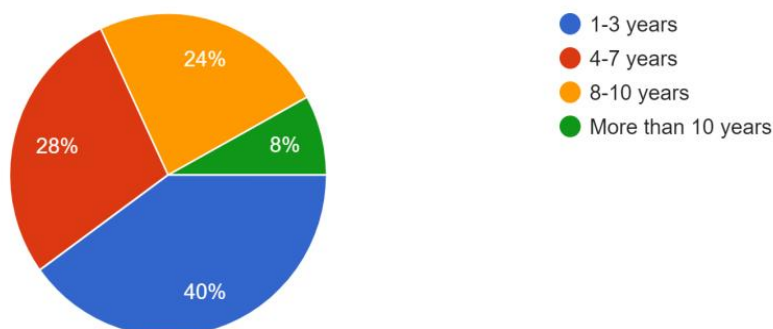
Another teacher said that there was no responsibility of the school to complete the syllabus, the books and homework were provided to the students in-person and students were supposed to complete their task on their own and they had no connection with the students during COVID'19 vacations. All the responses clearly express that Pakistan was ill-prepared to meet the demands of this transition. Many children, especially those from underprivileged backgrounds, lacked the necessary resources to engage in online learning which deepened educational inequities and harmed the academic performance of the students.

### 4.1. Questionnaire responses from Teachers

Figure 1

1. Years of Teaching Experience:

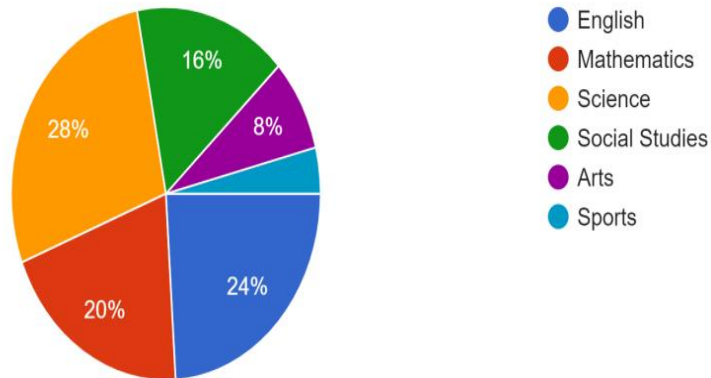
25 responses



**Figure 2**

2. Subject(s) Taught:

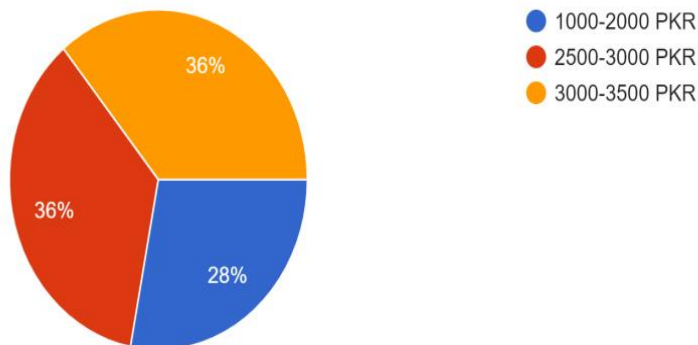
25 responses



**Figure 3**

3. What is the fee range of your school per month?

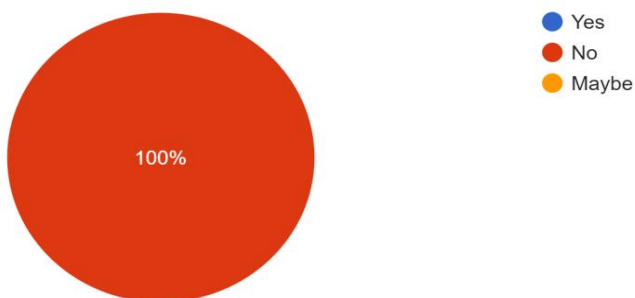
25 responses



**Figure 4**

4. Does your school provide digital devices for teaching?

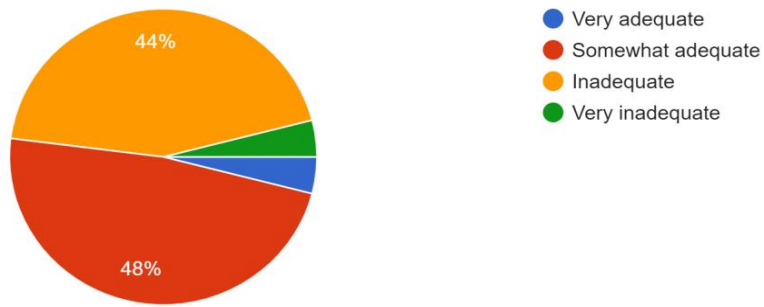
25 responses



**Figure 5**

5. How adequate is your access to digital tools and resources for online teaching?

