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Digitalisation of secondary school education in Delhi during the COVID-19 pandemic: How does gender factor in?

Protiva Kundu
Shruti Ambast

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Preface

Governments worldwide are increasingly relying on digitalisation for public service delivery. The effects of the COVID-19 pandemic significantly accelerated this trend. However, existing structural inequalities in access and use of ICT risk leaving behind historically marginalised populations and creating new groups of disadvantaged people. Therefore, it is crucial to understand the opportunities and challenges presented by the transition to digital public services in the Global South.

Southern Voice partnered with the Centre for Budget and Governance Accountability (CBGA), the Instituto de Estudios Peruanos (IEP), and the Science, Technology and Innovation Policy Research Organisation (STIPRO), to explore the impacts of the rapid digitalisation of public services caused by the pandemic. Through a cross-country collaboration between India, Peru and Tanzania, new evidence was gathered regarding online learning experiences at the secondary and tertiary levels of education, as well as in online business registration. The findings allow us to reflect on common challenges arising in different contexts, and envision some of the steps forward. The initiative was part of the COVID collective research platform, led by the Institute of Development Studies (IDS).

The present study, authored by the Centre for Budget and Governance Accountability, explores the experiences of secondary-level students, teachers, parents and CSOs in the transition to online learning in Delhi. In order to harness the opportunities offered by ICT, it examines the early repercussions of the digital shift in access to quality education, keeping an eye on gender differences.

We expect this publication to shed light on key public policy initiatives and reforms required to advance digital inclusion and gender equity in public education services.

Rose Ngugi

Chair, Southern Voice

and

Executive Director, Kenya Institute for Public Policy Research and Analysis (KIPPRA)

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Any errors or omissions are solely our responsibility.

Abstract

This study presents a qualitative analysis of the public provision of secondary education in India and how it was transformed by the use of digital technologies during the COVID-19 crisis. We question whether this shift was experienced differentially based on gender, and how the differences, if any, were experienced, and examine the risks and opportunities generated for students and other stakeholders. For a holistic understanding, we surveyed both girls and boys enrolled in government schools in Delhi, and interviewed parents, teachers, and Civil Society Organisations. We found that inadequate access to digital devices within households was a significant barrier across genders, with girls being slightly more affected. Girls were also less likely to have a conducive learning environment to study at home and were in some cases constrained by an increased burden of domestic work. They were also more likely than boys to express a strong preference for traditional learning. Systemic deficiencies such as lack of adequate teaching and non-teaching staff, and narrow, exam-centred pedagogies were also at play. Our findings are important for policymakers to enable the positive use of digital technologies, and the creation of supportive and empowering learning environments. The study recommends overarching policy reforms to improve digital access for girls.

Authors

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Content

Preface	iv
Acknowledgements	v
Abstract.....	vi
Content.....	vii
List of figures.....	viii
List of tables	viii
Acronyms and abbreviations	ix
Introduction	10
Methodology	15
Findings	22
Conclusions and policy recommendations	41
References	48
Appendices	53



List of figures

Figure 1. Framework for inquiry into the digital divide in the public provision of secondary education **16**

Figure 2. Mapping of main actors associated with the digitisation of public service delivery in secondary education..... **18**

Figure 3. Distribution of respondents by reasons for inadequate access to device (in percentage) **26**

Figure 4. Response to 'Are you enjoying online classes?' by gender **32**

Figure 5. Students' responses to the question, 'While attending online classes, what was your observation about your classmates' attendance?' **35**



List of tables

Table 1. Policy interventions related to digital education by Union Government and Delhi Government **23**

Acronyms and abbreviations

CSO	Civil Society Organisation
IVRS	Interactive Voice Response System
MDG	Millennium Development Goal
MoE	Ministry of Education
MSCERT	Maharashtra State Council of Educational Research and Training
NCERT	National Council of Educational Research and Training
PRAGYATA	Plan, Review, Arrange, Guide, Yak(talk), Assign, Track, and Appreciate
RPVV	Rajkiya Pratibha Vikas Vidyalaya
SDG	Sustainable Development Goal
SMSA	Samagra Shiksha Abhiyan
SoE	Schools of Excellence
SoSE	Schools of Specialised Excellence
UN	United Nation
UNESCO	United Nations Educational, Scientific and Cultural Organisation

Digitalisation of secondary school education in Delhi during the COVID-19 pandemic: How does gender factor in?

Protiva Kundu and Shruti Ambast

Introduction

To ensure that 'no child is left behind', the Indian Government has a duty to fulfil the development goal of gender equity in education. While India committed to achieving the Millennium Development Goal (MDG) of gender parity in school education by 2015, the target remains elusive. In 2015, India signed the 2030 Sustainable Development Agenda. Sustainable Development Goal 4 (SDG 4) seeks to 'ensure that all girls and boys complete free, equitable and quality primary and secondary education with effective learning outcomes'. It also aims at eliminating gender disparity in education by ensuring equal access to all levels of education. Its achievement directly impacts other interlinked SDG targets, such as health and well-being (SDG 3 target 3.7); gender equality (SDG 5 target 5.6); and decent work and sustainable growth (SDG 8 target 8.6).

There is ample evidence attesting to the importance of girls' education and the best means of engaging them (Gakidou et al., 2010; Montenegro & Patrinos, 2014; Kaffenberger & Pritchett, 2021). In India, much has been done to advance girls' education, including policies and programmes that seek to increase girls' enrolment in schools, as well as training and retaining them once within the education system (Govinda & Bandyopadhyay, 2008; SRI-IMRB, 2014; Kundu, 2019). However, despite the gender gap has narrowed at the elementary level in the last 10 years, it remains significant at the secondary and higher education levels. According to the Unified District Information System for Education (UDISE) 2018-19, while the drop-out rate for girls at the primary level is 4.3%, it increases to 17% at the secondary level (Sonawane, 2020). Furthermore, it is estimated that around 39.4% of adolescent girls in the 15-18 age group in India are not attending any educational institution at all. According to a survey conducted in 2018, this can be attributed to the fact that the vast majority - around 65% - are "either engaged in household activities, are dependents, or, are engaged in begging, etc" (NCPCR, 2018).

Depriving girls of access to education, especially at the secondary school level, has not only a dramatic impact on girls themselves, but also on their families, communities, and societies. While the opportunity cost of not educating a girl is enormous, girls are still less likely than boys ever to set foot in a school, and are more likely to drop out before

completion. Parents incur substantial expenses for schooling as secondary education is not free in India, and there is a significant difference in the cost of government and private schools. As parents are traditionally more willing to pay for their sons' education than their daughters', and private schools are perceived to provide better quality education, it is low fee-charging government schools that often cater to girls (Dreze & Kingdon, 2003; Bose, 2012). Keeping an adolescent girl in school is thus more costly than for boys, as funding is not only needed for school-based interventions, but also incentive, community-based, education system and health system interventions (Sampa et al, 2021). Therefore, any shifts or disruptions in the public provision of secondary education must consider specific impacts on female students, and more broadly, the fulfilment of interconnected development goals.

Education is one of the key sectors impacted by COVID-19. As an immediate response to the pandemic, the Government of India declared a nationwide school closure in March 2020. To fulfil the obligation to respect children's right to education under India's Constitution, the government directed schools to shift their classes online from the first week of April 2020. In support of the process, both the Union and State Governments announced measures to facilitate the transition. These included creating apps for online learning resources, apps for supporting students' psycho-social wellbeing, and the streaming of educational content through media formats including television, radio, and online platforms such as YouTube.



Inadequate access to devices was a challenge across genders; and it affected a slightly higher proportion of girls (62%) than boys (56%).

Around 320 million children in India had to switch to e-learning as a result of school closures during the pandemic, 133 million of which were enrolled in secondary school (UNESCO, 2020a). The unplanned and rapid digitalisation highlighted the stark regional, social and economic disparities within India's school education system. The shift from classroom-based learning to digital education left out a large number of children: those with limited access to the infrastructure and resources required for online learning. In this context, it is important to understand how gender has factored into this transition and what further challenges it has brought for girls' access to education. This will enable an understanding of the policy measures needed to support girls' access to the new digital way of learning.

Objectives of the study

With the trajectory of the pandemic still unknown, digital education as the principal learning mode may remain in force for a long period of time. By providing evidence of adolescent girls' specific concerns around the transition to online education, and laying out its possible adverse effects on gender equality, the present study can support the formulation of more inclusive, gender-responsive policies. Accordingly, the main objectives of this study are to investigate the following issues and questions.

- The study seeks to examine how girls with access to online education are negotiating the digital shift. This involves understanding their preferences between different modes of learning, including the value they place on physical classes in comparison to online environments, how they value school as a social space and its implication on learning, and new needs that may have developed in response to the shift in the learning environment.
- The analysis also aims to understand the role that gender and income status play in enabling access to online education. This would help determine suitable policy measures such as monetary assistance, the design and execution of online pedagogy, teacher training and counselling.
- The study also explores the extent to which the digital shift has contributed to girls' dropping out of secondary school education.¹
- In addition, the research assesses the impact that government interventions had on girls' access to education during the COVID-19 crisis - have they enabled or hindered it? While we argue that the digitalisation of education has been more harmful to girls' learning trajectory than their male counterparts, the research also hopes to uncover any advantages that girls may have experienced in response to the digital shift, and any challenges that may have emerged for boys.

The paper has four sections. Section I includes a brief introduction, the research objective, and a detailed literature review. Section II describes the methodology and limitations of the study. Section III covers the findings from the primary survey and secondary survey. Section IV concludes with a set of policy recommendations.

¹ Secondary education includes IX-XII grades. The general age range of students enrolled in secondary education is 15-19 years.

Literature review

The pandemic has forced us to rethink girls' education design, implementation, and outcomes. Indeed, India's education system was already highly inequitable and plagued by opportunity gaps in learning that only widened during the pandemic (Kundu, 2020; Malala Fund, 2020). Reviewing girls' access to education is thus critical for ensuring their continued development, including life skills and long-term success.

Prior to the pandemic, boys were twice as likely as girls to complete secondary education (UNESCO, 2020b). There is apprehension that interruptions to learning may worsen this trend, increasing the number of adolescent girls out of school. Early estimates from UNESCO suggested that 11 million girls globally may not return to school, and that girls aged 12-17 are at particular risk of dropping out of school in low and lower-income countries like India. Estimates in 2021 suggest that 10 million secondary school girls in India may drop out due to the pandemic (RTE Forum, 2021). With a five-state field survey concluding that the gendered impact of the pandemic might reverse all the progress that India has achieved towards attaining gender equality in education, the issue has been flagged as needing immediate and comprehensive intervention (Malala Fund, 2020).

An important factor that contributes to girls missing out on education is the existing digital divide. This is informed by their unequal access to the technology, infrastructure and know-how required for participating in online learning. Evidence from across the globe suggests that girls and women often remain trapped in a vicious cycle in which prevailing gender gaps prevent them from accessing digital technology in a way that benefits or empowers them (Gray, Gainous & Wagner, 2016; UNICEF, 2021). Early internet use studies show that women are more likely than men to feel they do not 'need to use' or 'want to use' the internet (Fallows, 2005). One study found that most women believe that access to the internet would not benefit them (Intel, 2012).