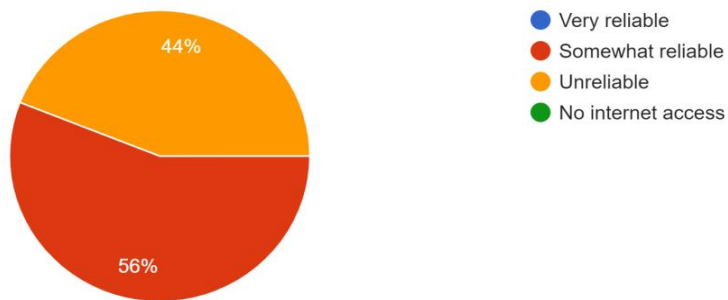
25 responses



**Figure 6**

6. How reliable is your internet connection for online teaching?

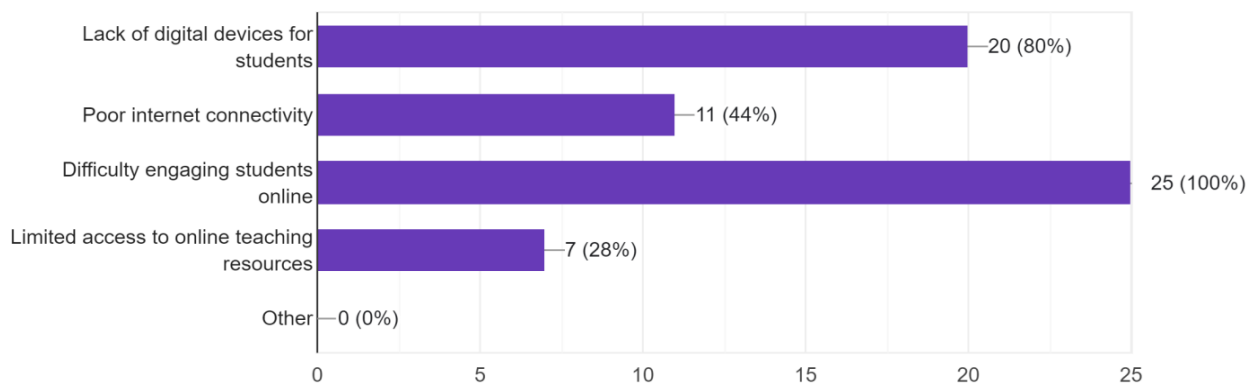
25 responses



**Figure 7**

7. What challenges do you face in online teaching? (Select all that apply)

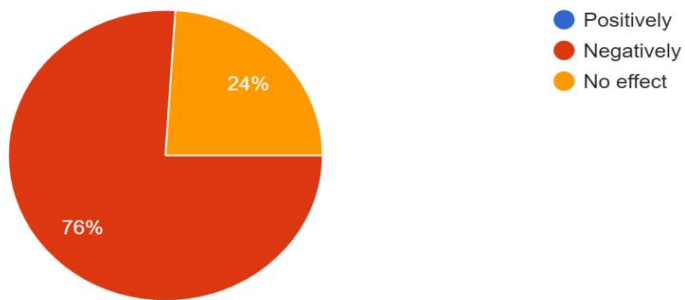
25 responses



**Figure 8**

8. How have these challenges affected your teaching effectiveness?

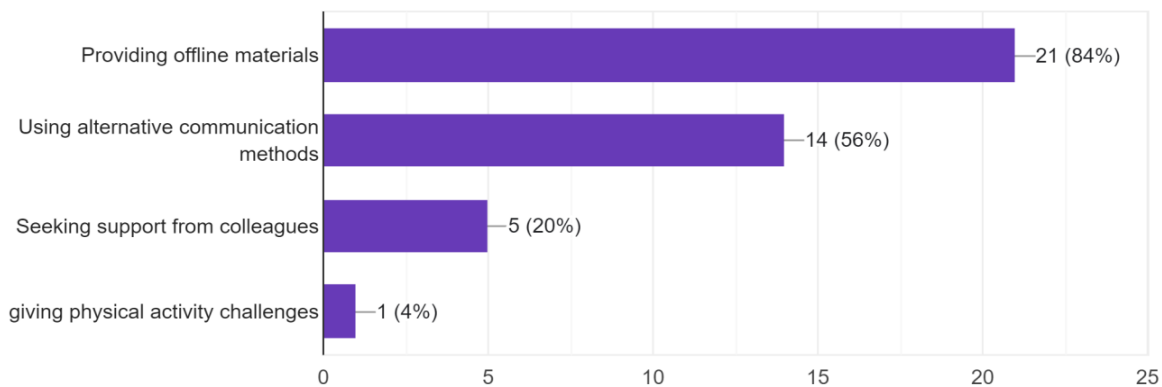
25 responses



**Figure 9**

9. What strategies do you use to overcome challenges in online teaching? (Select all that apply)

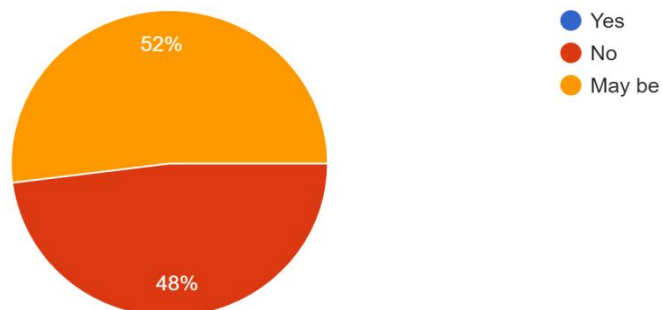
25 responses



**Figure 10**

10. Do you feel that these strategies have been effective?

25 responses

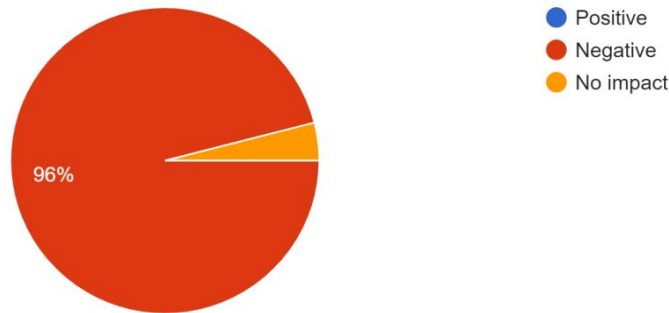




**Figure 11**

11. How do you perceive the impact of digital access on students' academic performance?

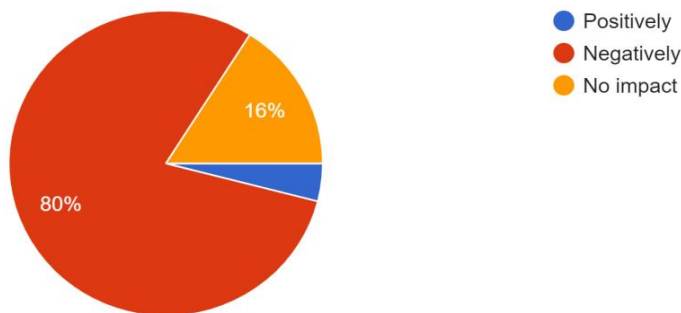
25 responses



**Figure 12**

12. Do you believe that students' overall well-being has been affected by online learning?

25 responses



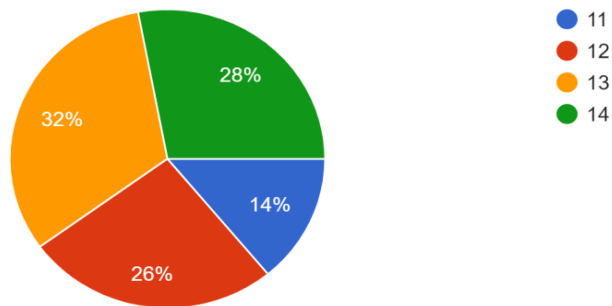
The survey with teachers concluded that none of the schools provided digital devices for teaching, and when asked about access to digital tools and resources, 4% of teachers reported having very adequate access, 48% somewhat adequate, 44% inadequate, and 4% very inadequate access. Regarding the reliability of internet connections, 44% of the teachers described their internet connection as unreliable, while 56% found it somewhat reliable. The major challenges encountered during online teaching included a lack of digital devices (80%), poor internet connectivity (44%), difficulty engaging students (100%), and limited access to online teaching resources (28%). These challenges had a significant impact on teaching effectiveness, with 76% of teachers reporting negative effects. To address these challenges, teachers employed various strategies such as providing offline materials (84%), using alternative communication methods (56%), seeking support from colleagues (20%), and involving sports and arts teachers in home-based physical activities (4%). Despite these efforts, 42% of teachers believed these strategies were only somewhat effective, while 48% found them ineffective during COVID-19 distance learning. In terms of student academic performance, 96% of teachers perceived a negative impact due to the lack of digital access, with only 4% reporting no impact. Furthermore, 80% of teachers felt that students' overall well-being had been negatively affected by online learning, while 16% observed no impact, and just 4% saw a positive effect. In addition to the survey, a focus group discussion with 15 teachers (three from each school) highlighted that during the pandemic, students were least engaged in online learning and developed a non-serious attitude due to school closures. Teachers noted that students' social skills, learning patterns, and habits were severely disrupted. While a few students returned to school with a positive attitude, the majority had a negative attitude toward studying and were more engaged with social media and technology. This decline in academic performance was attributed to several

factors, including students' socioeconomic status, lack of resources, and increased household conflicts, as many parents lost jobs or faced financial difficulties during the pandemic.

#### 4.2. Questionnaire responses from Students Figure 1

1. Age

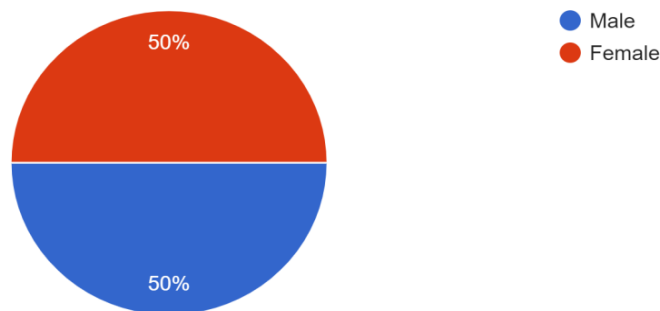
50 responses



#### Figure 2

2. Gender

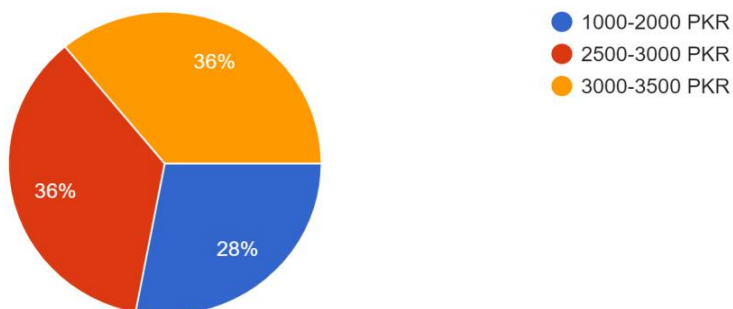
50 responses



#### Figure 3

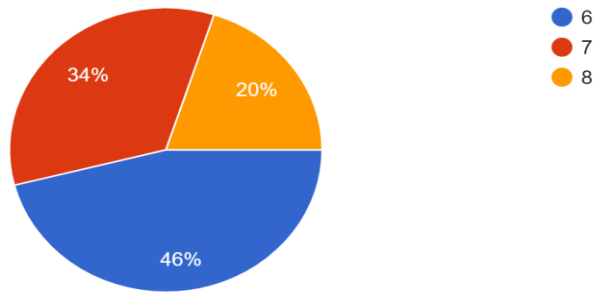
3. What is the fee range of your school per month?