However, while half of the women with no formal education said they were not comfortable with the internet, this proportion fell significantly among women who had completed at least high school education. This suggests that there is a positive relationship between one's level of education and digital technology engagement. Indeed, as confirmed by the 2019 Mobile Gender Gap report, it is less educated women that remain disproportionately unconnected to the internet and without digital skills (Rowntree, 2019). The Intel and Dalburg study also found cultural reasons associated with women's disconnect from the internet, with some believing the internet to be inappropriate for them as a result of negative social perception and the attitudes of family members. Girls and women also face specific risks online, such as cyberstalking and online harassment. In addition, economic disparity persists, which may also have a gender dimension.

For instance, a study found that Google searches related to school increased more in wealthier areas compared to less wealthy ones (Bacher-Hicks, Goodman & Mulhern, 2021). These specific challenges faced by girls in accessing online education compound the risks arising from school closures and the lack of a secure learning environment.

In India, the digital divide is more clearly understood as a reflection of economic disparity, despite some studies highlighting gender as an important dimension. Only 8% of households in India with children between the ages of 5 to 24 have access to both a computer and an internet connection (MOSPI, 2019). A survey of 7,200 teens across four Indian states found only 12% of girls had access to mobile phones as opposed to 35% of boys (Centre for Catalysing Change, 2020). Given girls' limited access to devices, internet and textbooks, the survey found a higher challenge for girls to continue education than boys. A survey by UNICEF and Maharashtra State Council of Educational Research and Training (MSCERT) in Maharashtra, found that while 60% of government school students had access to smartphones, only 57% had internet connectivity, and less than 1% of the students surveyed had access to laptops and desktops. In addition, only 30% were found to be using the state's 'Diksha'² learning app (Bhatkhande, 2020). It is notable that the survey found more disparities in digital access based on location (urban vs rural), and for children with special needs or from disadvantaged groups. Gender was not the major nor only factor (Goradia, 2020).



Only 29% of girls reported that they always had access to a quiet place to study inside the home, compared to 43% of boys.

The availability of devices in the household does not necessarily ensure access to online education. Girls may be burdened with care and domestic tasks which impede their ability to participate in online classes (Centre for Catalysing Change, 2020; Roy, 2021; UNICEF, 2021). The five-state study found that large proportions of girls were spending time on chores like cooking, cleaning, and taking care of their siblings. Boys, on the other hand, were spending more time on farming and watching TV.

² DIKSHA (Digital Infrastructure for Knowledge Sharing) is an app developed by Ministry of Education. The national platform is an open repository of learning materials for school education for teachers, students and parents.

Girls were also more likely to face restrictions on their mobility because of restrictive gender norms, which reduce their access to basic services like education, health, and nutrition (Care, 2020). According to a survey by UN Women and the International Center for Research on Women, 95% of women aged 16-49 years also feel unsafe in public spaces, such as those in the capital city of Delhi (Sharma, 2021). These factors, together with COVID-related mitigation measures like school closures, further restricted girls' mobility.

Finally, girls from marginalised groups were doubly disadvantaged. An online survey of more than 10,000 students from marginalised populations across six Indian states revealed (Rana, 2021) that accessing education during the pandemic was a challenge for the majority of surveyed students and the struggles were more acute for girls with disadvantaged backgrounds (Rana, 2021; Roy, 2021).

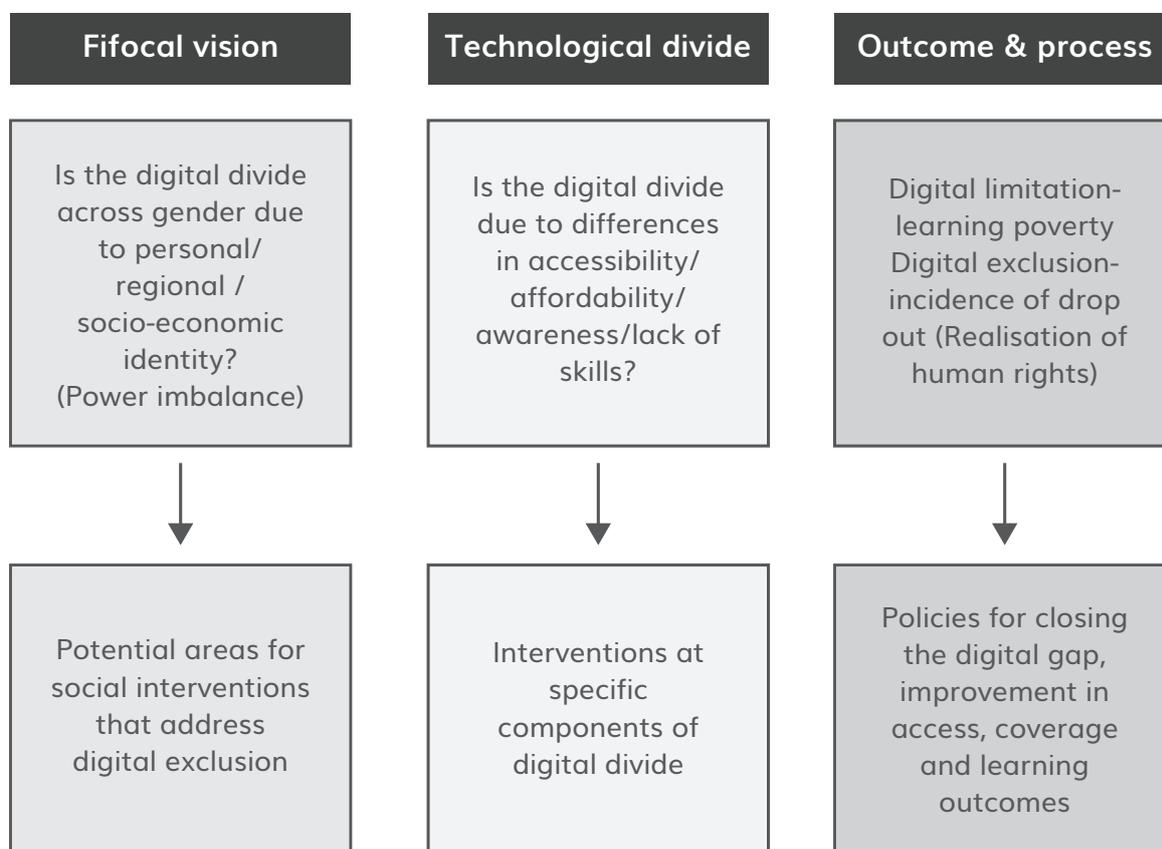
Methodology

The digital divide has many levels. The first level is access to technological equipment (Compaine, 2001; Campos-Castillo, 2015). The second level considers inequality in capability and peoples' varying knowledge, awareness, and skill (Wei et al., 2011). The third level focuses on the outcomes of using digital technology (van Deursen and Helsper, 2015).

The theoretical framework for 'Inquiry into the Technological Divide' proposed by West & Heath (2009), addresses the impact of the technological divide from the abovementioned perspectives, and identifies potential policy intervention areas to address the digital gap. The column 'Fifocal vision' situates the technological divide in socially constructed contexts and analyses potential social intervention areas to bridge the gap. The column 'Technological divide' analyses the digital divide in terms of accessibility, capability, affordability, and awareness among users. The third column, 'Outcome & process', highlights the impact of the digital divide and seeks long-term processes and interventions to mitigate digital exclusion.

Our research hypothesis is broadly based on West & Heath's framework. It allows us to examine how, and at what level, the different factors that lead to the digital divide (access, skill level, knowledge, and awareness, learning opportunities and support) are creating gender inequities. Figure 1 interprets the West and Heath's framework in the context of the public provision of secondary education.

Figure 1. Framework for inquiry into the digital divide in the public provision of secondary education



Note: The first box in each column presents challenges associated with digital exclusion in education. The following box indicates possible areas for intervention.

The first column questions: Why do measured disparities exist between girls and boys? This question enables us to identify potential areas that need attention to address digital exclusion in education.

The second column questions: Which factors are responsible for the digital divide in secondary education across genders? This helps to locate the specific components needing policy attention.

The third column questions: What are the long-term impacts of the digital divide in secondary education, and how can they be addressed? This helps us identify long-term policy recommendations.

Source: Authors' interpretation of West & Heath model (2009).

Using this framework, the paper investigates the impact of online education on students attending secondary education in government and government-aided schools from a gendered perspective. The analysis covers the following aspects:

- i. Challenges of online education for girls and boys enrolled in secondary education
- ii. Impact of online education on girls enrolled in secondary education in terms of overall experience of learning, and impact on other areas of their lives
- iii. Government interventions related to online education for girls: measures taken vis-à-vis ground realities
- iv. Demand and preference for interventions among students pursuing online education.

To answer these questions, the first step was identifying the main actors involved in the direct and indirect provision of digital education in secondary schools. Based on their functioning within the system, these actors have been grouped into the categories of demand or supply (Figure 2).

On the demand side are students and parents, both of whom feel the impacts of the sudden transition from traditional classrooms to virtual platforms. The government and civil society organisations (CSOs) fall into the supply category, playing the role of enablers and facilitators in the implementation of education services.

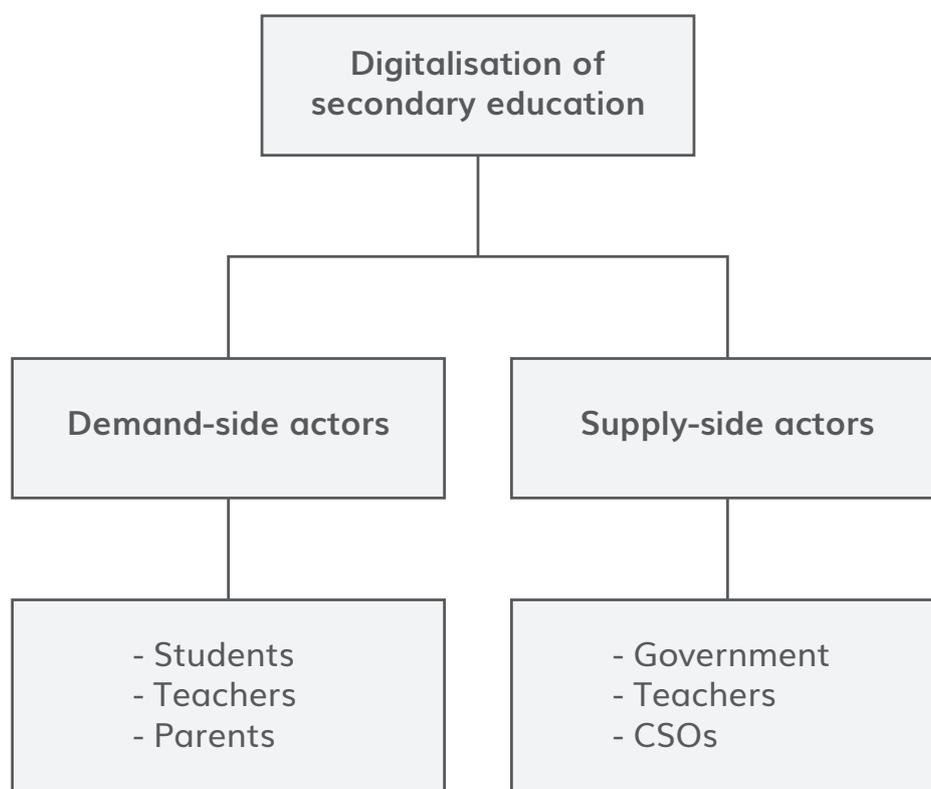
Teachers are the only stakeholders who straddle both, impacted by the change in the system, while also actively participating to make the transition work.