50 responses



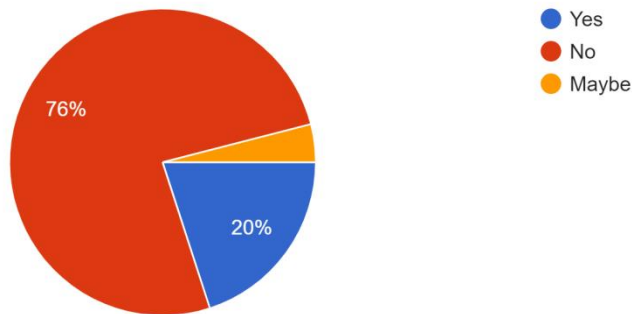
**Figure 4**

4. Grade  
50 responses



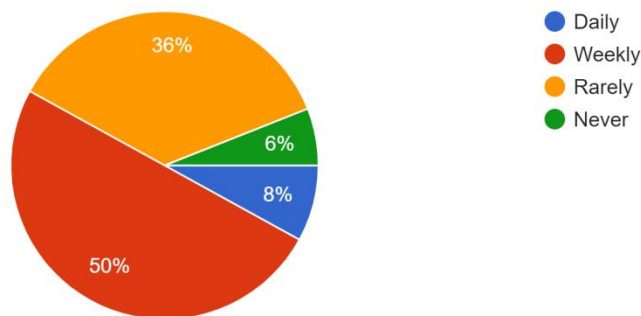
**Figure 5**

5. Do you have access to a personal digital device (e.g., smartphone, tablet, laptop)?  
50 responses



**Figure 6**

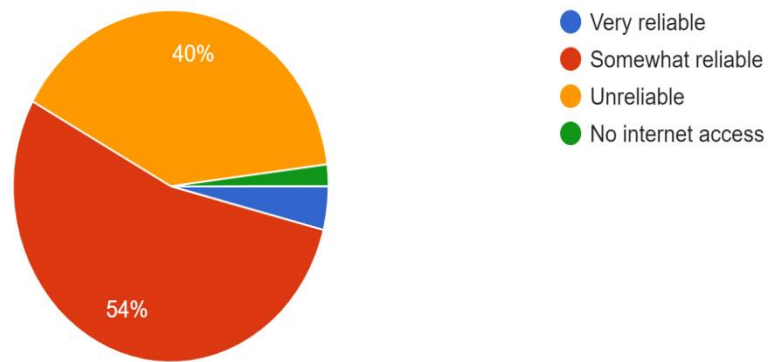
6. How often do you use a digital device for online learning?  
50 responses



**Figure 7**

7. How reliable is your internet connection for online learning?

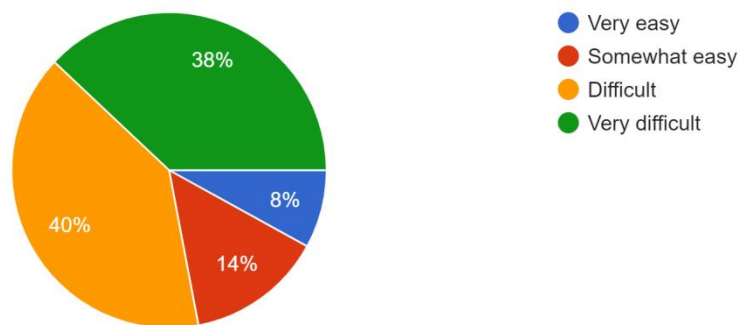
50 responses



**Figure 8**

8. How easy is it for you to access online learning platforms (e.g., Zoom, Google Classroom)?

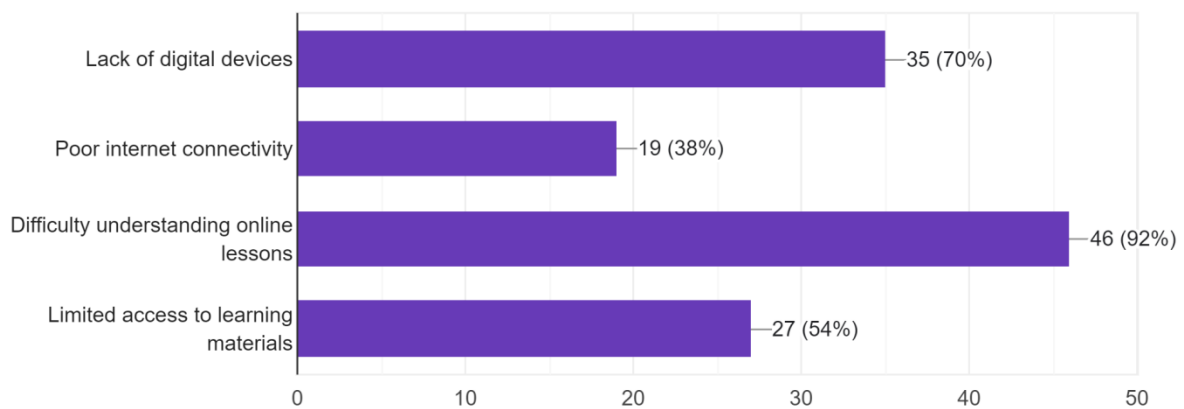
50 responses



**Figure 9**

9. What challenges do you face in online learning? (Select all that apply)

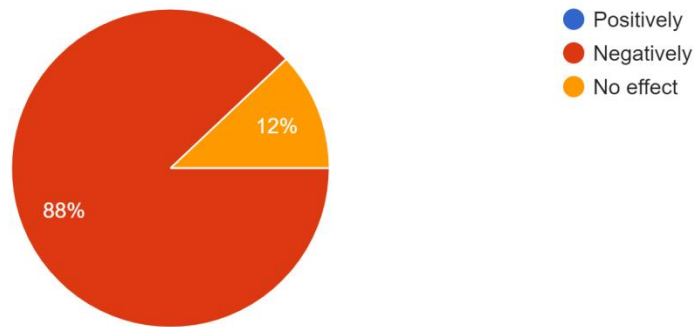
50 responses



**Figure 10**

10. How do these challenges affect your learning and academic performance?

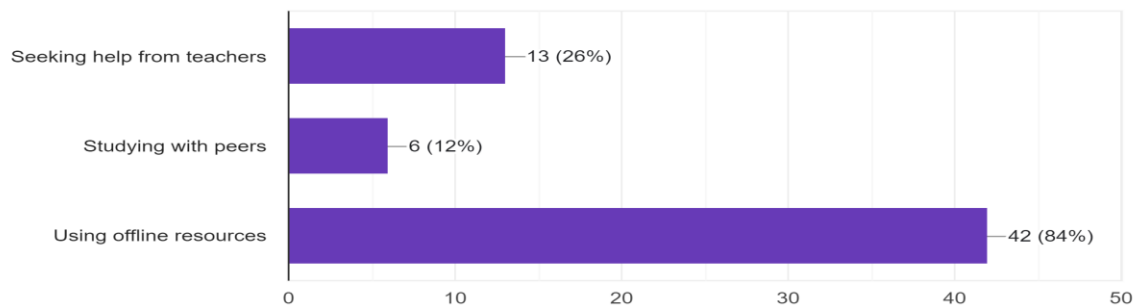
50 responses