A mixed methods design was used for the analysis, consisting of a field survey and desk-based research with secondary data sources.

Analysing the public provision of secondary level education as a broader area of research was purposely chosen as India has made significant progress in universalising primary education, but there continues to be a high risk of dropout for adolescent girls at the secondary level. Further, the experience of online learning during the pandemic was completely new for school students, including those at the secondary level.

As both the authors are based in Delhi and had better access to secondary education stakeholders, the capital city was chosen for the survey sample. Choosing Delhi also enabled the study to go ahead despite the mobility restrictions resulting from the pandemic. In relation to other states across India, Delhi also has a relatively higher spending on school education, providing a useful case study for the analysis.

Figure 2. Mapping of main actors associated with the digitisation of public service delivery in secondary education



Source: Authors' interpretation.

Delhi has a population of 16 million people, of which 1.7 million fall into the age group attending secondary education (15-19 years). This comprises both lower secondary (IX-X), and senior secondary levels (XI-XII). The study was carried out with children enrolled in secondary education in government and government-aided schools.

As per the Delhi School Education Act of 1973, educational facilities are provided across the following stages: pre-primary (nursery and kindergarten), primary (I-V), middle (VI-VIII), lower secondary (IX-X) and senior secondary level (XI-XII). Pre-primary and primary education are largely the responsibility of municipal or local bodies. Middle, secondary, and senior secondary education are under the charge of the Directorate of Education, Government of Delhi. By design, while government schools are owned, controlled, and financed by Central or State Government, or a competent local body, government-aided schools are private-owned, but still get support from the government. These schools get annually recurring aid from the Central or State Government, or a competent local body, and are categorised as 'aided schools'.

There are a total of 1230 government and government-aided schools in Delhi, 1054 of which are government schools. As of the 2019-2020 academic school year, both government and government-aided schools constituted 22% of total schools and 37% of the total enrolment number. Within government-run schools, there is a huge variation in terms of structure, enrolment, and quality of education. There is a category of regular government schools, including Sarvodaya and Government Secondary/Senior Secondary Schools. Another special category of schools admits students selectively, based on exams, such as Rajkiya Pratibha Vikas Vidyalayas (RPVVs), Schools of Excellence (SoEs) and Schools of Specialised Excellence (SoSEs). At the secondary level, the most common category of schools is that of Government Senior Secondary Schools, totalling 459 in number. Of these, 167 are girls-only, 237 are boys-only, and 55 are co-educational (boys and girls). As for Sarvodaya Senior Schools, there are a total of 445, of which 226 are girls-only, 133 boys-only schools and 86 are co-educational. In both categories there are a few additional schools, which only go up to lower secondary level or class X. Among special category schools, all of which are co-educational, there are 23 RPVVs, 6 SoEs and 20 SoSEs.

Details of the primary survey

The primary research focused on gathering qualitative data. A combination of purposive and snowball sampling was used for the selection of participants. The survey was conducted over two months, from June to July 2021. To capture demand-side information, two out of Delhi's 11 districts were chosen: Southeast and Southwest. These districts vary in size and demography but have similar delivery of public-school education in place. The Southeast district is largely urban, with relatively high-income levels among the population. The district has 97 government schools, 40 of which are girls-only, 30 are boys-only and 18 are co-educational. Of these, seven are special category schools. On its part, the Southwest district is largely rural, with mostly middle-income households. The district has 98 government schools, 31 of which are girls-only, 30 are boys-only and 37 are co-educational. Eight of these are special category schools.

In total, 30 girls and 30 boys were interviewed to learn about their experiences. The primary focus was on children attending online classes, but the perspectives of students currently enrolled and unable to attend online classes were also captured. Evidence from various studies shows that a large number of children discontinued education altogether during the pandemic. However, owing to a small sample size, our survey does not capture these experiences. As respondents were primarily from urban and relatively higher income areas of Southeast and Southwest Delhi, it is anticipated that the results could be slightly skewed. It is evident that the level of socio-economic deprivation of these students was lower than that of average government school students,

particularly those studying in rural districts of India. However, the responses still reveal mixed experiences, thus providing insights into the many variations in issues of access, affordability, and overall remote learning experience.

The data was gathered through telephone interviews. Given the existing digital divide, reaching children from all social strata through an online survey was difficult. Therefore, choosing phone calls as the main tool to gather information was a conscious decision not to exclude children with limited access to a smartphone, internet connection and other digital technologies.

An individual questionnaire was designed to conduct semi-structured interviews with secondary level students enrolled in government and government-aided schools (see Appendix 1). The questionnaire was designed to capture different aspects of children's experiences and was organised in five categories: i) General information, ii) Access, affordability, and remote learning experience, iii) Literacy, iv) Impact and V) Perspective.

Under the first category, General information, details of the respondents' background and current education status were collected. The second category covered questions of accessibility and affordability of remote learning, as well as content and mode. The third category, Literacy, assessed the respondents' digital skills, including the ease with which they operate devices and their knowledge of internet usage. The fourth category assessed the impact of online learning on respondents' education and broader aspects of their lives. Finally, the category 'Perspective', gathered the respondents' perceptions and preferences on the remote learning experience.

These categories were informed by a review of existing literature and other surveys in the domain. The questionnaire included both multiple choice and open-ended questions. A corresponding matrix was developed to capture and code the responses. The responses were transcribed in a matrix during and after the interviews. Answers to close-ended questions were coded for ease of collation. Answers to open-ended questions and other remarks were documented as notes. A statement on ethical practice was also prepared and shared verbally with each respondent before the interview. The phrasing and order of questions was refined as the interviews proceeded to make them more effective.

To understand the impact of digitalisation more holistically, the perspectives of other key stakeholders were captured, including parents, teachers, and CSOs. The transition to online education had both direct and indirect impacts on teachers and parents. While teachers play a significant role in delivering education services through the new virtual mode, parents also play an active role in executing virtual learning at home. In addition, CSOs facilitated the online learning process in different ways, including working

as a communication bridge between teachers and students, and teachers and parents. The perspectives of CSOs working on gender or school education issues were sought to capture the challenges of remote learning at the implementation level, and to understand the positives and negatives of digital education.

Teachers, parents and CSOs were identified through purposive and snowball sampling techniques. Their perspectives were gathered through unstructured interviews largely conducted through WhatsApp and Google Meet (refer to Appendix 1 for a list of guided questions). Due to pandemic-related restrictions, face-to-face interviews could not be conducted, so the study relied on phone interviews and virtual platforms in compliance with the regulations. Five teachers, five parents and members from five CSOs were interviewed individually, since both teachers and CSOs showed reluctance to participate in group discussions. The small number of interviewees poses a limitation to the nature and scope of information gathered. Therefore, their responses are treated as non-generalisable, yet important supplements to the students' responses. As detailed in the following paragraph, the interviews were carried out in keeping with ethical research practices.

Ethical considerations

Before carrying out the interviews, respondents were provided with sufficient information about the project, researchers' identity and general assurances about their participation. The purpose was allowing them to understand the implications of their participation and reach a fully informed decision about whether to participate. Voluntary participation was ensured, and participants were provided the option to withdraw from the interview at any stage if they so wished. The duration of the phone calls and interviews was communicated to participants prior to the interview.

The use of offensive, discriminatory, or other unacceptable language was strictly avoided in the questionnaire, interviews, and discussion. The privacy and anonymity of all respondents was ensured. Other authors' work in this study has been duly acknowledged.

Details of the secondary survey

Information on the measures taken by the government to provide secondary education through digital platforms during the pandemic was gathered from resources of the Union Government and the Delhi Government. This included government notifications, circulars, and reports on the interventions for online education, especially for girls at the secondary level. It also included a review of surveys, media reports and articles that capture the impact of online education on children, with a special focus

on girls. An analysis of the Union Government Budget and Delhi State Budget was also conducted to understand the resource allocation for online schooling during this time. Quantitative data from secondary sources was used to complement primary data and triangulate and contextualise our findings. A combination of qualitative and quantitative data ensures that the limitations of one type of data are balanced by the strengths of the other.

Limitations

The study faced limitations resulting from the ongoing pandemic and its associated challenges:

- The geographical scope of the research is limited due to mobility restrictions. This confined primary survey research to the state of Delhi.
- The evidence collected cannot be generalised. This is necessary to ensure greater detail and insight into the barriers that need to be overcome through the implementation of public policy
- Reaching a larger sample of respondents was difficult due to the pandemic-related restrictions and limited access to basic digital infrastructure.
- Conducting phone interviews was the only viable option, however, the process took more time than anticipated as phones were not always available for the respondents.
- Important data was unavailable or inaccessible, including district-wise coverage, fund allocation and fund utilisation of government measures to support online education.



Findings

The survey findings are organised and presented under two broad themes: those concerning the demand side (experiences of students, teachers, and parents), and those concerning the supply side (measures taken by the government and supporting measures by teachers and CSOs).

With the pandemic outbreak, schools were advised to start classes online. Various policy measures were introduced by the Union Government and Delhi Government. To contextualise our findings, the following table maps some of the key policy interventions taken by both governments over the period of March 2020 – July 2021.

Table 1. Policy interventions related to digital education by Union Government and Delhi Government

Timeline	Interventions
March 2020	First circular by Delhi Government to resume teaching-learning activities for students in government and government-aided schools, and instructions for communicating them to students.
May 2020	Delhi Government partners with Khan Academy to deliver curated maths content to class IX students in secondary government schools through SMS.
May 2020	Order for all schools to educate students on the symptoms of COVID-19 and its preventive measures. Teachers also share materials prepared by the government through social media, mass message facilities or e-mail.
July 2020	Order for all schools to follow the PRAGYATA Guidelines prepared by the Union Ministry of Education to guide and assist schools, administration, teachers, parents and students in using digital modes of education. Launch of live YouTube classes by Delhi Government for class XII students.
August 2020	Delhi Government launches physical exercise sessions for students on YouTube channel; teachers are asked to share the channel with students and keep track.
November 2020	Online workshop on responsible social media use for students of classes IX-XII under the Gender & Equity component of <i>Samagra Shiksha Abhiyan</i> , a flagship scheme for school education.
February 2021	Order for all schools to follow NCERT and UNICEF guidelines on safe online learning.

Note: PRAGYATA stands for *Guidelines on digital education by the Ministry of Education*; NCERT refers to the *National Council of Educational Research and Training*.

Source: Authors' illustration based on Government of NCT of Delhi (2020a, 2020b, 2020c, 2020d, 2021a); The Quint (2020); The Indian Express (2020).

Since external board examinations for class XI and XII were upcoming, additional measures were taken for students in government and government-aided schools. For students of class XII, a centralised approach to remote learning was followed. The Core Academic Unit of the Directorate of Education developed video-based content for topics across subjects and hosted them on YouTube for live viewing. The same approach was followed some time after for class XI students. The programme was eventually supplemented with subject-specific teachers to allow students to clear doubts on the materials. Subsequently, the centralised video-based teaching was entirely replaced by online teaching at the class-level.

It was also reported that the Delhi Government distributed tablets to class XI and XII students in SoEs, as well as to 'meritorious' students of class X in other government schools (India Today, 2020). The former was confirmed in our discussions with respondents from SoEs.

Demand side: experiences of students, teachers, and parents

Our respondents were distributed across different school categories and classes. Of the 60 students surveyed, 36 were from government schools, 13 from government-aided schools and 11 from special category schools. Seven of the respondents were studying in class IX, 18 in class X, 12 in class XI and 23 in class XII.

As discussed in the methodology, the study attempted to include both students who attended online classes and students who did not. Through their responses, an in-depth understanding of the challenges students faced in transitioning to online education was gained. These included barriers in access to online education and obstacles when already engaged in online learning.

As per the 'Technological divide' column in the West and Heath framework (2009), this section seeks to identify factors contributing to the digital divide in secondary education, and the extent to which the divide is gendered. The findings have been categorised under five major dimensions of online education:

1. Access and affordability of remote learning
2. Mode and content of remote learning
3. Ease of navigating digital platforms and materials
4. Effectiveness of online education and overall impact on students and teachers
5. Stakeholders' perspectives on their experience

Access and affordability of remote learning

Eight respondents of our sample (five girls and three boys) reported not being able to attend online classes due to insufficient access (7 respondents) or no access (one respondent) to a device, despite attending school before the pandemic began. The rest were able to attend online classes during the last school year, even if their attendance was irregular. The device available to 80% of respondents was a smartphone. Among the remaining 20%, two had access to both a smartphone and a tablet (having received the latter from their school previously), five were using a tablet, two were using laptops, and two had a basic phone.

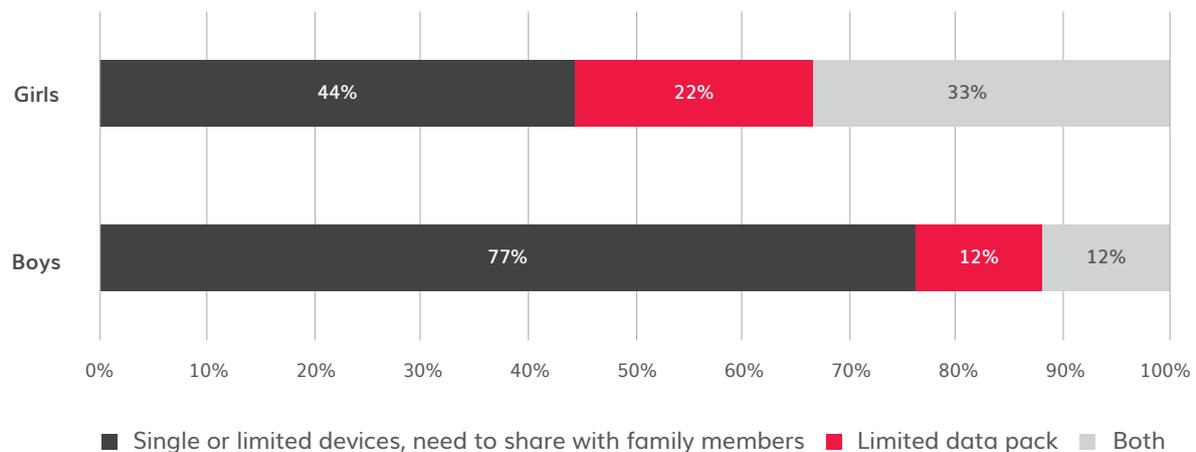
Responses on access to devices suggest that gender in our sample was a differentiating factor only to an extent, and economic factors were more influential for both boys and girls. Only 42% of the total respondents reported that their device belonged to them. The difference between boys and girls was marginal, with a slightly higher proportion of boys reporting the device belonged to them (43%), as compared to girls (41%). In discussions with CSOs, there was a consensus that boys are more likely to have a personal device, while girls are more likely to share them. The difference was attributed to patriarchal thinking, involving the prioritisation of boys' education and fears among parents about giving 'too much access or freedom' to their daughters. Given our small sample size, it is hard to corroborate this pattern.



Some respondents had trouble understanding English-language content, and girls were more likely to report facing a language barrier in learning.

However, a higher proportion of girls (62%) did not have access to a device when needed in comparison to boys (56%). The most common reason for lacking adequate access was the need to share the device with family members, including parents, siblings, and in some cases, extended relatives. Most boys reported sharing a single device (or a limited number of devices) with family members as the reason for inadequate access to online education. Girls' responses on the other hand, were more widely distributed and included factors such as a 'limited data pack' or the combination of 'both'. What is evident is that the challenge of sharing devices with family members was a predominant issue across genders (Figure 3).

Figure 3. Distribution of respondents by reasons for inadequate access to device (in percentage)



Source: Authors' calculation based on survey data.

A more complete picture was revealed with additional explanations. Many respondents reported they did not have a smartphone prior to the pandemic and that the device was bought to attend online classes. Sharing a phone with other school-going siblings was also a common occurrence. It should be noted that 68% of respondents said they had school-going siblings, and the average number of school-going siblings for a respondent was between one and two.

Among siblings, priority may have been given to students of class X and XII, as they were sitting their board exams, or to siblings who were in college. One respondent from class XI mentioned that his access to online classes was limited because his elder brother, in class XII, owned the phone and 'needed it more'. Another respondent from class IX revealed he shares one phone with his younger brother, while his older brother in college had his own phone and a laptop.

In other cases, an earning member of the family would take the phone to work, which meant that the child only had access during the evenings. One of our CSO respondents stated that this became a bigger challenge once the initial lockdown was lifted, as earning family members went to work. One student respondent in class IX, for instance, shared that there was only one phone in his household and that his father took it with him to work. As a result, he was only able to study late in the evening or early in the morning. He would complete his worksheets and send them to the teacher over WhatsApp and did not attend any live classes. Another respondent in class X went to his aunt's house in the evenings to use her phone to study, as there was no phone at his house. As his aunt's house was far away, his father would drop him there.

While some students from special category schools received tablets from the government, they reported these had limited functionality. Students mentioned they had to figure out most of the functions on their own, since they did not receive enough school support. As the distribution of devices was selective, most students did not benefit from this intervention.

Beyond access to a device, many other factors determined the extent and quality of remote learning. Respondents were asked to rate their frequency of access to the following: a quiet place to study, headphones or earphones, regular electricity supply, good internet connection, and education materials (such as notebooks and stationery). Forty-three percentage of boys reported they always had access to a quiet place to study, compared to just 29% of girls. The place would usually be a separate room or designated area of the house. The difference in responses allude to a relative lack of privacy for girls within their homes. One teacher shared the view that girls were more likely than boys to be under the surveillance of parents, relatives and siblings at home.

Concerning access to headphones, electricity and good internet connectivity, no major gender differences emerged. Nearly 26% of respondents said they never had access to headphones, earphones, or a camera, but they would simply put their phones on speaker mode and listen to the classes. Similarly, the majority of respondents (68%) said they always had access to regular electricity supply.

However, a steady internet connection was not guaranteed. Only around 40% of respondents said they always had access to the internet, while the rest answered, 'sometimes' or 'never'. The responses were similar for boys and girls. A poor network connection, inadequate data plans and software and hardware issues were common constraints. One respondent indicated she had 1.5 GB of data on the phone daily, which was insufficient for accessing classes, especially because she shared the phone with her elder sister and younger brother. Voice breakage, video interruptions and network issues were frequent during classes. Some respondents stated they would leave their house and stand in a corner of the nearby lanes to seek better connectivity.

In addition, many reported needing to recharge data plans more frequently than usual because of the increase in usage. This could amount to an increased expense of around INR 500-600 (USD 7-8) a month. Though it was reported that the Delhi Government announced a monthly internet subsidy of INR 200 (USD 2.7) for class XII students (Hindustan Times, 2020), none of our respondents heard of this, let alone tried to claim it.

One respondent reported that using up all mobile data on classes meant none would be left for other recreational activities. One CSO pointed out that families with children

attending government schools often bought low quality phones (INR 5000-6000/USD 70-80) that did not support long virtual calls. One student, for instance, said she could not attend Zoom classes because the application did not function properly on her phone.

Concerning education materials, 80% of boys said they had access to the materials needed, compared to 59% of girls. This was related to a variety of issues. One respondent in class XI indicated her father lost his job during the lockdown, so she had no access to the educational materials needed and had to 'adjust' to studying without them. Many also reported using old notebooks from previous school years. Others borrowed materials from siblings, friends, and fellow students, or downloaded e-books on their phones.

A combination of the factors mentioned above created significant barriers for secondary school children to access online education, with a slightly heightened impact for girls. The following statement from a class XII respondent describes an experience that resonates with many of the responses:

Sometimes the phone would not be charged, as everyone was using the phone. Sometimes the internet recharge was not done. Sometimes my sister's class was at the same time as mine. Sometimes I had to do some household work. There were many interruptions from family members - I would be asked to do this and that, to go out and buy something. But I could see video recordings of classes later during my free time.

Mode and content of remote learning

Discussions with teachers, administrators and CSOs revealed that the government followed an adaptive but somewhat ad hoc approach towards remote learning. Education for students in classes IX to XII in Delhi Government schools was primarily delivered through live online classes and online or physical sharing of educational materials. Online classes were made available to students in class XI and XII who had access to mobile devices. For those without them, there was an option to physically collect weekly worksheets from school, return them once completed, and collect the next set. For students in classes IX and X, teaching was largely held through worksheets shared on WhatsApp groups, and students without access to smartphones could collect hard copies of the worksheets from the schools. The worksheets had key points from each chapter of a textbook followed by exercises, including objective and multiple-choice questions.

In terms of mode of remote learning, 52% boys and 48% girls attended live online classes, revealing a marginal gender difference. In the case of recorded online classes, usage was higher for girls, at 64% vs. 36% for boys. One respondent from class XI reported

she could not attend live classes but watched the videos prepared and uploaded by the Delhi Government on YouTube. According to media reports, the Delhi Government also used an Interactive Voice Response System (IVRS) for remote learning (Hindustan Times, 2020), and partnered with Khan Academy, a private organisation, to deliver curated maths content to class IX students through SMS (The Quint, 2020). However, it is unclear how many students were covered by these initiatives since none of our respondents appeared to have any knowledge of them.