**Figure 11**

11. What strategies do you use to overcome challenges in online learning? (Select all that apply)

50 responses



**Figure 12**

12. Do you feel that these strategies have been effective?

50 responses

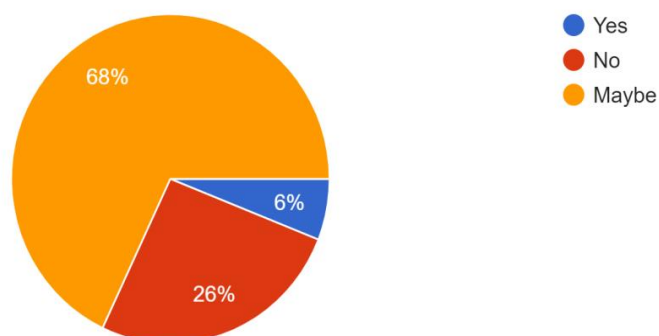


Figure 13

13. How has your academic performance changed since the shift to online learning?  
50 responses

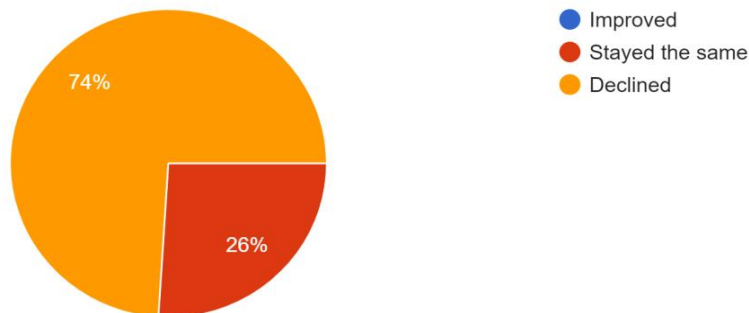
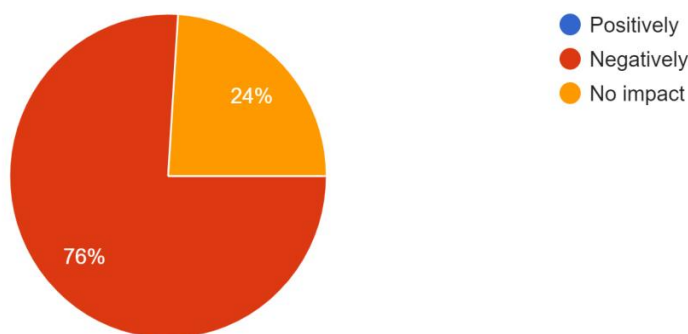


Figure 14

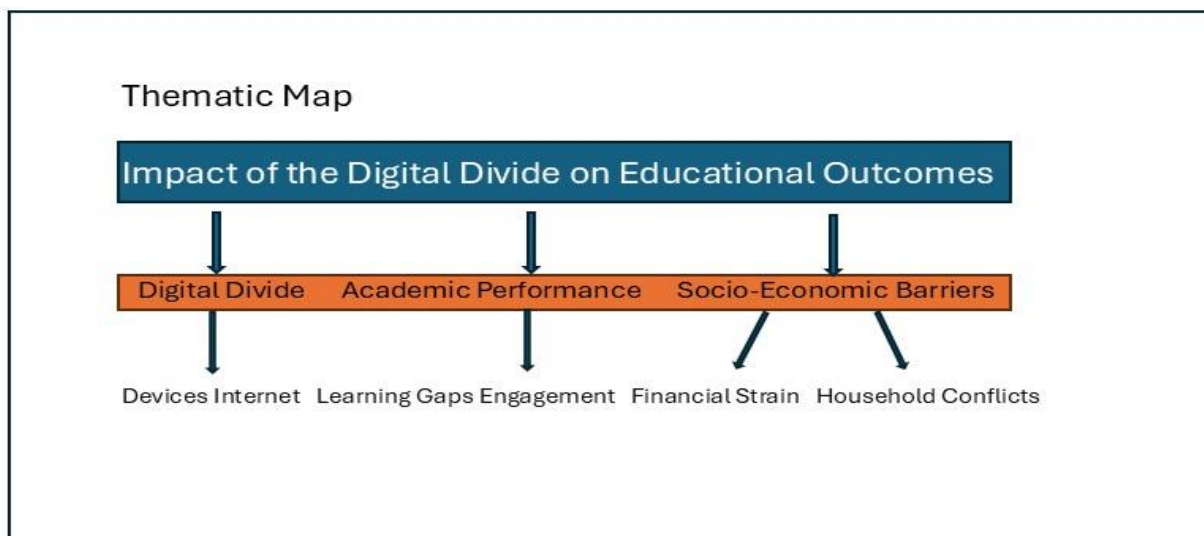
14. Do you feel that online learning has impacted your overall well-being?  
50 responses