Concerning time spent, girls were likely to report more time spent on remote learning. While 35% of boys said they spent less than two hours on remote learning, only 16% of girls said the same. Instead, 64% of girls reported spending between 2-5 hours on remote learning, and 20% reported spending more than five hours, compared to 54% and 12% boys respectively. A teacher from a boys-only school indicated that there is a general understanding that girls are more responsive and attentive to their studies. This could be a result of social norms that encourage girls to be more dedicated and focused on academic pursuits, as opposed to a wider range of educational and non-educational activities. This can also be attributed to the fact that girls have less freedom, stricter parental supervision, and tighter constraints on their mobility. In addition, 86% of boys and 79% of girls reported doing some form of self-study. Roughly the same proportion of boys and girls (around 75%) reported looking up extra resources on the internet. Others said they did not have the time or access to devices or materials to undertake self-study.

WhatsApp was the main coordination platform between teachers and students. There was usually a main WhatsApp class group and separate groups per subject. However, establishing initial communication with students for them to engage in remote learning was a challenge. While schools had records on the students' phone numbers, it was not possible to reach all students. Some families returned to their villages, particularly those of migrant workers. One CSO respondent confirmed that many students were left out from the beginning, especially when there was no smartphone in the household. Her organisation took up the work of door-to-door mobilisation to inform students about remote education options alternative to online classes. The findings are in line with the Delhi Government data, by which only 6 out of 10 students joined remote learning in the first two months of lockdown (Hindustan Times, 2020). Reverse migration of workers after losing their livelihood and additional economic challenges were cited as main reasons. The platforms used to facilitate learning were also different in government-aided schools', especially those with higher fees.³ A respondent from such a school mentioned that students had Google Classroom accounts, where they would regularly upload their work.

³ As per Delhi School Education Act and Rule, 1973, the tuition fee and admission fees are very less in government-aided schools in Delhi. However, the development fees and transportation fees, which are charged monthly per student vary across the government-aided schools.

Students attending government schools could not rely too much on parental support for schoolwork, as they were likely to be first-generation learners. Despite many respondents indicating that their parents supported them in continuing their studies, none reported that parents got involved in the learning process itself. One parent stated that despite being educated, it was difficult to get involved in his child's remote learning due to a limited technological know-how, and the lack of time related to the increased work burden during the pandemic.

Apart from the academic curriculum, there were very few school activities mentioned. Only 32% of respondents reported being provided with directions for physical activity. In such cases, the teacher would usually send exercise videos featuring yoga or running. Sometimes, students would do the exercises and send a recording back to the teachers to convey they had done them. Some respondents said the response to exercise videos was not enthusiastic and hardly any students participated. Very few other extra-curricular activities were reported. However, respondents enrolled in a School of Excellence mentioned poetry competitions, story-writing competitions, and sessions for the Entrepreneur Mindset Curriculum (a special programme run by the Delhi Government for select students). One respondent from a regular government school mentioned a teachers' day celebration.

Ease of navigating digital platforms and learning materials

Accessing education through digital platforms is affected by the learner's capability to use and understand digital tools. Among the 15-29 age group of the Indian population, only 34% know how to use a computer, with a proportion of 39% of men and 28% of women (MOSPI, 2019). There is also a gender difference in the ability to use the internet, with a difference of 49% for men and 32% for women (MOSPI, 2019). In terms of overall digital literacy, our survey revealed similar results. Only 11% of respondents said they had a computer at home, and it was found that computer and internet usage are not part of the curriculum in Delhi Government schools. This raises questions about the government's plans to prepare students for digital learning, as there is a clear lack of capacity (both from staff and students) to adjust to the sudden shift. Indeed, only 19% of respondents reported having regular computer classes at school prior to school closures. Among these, some mentioned that classes had only taken place a few times, often at lower school levels. Respondents also indicated that the contents and methods used in these classes were not adequate enough to provide them with sufficient digital skills. For instance, one respondent stated that teachers only taught theory in their computer classes, so they never actually used computers. Another respondent stated that when they did get to use a computer, it was only to draw and paint.

The latter may explain respondents' lack of familiarity with applications like Word, Excel and PowerPoint. Twenty-three percentage of respondents reported they had never heard of these applications and only 19% of respondents said they found them easy to use. One teacher also stated that government schools are not equipped for WiFi, and that the few computers they had were given away to be used at vaccination sites set up in the school.

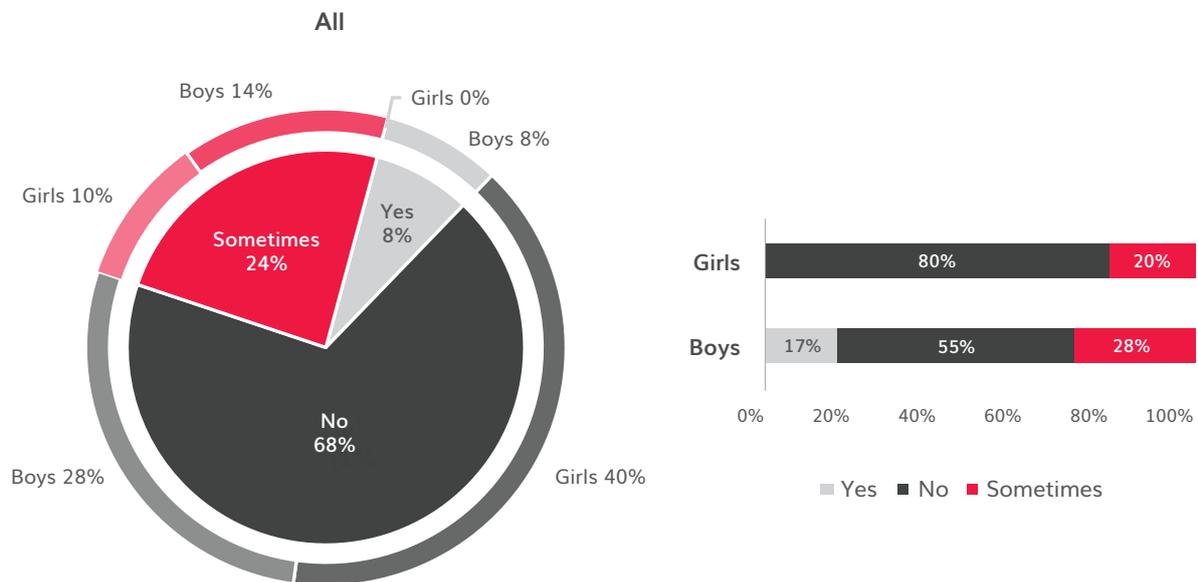
However, lack of access to computers and other devices did not appear to significantly disadvantage students from picking up basic functions when gaining access to devices later. In fact, 48.3% of respondents said it was easy for them to use smartphones or other devices for online classes, while 37% said it was moderate - not too easy nor too difficult. With regards to students' ability to use the internet, an even larger proportion (60%) declared it easy, and 33% described it as moderate. A common experience amongst respondents was that, although initially difficult, learning to use a smartphone and the internet got easier over time. However, some students expressed difficulties with certain aspects of online learning, including using platforms such as Google Meet and Zoom for the first time, and converting files into PDFs. However, no significant gender differences were found in students' digital capacities in these areas. In fact, in some cases, navigation of a select function or tool was easier for girls than boys, as reported by the respondents.

Another aspect that impacted students' ability to engage with digital tools was language, particularly for girls. A total of 17% of girls reported facing a language barrier, compared to 4% of boys. A larger proportion of boys (60%) reported facing no language barrier, compared to girls (45%). Discussions revealed that the language barrier was usually in reference to English, which many respondents had trouble understanding. In contrast, most respondents found Hindi or Urdu (the vernacular languages) much easier to understand. One female respondent in class XI shared that as all videos sent by teachers were in English, it was initially hard for her to comprehend. Later, however, teachers started sharing videos in both languages. Another female respondent in class XI stated that her lack of comfort with the English language made it difficult to understand how to use a smartphone and the internet. One male respondent shared that while he could understand English, he preferred a bilingual mode of learning.

Effectiveness of online education and overall impact on students

To capture the impact of online education, students were asked whether they were enjoying the new mode of learning. Girls disliked online education more than their male counterparts, and none of them expressed enjoying online classes. While 80% of girls stated they did not enjoy online learning, boys' responses were more mixed (Figure 4).

Figure 4. Response to 'Are you enjoying online classes?' by gender



Source: Authors' calculation based on survey data.

The flexibility resulting from online learning was one of the biggest draws for respondents. Two key aspects that students enjoyed were attending classes from anywhere, and being able to revisit lectures, contents, and notes at a convenient time. For instance, one student mentioned that making personal notes based on the shared materials and recordings was the most positive feature of online classes, 'which is otherwise difficult in regular classes'. Some students also indicated that online classes allowed them to save time and money as they no longer had to commute to school. For some, the freedom to do other things alongside classes was also a positive feature.

Concerning the reasons for disliking online learning, responses reveal that multiple factors are at play. Given that girls reported a stronger dissatisfaction, their responses present important insights for the purpose of our study. Beyond access to devices and internet connectivity, students that were able to attend classes also faced difficulties in the online learning process. Some lost interest in education, as they could not understand what was being taught, and felt that teachers did not entertain their questions. This was more challenging for students learning through WhatsApp, as they were unable to clarify doubts in real time. From the teachers' perspective, a respondent said that students were mostly passive during classes, and that if they asked questions, they would usually be procedural such as 'when do we have to submit our work?' or 'how many pages do we have to read?'.

Another common reason cited among students for disliking online classes was difficulty to concentrate. For most, this was attributed to the absence of a conducive learning environment at home, disturbances created by other students during live classes, and sitting for prolonged periods of time. Notably, 89% of girls viewed their learning as inadequate, in comparison to 57% of boys. This is probably why around 44% of girls stated that if online education continued, they may discontinue their studies, whereas only 33% of boys declared the same. Many of the respondents also said that a continuation of online education might change their future higher education plans.

The shift to online learning also had consequences on students' wellbeing. The sudden increase of time spent in front of a screen put many children's health at risk. Under the PRAGYATA⁴ guidelines, the Union Ministry of Education (MoE) recommended a maximum of four 30–45-minute synchronous online learning sessions a day for IX–XII class students. Secondary students were also advised to restrict time for 'surfing and scrolling' and 'reading information on every issue' to no more than 2 hours a day (MoE, 2020a). However, even with these recommendations, about one-third of our respondents complained of frequent headaches and eye-related problems, and 40% reported developing neck and shoulder pains. In addition to physical consequences, students' mental health was affected, with 20% of respondents reporting feeling depressed, the majority of which were girls.

In addition, many respondents said that time spent on domestic chores increased during the pandemic. Increased domestic work reduced the ability to engage in remote learning activities for 30% of respondents, as they often missed classes to complete their chores. Of these, 67% of respondents were girls, while the corresponding figure for boys was 33%. Our CSO respondents confirmed that this was a challenge in many households. They also shared that parental attitudes towards girls' education could vary significantly depending on the neighbourhood. In some parts of Delhi, parents continue to hold conservative views that prioritise boys' education at the expense of girls. However, in the south of Delhi where our sample is from, parents are believed to be more progressive.

Around 12% of students reported that besides attending online classes, they were also helping family members with paid and unpaid work. Some worked and studied simultaneously, making it particularly difficult to concentrate on lessons. The majority of students with the double responsibility of learning and working were either from families with only one earning member, or students with a single mother who had limited access to earning opportunities. While 17% of respondents reported working somewhere during

4 PRAGYATA is MoE's guideline on digital education. The full form is: Plan, Review, Arrange, Guide, Yak(talk), Assign, Track, and Appreciate.

this time, another 16% shared that they were looking for a job. Thirteen percentage of boys reported working compared to 4% of girls. However, it was the reverse for jobseekers; 11% of girls reported looking for a job, compared to 5% of boys. One CSO respondent attributed this to the fact that boys are generally afforded greater mobility, enabling them to go out and work. Girls, on the other hand, were more likely to be asked to stay at home despite economic pressures.

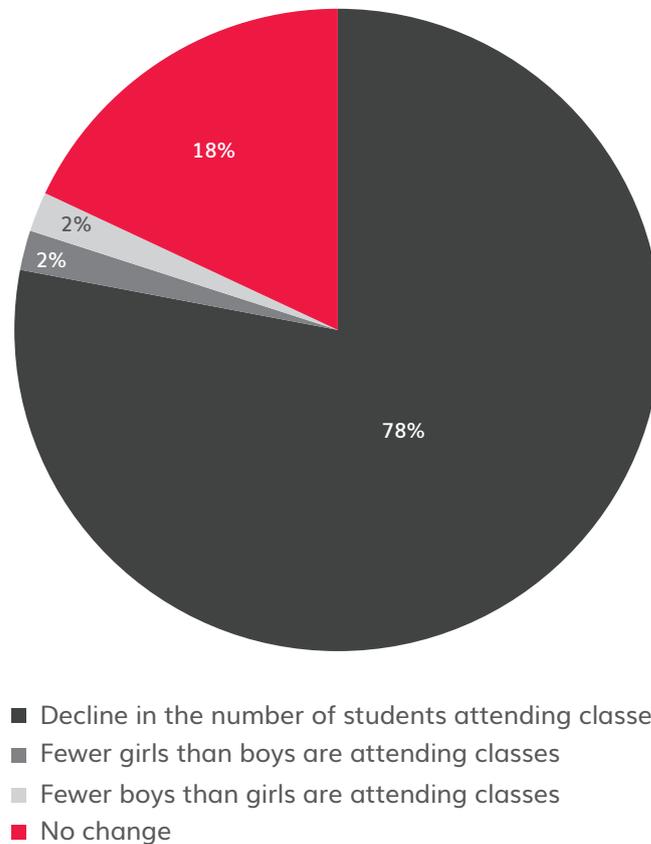
Working respondents said they would leave their jobs when schools reopened, and those in search of work expressed a willingness to continue studying. However, strong economic pressures may in fact push them to quit their studies. This view was shared among all CSO respondents, who said that once students and their families became accustomed to the work and money, it would be difficult to quit and resume school.

One CSO respondent believed that working class families were too concerned about putting food on the table to prioritise children's online education. Parent respondents confirmed that while they wanted their children to complete their studies, economic necessity during the pandemic forced them to rely on their children's support. For some parents, the flexibility afforded by remote learning allowed them to take their children with them to their workplace. Some children accompanied their parents to the shops where they simultaneously helped and attended classes. One of the CSO respondents also reported that many girls began accompanying their mothers who worked as domestic helpers.

Early marriage is another large pressure that girls may face. Both our CSO and teacher respondents shared instances in which girls who previously attended school, left to get married. However, as many of these girls are 18 years of age or above, there is no legal recourse to be sought.

It was encouraging to note that 80% of respondents' families within the sample were keen to support their children's studies, whatever their current situation. However, as the survey was carried out with a limited sample, it is difficult to observe general trends in the experiences of digital education across the state. This is compounded by a lack of government data on student attendance. Still, students were asked about their classmates' attendance to online classes (Figure 5). Seventy-eight percentage of students reported a decline in attendance to school. According to their observations, only 30% to 40% of their classmates remained online during classes. Notably, 18% of students reported no change in the attendance pattern. However, most were from special category schools of the Delhi Government.

Figure 5. Students' responses to the question, 'While attending online classes, what was your observation about your classmates' attendance?'



Source: Authors' calculation based on survey data.

The class attendance rate was said to have improved marginally when schools reopened in February 2021 for a period of two months. About 62% of respondents saw a decline in the number of students returning to school, whereas 32% said that all their classmates were present. However, the improved situation is still concerning as it suggests a possibility of discontinuation of studies.

Students' perspectives on online education

To understand students' perspectives during their journey to online education, we asked respondents a set of questions about their experiences over the last year and a half. Overall, respondents expressed a preference for face-to-face teaching. Irrespective of gender, around 81% of the students preferred traditional classrooms, while 10% preferred the idea of blended education. Just 9% declared a preference for online education. This is related to the difficulties faced by students over the last 1.5 years, including basic

access, learning experience, and a lack of social interaction. As one respondent informed us, 'Because my siblings and I's classes start at the same time, we have only one device for attending online classes and we have a limited data pack'. Another respondent explained the advantage of physical classes as follows: 'We can concentrate more easily, and teachers can see our activities during the class and can clear our doubts'. Finally, one of our respondents captured a key component of the sociability of attending school in person: 'We can meet our friends and share our happiness or sadness with them to reduce our depression.' Among those that preferred online classes, the reasons cited were the advantages associated with learning at home, including flexibility and the capacity for more concentrated work.



88% of respondents believe that better support from the government could have eased the transition from traditional classroom to remote learning.

Regardless of preference, the majority of respondents (88%) believe that better support from the government could have eased the transition from traditional classroom to remote learning. They thought government support could have been delivered both in a monetary and non-monetary capacity. While preference for non-monetary assistance outweighed the desire for monetary support, a gendered breakdown shows that boys felt the need for monetary incentives more than girls.

A detailed discussion around non-monetary assistance revealed that students thought a good quality device, books and materials would be the most useful form of support. Those who opted for cash incentives, felt the money was needed to subsidise internet packages, either for mobile data packs or a better broadband connection. Further elaboration for the preference for cash revealed students thought they would be better placed to choose the network connection themselves. Indeed, they had a better understanding of the quality of service in their localities than the government who provided a standard service. A few students believed that teachers visiting their homes or communities and assisting them with learning would provide the most valuable form of support from the government, as this would supplement what they were being taught online.

The general feeling from surveyed students was a desire to go back to school and attend face to face classes. However, this response was not purely based on academic

needs. When asked what they missed the most about schools, the most common and spontaneous response was the in-person element. They missed having face to face interactions with friends and teachers, even if this was in the form of a punishment or rebuke. In one student's words 'I missed each and every wall of my school'.

Experience of online education among teachers

Online teaching was a new experience for teachers all over India, including those in Delhi. The sudden transition to remote learning created numerous challenges for them. Our teacher respondents told us that they were faced with a significant increase in workload, and a large and varied number of additional duties. Teachers had to schedule a new program of classes, and balance this alongside students' availability. New responsibilities left teachers with little time or mental capacity to improve their teaching methods, track down students who missed classes, and devote extra time to reaching students unable to access online learning facilities.

The difficulties faced by students in accessing digital tools throughout the pandemic were also applicable to teachers. While the Delhi Government provided tablets to all the government-school teachers, this did not solve the issue of internet connection. Teachers mentioned having to spend substantial amounts of their own money to obtain enough internet data for long video calls, and for uploading and sharing large volumes of data. Moreover, due to poor quality, the tablets were increasingly unreliable for online teaching.

In addition to the lack of good quality equipment, teachers received no specialised training to improve their management of the online learning experience. While some reported one or two-day training sessions on topics such as learning how to use Google Tools, these did not compensate for the lack of proper capacity-building workshops and supporting digital infrastructure. In the absence of appropriate training, and in the face of mounting pressure to prepare students for their exams, teachers had little room to innovate and make the most of virtual platforms.

Perspectives of teachers and CSOs on online education

Information gathered from different stakeholders suggests that the indicators used to monitor student engagement throughout the pandemic were inadequate to accurately assess their participation in online learning. For instance, teachers were asked to weekly report the number of students 'connected' to WhatsApp. However, as one teacher pointed out, this was meaningless. Unless teachers also checked up the duration for which students were connected, and the activities they were engaged in

whilst online, it would be impossible to gain a full understanding of their participation. Therefore, the only indicator this data provided was the number of students who had access to a smartphone in the household. This would not, however, reflect the substance of students' responses nor how well they mastered the teaching contents.

There was also an inordinate focus on the completion of the syllabus, which students had to complete within the school year to sit their exams. This rush to finish the syllabus was added to the various challenges of remote learning. One of our CSO respondents declared that no thought was given to how the syllabus could be shortened or modified, or if an alternative might have been more appropriate given the unprecedented COVID-19 situation. Another CSO respondent complained that weekly worksheets were not designed properly: there was too little content for students to effectively practice basic reading and writing skills, and to gain a full understanding of different subject matter. These deficiencies in the provision of online learning must be situated in the high loss of learning among students, confirmed by all our CSO respondents.

Supply side: interventions by the government

Following the discussion of findings collected from students, parents, teachers and CSOs, the governments' interventions during this period are now assessed, as well as the resources allocated towards remote learning.

Since a new government came to power in Delhi in 2016, a visible transformation has been observed in the government school system. Education has become a priority area for the Delhi Government, reflected in sustained high budgetary allocation. The focus has been on strengthening school infrastructure, revamping the teacher-training system, improving student learning programmes, and encouraging community mobilisation. However, Delhi government schools operate with only 57% of permanent teachers, while the rest rely on short-term contracts. A huge number of vacant posts also persists amongst the teaching and non-teaching staff. While Delhi's average student to teacher ratio in 2019-2020 was 28:1 at the secondary level, and 18:1 at the senior secondary level (MoE 2020b), the ratio varies significantly across school categories. Schools like RPVV and SoE have largely favourable student-teacher ratios, with a norm of 30:1 at the secondary level. However, in the majority of regular government schools, it varies from 45 to 60 students per teacher (Bhatia, 2018).

In terms of digital infrastructure, while most government and government-aided schools have internet connectivity, this is largely for office use according to a teacher respondent, and students and teachers are not able to access it for education purposes. However, in 2019-2020, all the government-school teachers were provided with tablets

for administrative purposes, such as sharing learning materials, monitoring student attendance, and tracking academic performance and learning disabilities (Government of NCT of Delhi, 2021b).