The survey was conducted with 50 students (25 female and 25 male) from grades 6, 7, and 8 in low-cost private sector schools across different areas of Lahore, Pakistan. The findings showed that 78% of the students did not have access to a personal digital device, while only 20% had access, and 4% were uncertain. When asked how often they used digital devices for online learning, 8% reported daily usage, 50% used them weekly, 36% rarely, and 6% never used them. In terms of internet reliability, 40% of the students reported having unreliable internet, 54% found it somewhat reliable, 4% had very reliable internet, and 2% had no internet access. When accessing online learning platforms like Zoom or Google Classroom, 38% found it very difficult, 40% difficult, 14% somewhat easy, and only 8% very easy. The challenges students faced in online learning were significant: 70% lacked digital devices, 38% had poor internet connections, 92% struggled with understanding online lessons, and 54% reported limited access to online learning materials. To overcome these challenges, students employed various strategies, such as using offline resources (84%), seeking help from teachers (26%), and studying with peers (12%). However, only 6% found these strategies effective, while 26% believed they were ineffective, and 68% were uncertain. When assessing academic performance, 74% of students reported a decline since the shift to online learning, while 26% said their performance remained the same. Regarding overall well-being, 76% of students felt that online learning had negatively impacted them, while 24% noticed no impact. Further the below (figure 1) shows the themes which were extracted from the data collected from interviews and focus groups to do the thematic analysis and with the method of coding and mapping the analysis was done. Focus group discussions revealed that students found it challenging to keep up with lessons and achieve good grades after returning to school post-COVID-19. The difficulties they experienced during online learning, including poor economic conditions, uneducated parents unable to guide them, and lack of digital devices, have continued to affect their academic

performance. Many students expressed that their attention and interest in studying had declined, making it harder for them to regain focus and excel in their studies now that they are back in a traditional classroom setting.

**Figure 1**



## 5. Conclusion

Overall, the analysis reveals that the transition to online learning has severely impacted students' educational experiences, underscoring the need for comprehensive interventions to address digital access, support systems, and the emotional well-being of students, particularly those from low-income backgrounds. In result of the COVID-19 pandemic outburst traditional educational system became ineffective, the academic performance teachers and students affected because the institutions were not prepared, they had insufficient digital infrastructure to adopt online distance learning. This was the world's first grand experiment in online education, which was also the need of the time and necessary to cater immediate challenges like school closures, that gave mixed outcomes. In Lahore, Pakistan, the educational situation was also grave. Lahore being the largest city of the province and despite having Morden technology and advanced infrastructure still lack digital infrastructure for all. Many educators lacked the expertise for effective online teachings, many schools were unable to provide technical support to teachers and had a significant lack of ICT infrastructure. Research indicates that the number of teachers and academicians were unprepared to adopt digital methodologies into their teaching practices. Moreover, many children from underprivileged areas and low-economic backgrounds lacked access to necessary digital resources including basic media such as televisions or radios, which further widened existing educational gaps. Consequently, the risk of students becoming weak academically and even dropping out of school increased. This unfortunately threatened the progress of Pakistan in education sector from the past several years.

### 5.1. Limitations of the study

There are certain limitations of this study, firstly, the fast-changing environment of digital technologies and relevant educational policies could make the outcomes relevant can limit their applicability in future contexts. Secondly, the concentration on low cost private schools in Lahore may not reflect the wide diversity of experiences that students from other parts of the Pakistan or in the world might have to go through. Moreover, participants in the study self-reported their data and there could be bias in this approach as respondents may tend to exaggerate their estimates on digital access and competencies or the other way round. Additionally, such variables as economic status and government support, among other determinants of educational performance, were not controlled in the study which might pose the risk of altering the conclusions of the investigation. Even, in the context of low-income countries, the relatively small number of 100 students and 25 teachers could explain the findings can be generalized ion the basis of demographics and socio-economic status of the students in these schools, but it can vary in different educational settings over the world.



## 5.2. Recommendations

- To address these critical issues, following immediate strategic actions are necessary. Providing teachers with adequate training and support for digital instruction is essential, along with ensuring that students have access to reliable internet and personal digital devices.
- Building a robust ICT infrastructure in schools will help mitigate these challenges and promote a more equitable educational landscape. Without such measures, students, particularly those from low-income backgrounds, will continue to fall further behind. Such as STEM school program which has been initiated through Public-Private Partnerships in Pakistan. The program targets deserving students of 6-8 grade and help them develop their skills through technological education. The laptop scheme for school children has also been launched by the government and non-governmental organizations in Pakistan.
- Long-term planning and investment are crucial to closing the digital divide. By addressing the deep-rooted structural challenges in the education system and ensuring access to the necessary tools and support, Pakistan can create a more inclusive and equitable educational environment for all students, especially those from underprivileged backgrounds.
- Targeted interventions must focus on digital inclusion, teacher training, and the development of effective online education strategies to safeguard the future of education in the post-pandemic world.

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