As discussed earlier, the government announced a series of public policy interventions for the transition to online learning in response to the pandemic. However, none of these were reflected in budgetary terms. Public spending (Union and States together) on education has been historically low in India. In 1966, the Education Commission of India recommended that 6% of Gross Domestic Product (GDP) be allocated to education by 1985-1986. However, in 2018-2019, spending on education still only reached 4.4% of GDP (MoE, 2021).

In 2021-2022, the first fiscal year after the pandemic outbreak, additional budgetary measures by the Union and State Governments were expected for all sectors, including education. Yet, neither the Union Budget nor state budgets have much to show in terms of progressive allocation. It was found that two-thirds of low and lower-middle-income countries cut their public education budgets during the pandemic (World Bank & UNESCO, 2021). India is among these countries. The school education budget in India was slashed by 8%, compared to the previous year (Sonawane, 2020). The only visible budgetary intervention of the Union Government during 2020-2021 was an allocation of INR 57 billion (USD 7.7 billion) to the school education sector to 'mitigate the effects of COVID-19' (Sharma, 2020). Of the total allocation, two major interventions were specific to digital education. INR 8.2 billion (USD 0.1 billion) were allocated for promoting online learning through digital initiatives, and INR 2.7 billion (USD 0.036 billion) were allocated for online teacher training and the professional development of teachers (Sharma, 2020). This allocation is minuscule given the fact that 320 million children in India were affected by pandemic-induced school closures.

On the other hand, the Delhi Government's budget for school education witnessed a marginal increase of 6% in 2021-2022. The rise was largely on account of increased allocation for the secondary education component under the Samagra Shiksha Abhiyan (SMSA)⁵ scheme. Secondary schools received a total of INR 5.1 billion (USD 0.07 billion) to improve digital infrastructure, a number almost five times higher than the previous year's allocation. The areas that received the most were Science TV Programmes, Virtual Schools, digital classrooms, and online assessments.

⁵ Samagra Shiksha Abhiyan is a scheme funded partially by the Union Government, to provide school education holistically from pre-primary to secondary level in all states.

Teachers and CSOs as facilitators

Discussions with students, teachers and CSOs highlighted how teachers and CSOs supported students in the transition. For students, teachers are the first contact point in online learning. Students were asked about the key tasks undertaken by teachers, as well as teachers' responsiveness towards their needs. Ninety-one percentage of respondents reported that regular homework was common in the transition to online learning. Around 69% of respondents said that teachers provided homework feedback, often shared via WhatsApp. In most cases, students shared their homework with their teachers by taking photos of their handwritten tasks and sending them to WhatsApp groups. In some cases, teachers would maintain checklists of who submitted the homework and who had not.

Around 80% of respondents said that teachers were open to students' suggestions. Some respondents said teachers spent extra time explaining things that students did not understand during class. Respondents also said that teachers were open to changing class timings based on their needs. For instance, one teacher agreed to have classes at 7 pm, when most students were available and had access to mobile devices. Teacher and CSO respondents confirmed this, stating that they often had to schedule classes and other activities in the evening to fit students' needs.

Respondents also told us that their teachers personally paid the extra cost of supporting students in remote learning. For instance, in 2019-2020, when tablets were provided to teachers, a monthly internet subsidy of INR 200 (USD 2.7) was announced. However, as one teacher respondent revealed, this is yet to come through.

Irrespective of gender, 89% of respondents said that teachers informed them about COVID-19 protocols and how exams would be conducted. In addition, 78% of respondents said teachers could be reached for one-on-one communication. One respondent elaborated on the matter, pointing out that he could personally message the teacher, who would call them back to clarify doubts. However, another respondent said that all communication happened on WhatsApp groups and teachers could never be reached individually.

The CSO respondents also discussed their role in supporting students during this period of online education. Some CSOs told us about their contribution to help students with no access to devices. Two CSOs, for instance, distributed smartphones to students. Another said they provided some students with tablets and supported crowdfunding efforts. CSOs also held supplementary classes for students, to help them further understand online contents and school materials provided by teachers. Finally, an

organisation working on girls' education shared they intervened in one case of child marriage, preventing it from taking place.

Conclusions and policy recommendations

The implications of our findings must be contextualised within the social, economic, and geographical location of our sample. With Delhi being largely urban in nature and having a heterogenous migratory population, the conclusions of the present study cannot be considered representative of India as a whole. However, they can be corroborated with broader national and international findings on digital learning to underscore the severe problems that online learning solutions generated for government-school students.

Demand side: key takeaways from the experience of students and teachers

Access was found to be the major challenge in online education, and girls faced a few heightened challenges in this regard. Girls were slightly less likely to own a device or have access to a device when they needed it. Their access to education materials was lower, and they were less likely to have a quiet place to study. No gendered differences were found with regards to digital skills and capability to use the internet, but girls were more likely to report a language barrier while using digital content.

A large number of boys and girls lacked proper access to remote learning at every level. The lack of basic digital infrastructure, including devices and internet connectivity, is an immediate barrier affecting nearly all students to varying degrees. General issues of poor connectivity, unaffordability of internet recharge, inferior quality of hardware and software, and insufficient digital literacy and exposure further compounded the specific challenges faced by girls.

Beyond access and literacy, there were also gender differences in how time was spent. While girls were more likely than boys to report an increase in domestic chores, this did not necessarily reduce their access to learning. In addition, girls were more likely to be looking for work than boys, but less likely to actually be working. Finally, girls were more likely to perceive they did not learn adequately through remote learning, and revealed a stronger preference for face-to-face learning. To sum up, girls and boys experienced challenges in accessing education in different ways.

Considering the experience of girls in special category and aided schools, it seems gender may stop being as important a determinant of access to online learning at a relatively higher socioeconomic status. Our study supports the proposition of West & Heath's (2009) 'Fifocal vision' model, in that the digital divide is at least as much about socioeconomic status as it is about gender. What this means is that girls from lower socioeconomic backgrounds are faced with the double burden of economic pressures and gender challenges. This needs to be considered when designing interventions to support remote learning.

An important aspect of gender difference in remote learning experiences is related to mobility. On the one hand, boys were frustrated as they were used to greater mobility. However, greater freedom enabled them to take up jobs or accompany earning family members to their workplace. On their part, girls were faced with more mobility restrictions, which kept them within the four walls of their home and under constant surveillance. This had a major impact on their mental and emotional well-being, as school used to be the one space away from the confines of the household that allowed them to move and socialise freely. In this sense, remote learning may have exacerbated the challenges girls were already facing. This could explain why a large number of girls felt it would be too difficult to catch up or would have to change their initial plans of pursuing higher education. The difficulties experienced with online learning seem to have made them more disillusioned with education and their capacity to succeed in it.



89% of girls felt their learning was not adequate due to the lack of a conducive home environment.

From our sample, it cannot be concluded that the digital divide was the primary challenge faced by girls enrolled in secondary education, nor the primary barrier to access and experience of remote learning. However, it can be said that the experience of online education magnified other structural factors that play a significant role in constraining girls' opportunities in education. Therefore, beyond digital access, policymakers must pursue strategies that seek to support and empower girls.

The use of digital devices and virtual platforms as a new experience for teachers unfamiliar with technology was also explored. Faced with inadequate training, many felt unequipped for their new roles. Furthermore, additional administrative duties were

already a major burden for government-school teachers. During the pandemic, their duties expanded to cover more tasks related to the COVID-19 crisis. This reflected both the government's disregard towards government-school teachers, as well as the staff shortage in government departments. The latter is a long-time systemic issue that goes beyond the ambit of the education sector, and hinders teachers' ability to meaningfully engage with students in times of crisis.

Supply side: key takeaways about the efficacy of government interventions

Challenges experienced by students during the pandemic were built on pre-existing problems. The public provision of school education in India is already under-funded and still has not reached 6% of GDP –a target initially set for 1986. Additionally, the profound financial pressures on the overall economy resulting from the pandemic caused a further 8% of Union budget cuts for school education in 2021 to 2022. This meant that after expenditures such as salaries and interest payments, States did not have enough resources for mitigating the gaps created by the digital divide. Therefore, any attempts to improve girls' online learning experiences must incorporate measures to address larger issues.

As governments must respect children's right to education, schools shifted from traditional classrooms to virtual platforms. However, governments did not have the policies, resources, nor infrastructure to roll out online learning in a fully inclusive manner. This was reflected in the adoption of minimalist online solutions at the early stages of the pandemic. Over time, both the Union Government and Government of Delhi began to focus on more context-based, direct teaching-learning solutions, but the efforts were neither comprehensive nor sufficient. There were no targeted interventions to support girls in continuing their education, particularly those from lower-income families. Moreover, the distribution of devices and provision of internet subsidies were either exclusive to some students, or little known about. If a student did receive a device, it would be shared among other family members. It is evident that devices themselves were not enough to address the challenges of remote learning.

In this context, the use of physical worksheets can be seen as an innovative and desirable method to the extent that it kept students connected to the school system. Though limited, the process of collecting and submitting worksheets, reading, writing, and solving questions served the purpose of engaging students who would have otherwise been completely cut-off from education. However, the latter cannot be seen as a substitute for learning, instruction, and interaction. The effectiveness of worksheets was also undermined by poor planning and design. These factors likely contributed to

girls' overall online learning experience throughout the pandemic and their belief that it was inadequate.

Many of the challenges students faced with remote learning can be traced back to persisting staff shortage in Delhi Government schools and its consequent effect on student-teacher ratios. The impact can be seen as teachers were unable to extend their support in multiple areas. For instance, teachers could not support students with no access to digital devices, those based out of town, or those who faced economic hardship. Another manifestation of this problem was that teachers reportedly delegated work to 'class monitors'. Recruitment of an adequate number of regular staff is possibly the most urgent intervention required from the government, especially as most other forms of support are contingent on teachers' availability. In these circumstances, the government's provision of digital resources, involving apps and portals, seems superficial. Interventions must be cognisant of the staff available in schools, their capacity vis-à-vis use of digital technology, and their workload with respect to additional administrative duties.

The indicators used by the government to monitor progress were procedural, such as the number of students 'connected' and attending classes, and the number of students who submitted homework. These were insufficient in revealing the extent to which students were actually engaged in the learning process, or in gauging students' needs. With girls reporting they spent more time daily on remote learning, yet learned less, it is evident that remote pedagogies did not meet their expectations. The usual approach within the Indian education system, which prioritises rote-learning and examinations over deeper comprehension and holistic engagement, continued to be a barrier when learning shifted online. Moreover, weekly reporting and compliance in syllabus completion increased the teachers' burden, leaving less time to adapt or innovate in online pedagogies to meaningfully connect with the students. The latter precipitated educational learning losses which will be extremely difficult to reverse. This may have also added to students' mental and emotional burden. The focus on board examinations also had the adverse effect of prioritising students in class X and class XII at the expense of others. This happened at all levels: from the household to schools and administration, all the way up to policymakers.

A positive learning attitude is an important quotient for students' performance. That is why extracurricular activities like sports, music, dance and drama are important in keeping students motivated (OECD, 2020). With the pandemic, its novel physical and social circumstances, and the subsequent adverse economic conditions, there was a need to reorient the entire school system and prioritise students' overall well-being. Yet, while some activities like sports, yoga and music were incorporated into secondary school curriculums, these activities did not take place with school closures. The way online

education affects the physical and mental well-being of children is extremely problematic. Schools need to make sure holistic approaches to education are compulsory. This is vital for nurturing the non-cognitive skills of students and must be implemented so that these activities do not become yet another task for students to complete.

Furthermore, the stratification of schools into different categories along the lines of 'merit' appears to be inimical to the idea of a strong public education system. Differences observed in remote learning experience in government schools, as compared to special category schools, suggest that the government is investing a disproportionate amount of resources into the latter category, which cater to a very small number of students. The skewed distribution of resources further disadvantages most students in regular government schools. This specially affects adolescent girls, for whom regular government schools are the default option.

Education is a right that many children are unable to fully enjoy. This is a consequence of a structurally unequal education system. The pandemic has exposed how entrenched the structural imbalances are between rural and urban populations, men and women, the rich and poor, and those with and without adequate access to the digital world. Without addressing the digital divide, the continuation of online education will only increase inequality in educational outcomes and may push those without digital access completely out of the system. If online education is to be seen as a viable solution to COVID-19, governments need to be attentive to students' socio-economic status during policy formulation, along with universal access to digital infrastructure. COVID-19 has created the opportunity for the government to build back an education system where 'no one is left behind'.

Policy implications for the future of remote learning

The COVID-19 pandemic highlighted the need for an education system that can support blended approaches to learning, incorporating both physical schools and remote set-ups. Whereas there is no alternative to face-to-face learning, strengthening digital infrastructure is imperative for education emergencies. A mere re-prioritisation of resources from one programme to another will not be helpful. Support should be at the core of all COVID-19 recovery plans, whether global, national, or sub-national.

Our discussions with students, teachers, parents and CSOs in Delhi have brought forth important realities at the ground level, and helped us identify gaps between policy pronouncement and policy implementation, where the government needs to take corrective measures.

As an immediate measure, the Delhi Government should provide a good quality device (preferably a tablet or laptop) to all secondary-level children in government and government-aided schools. This is feasible since Delhi's education budget reaches INR 163 billion and equipping students with tablets would cost around INR 0.8 billion. In addition, an internet subsidy should be provided to all students and teachers.

However, the challenges involved in accessing remote learning must also be situated in the larger context, since they overlap with challenges of in-person learning. Students' socioeconomic status can mean they live in households with multiple school going siblings, may lack personal space to attend class, could be susceptible to economic vulnerability, may be first generation learners, and could face gender-specific challenges. The evidence therefore suggests that having a device and internet connectivity is not sufficient in itself. In the medium term, there must be measures that support students in the use of devices, community interventions enabling parents to better support their children, psychological support to encourage girls' education, and overall economic relief. Support for parents must go beyond simply sending SMS messages as they may not have the time or knowhow to engage with learning content in this manner.

Besides online teaching, many states are adopting low- and no-technology learning methods. These are aimed at enhancing education for students with limited access to, or very basic, technological devices. Some of these models include, 'Vidyangana' (doorstep classes) for government school students by the Karnataka Government; a gadget bank introduced by the Jharkhand Government to facilitate online classes for underprivileged students; a Modular English education programme through weekly episodes aired on Television, by the Madhya Pradesh government, and a mobile library by the Bihar Government. Taking examples from other States, the Delhi Government should also prioritise alternative modes of remote learning and make digital content available in vernacular languages.

Remote learning interventions should also prioritise activities that enable socialisation and community engagement, even if these are done virtually or in small physical spaces. If schools are simply viewed as platforms for delivering lessons, the scope of online learning becomes limited at the outset. Considering the previous discussion, it is important to see government schools as critical social spaces where students from different social backgrounds interact with each other, and where girls especially have an outlet for expression and socialisation, which may be denied at home.

The Union and State Governments also ought to coordinate measures for providing sufficient teacher training, taking into account the varied responsibilities teachers assumed throughout the pandemic. Teachers must be supported in effectively incorporating technology into their pedagogical practices. Furthermore, as education shifted online, teachers no longer just played the role of instructors, but had to act as mentors and

provide support for students' overall well-being. They were additionally expected to have knowledge on health and hygiene.

Finally, it is important that the government considers the views of all stakeholders along the entire policymaking process; it is evident that this was not done in the transition to remote learning. The government must be transparent about its policies and put relevant data into the public domain to build accountability and take responsibility for any issues or failures. Inclusive policy demands the participation of all stakeholders in the planning process. A 'one size fits all' approach cannot be applied to policy interventions. This is particularly important for vulnerable children who are often excluded from these discussions, yet most affected by poor educational practices. Vulnerable groups include children with disabilities, children from disadvantaged social groups such as Scheduled Castes and Scheduled Tribes communities,⁶ children from religious minorities, migrant and LGBT children, and those living in rural areas or from economically lower backgrounds. From an intersectional perspective, girls are the most vulnerable. To ensure these different groups are heard, the government should carry out vulnerability mappings and provide children with monetary and non-monetary support to address their needs.

At this point, when a pan-India survey is not available for measuring the extent of the impact of the digitalisation of school education, this study provides a significant contribution to the literature. It highlights the impacts of the government-led transition to digital education at the secondary level in Delhi. The findings and information gained provide valuable insights for governments' actions plans, as well as for other stakeholders like teachers and CSOs. However, as our sample was small, capturing the extent of the gendered impact in the digitalisation of secondary education was difficult. Future surveys with access to larger sample sizes are required. It would also be interesting to track the educational journeys of secondary level students over the next few years to gauge the long-term impacts of the digitalisation of education.

⁶ 'Scheduled castes' is a constitutional and legal designation of sub-communities within the Hindu caste system (a form of social stratification of Hindu society). 'Scheduled Tribes' is a constitutional and legal designation of marginalised tribal communities on the basis of their traits, distinctive culture, geographical isolation, and backwardness. The classifications were done for purposes of statutory safeguards and benefits to these scheduled groups.

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Appendices

Appendix 1. Questionnaire for semi-structured telephonic interview with students

I. General Information

Name:

Gender:

Age:

Do you have any school-going siblings? (Yes – 1, No – 2)

No. of school-going siblings:

Grade/Standard:

Stream: (Science -1, Arts -2, Commerce -3)

How many earning family members do you have? (for students in grade XI and XII): (Only father – 1, only mother – 2, both father and mother – 3, Other – 4, specify)

School Management: (Government -1, Govt. aided -2) (please specify if it is a special category school like KV, Navodaya, RPVV)

School Type: (Only for girls -1, Co-education -2, Only for Boys -3):

School fees per annum:

What is your school's current status?

1. Fully closed due to covid, with online classes (or any form of remote learning, including radio and TV broadcasting)
2. Fully closed due to covid, no online classes
3. Open, but with reduced in-person class time, combined with distance classes
4. Fully open

When did your school start online classes?

Current educational status: (attending online classes in school -1, not attending online classes but was attending school earlier -2)

II. Access, affordability and experience of remote learning

II.a. For students who are not attending online classes

(Please provide reasons for not attending online classes)

II.b. For students who are attending online classes

- Which device are you using for studying?
(Laptop -1, Smartphone -2, Tablets - 3, Basic phone – 4, Others-5, specify)

- Does the device belong to you?
(Yes -1, No-2)
- Do you have access to the device as per your needs? If not, what is the reason?
(You can have more than one response)
 1. *Single device, need to share with family members*
 2. *Limited data package*
 3. *Other(specify)*
- In your home, do you have access to the following for the purpose of remote learning?

	Never	Sometimes	Always
A quiet place to study			
A headphone, microphone and camera			
Regular supply of electricity			
A reliable internet connection			
Education materials (pen, notebook etc.)			

- What type of remote learning strategies are provided by your school? (You can have more than one response)
 1. *Live online classes (accessed through computer, tablet, or smartphone)*
 2. *Recorded online classes (accessed through computer, tablet, or smartphone)*
 3. *Sharing online materials (like videos, presentations, worksheets)*
 4. *Educational television broadcasting*
 5. *Educational radio broadcasting*
 6. *Delivery of educational material at homes*
 7. *None*

- Please assess your level of satisfaction with the following mode of learning. If you have no experience with a particular mode, please select "Not applicable".

	Dissatisfied	Satisfied	Not Applicable
Live online classes			
Recorded online classes with video			
Recorded online classes with audio			
Educational television broadcasting			
Educational radio broadcasting			
Sharing of online materials (like videos, presentations)			

- During remote learning, did you also get any substitution or support for the following (more than one response may be selected):
 - Library use
 - Laboratory use
 - Physical activity
 - Extra-curricular activities (music, drama etc.)
- How much time do you spend on average on online classes every day? (including different forms of remote learning)
- At the time of online classes, what is your observation regarding the following statements

	Yes	No	Not applicable
The teacher provided course assignments (homework etc.) on a regular basis			

The teacher provided feedback on your performance on given assignments			
The teacher has been open to students' suggestions on online classes			
The teacher has informed you about how exams will look like in this new situation			
The teacher can be reached for one-on-one communication, if you have any doubts or concerns			

- Did you do any self-study during this period?
(Yes -1, No-2)
- For self-study, did you look for extra resources (on Google, YouTube, television etc.) on your own in addition to prescribed learning material?
(Yes -1, No-2)
- If your school opened for a limited period of time, did you have offline exams during that period?
(Yes -1, No-2)
- If your school opened for a limited period of time, did teachers revise syllabus/ clear doubts during that period?
(Yes -1, No-2)
- In the context of the COVID-19 pandemic, please indicate whether
 1. *The amount of fees has remained the same at your institution*
 2. *Your institution has reduced the amount of fees*
 3. *Your institution has cancelled the payment of fees*
 4. *Your institution has increased the fees on account of online classes*
- Have you received any books/study material from your school?
(Yes -1, No-2)
- Are any of these support measures provided by the government (your school) for remote learning? (You can have more than one response)
 1. *Internet data pack subsidy*
 2. *Digital devices (1-smartphone, 2- tablets, 3- laptop)*
 3. *Cash assistance for buying devices*

4. Online content

5. Hard copies of educational materials, books

6. In-person community-based learning

7. Content made available via television / radio

- Have you heard of any support measures provided by the government for continuing study during the pandemic, that you have not received? (Yes-1; please specify; No-2)

III. Literacy

- Do you have a computer at home?
(Yes -1, No-2)
- Did you have regular computer classes at school?
(Yes -1, No-2)
- How easy is it for you to use a computer/laptop/smartphone for online classes and assignments?
 1. Easy
 2. Moderate
 3. Difficult
- How easy is it for you to use the internet?
 1. Easy
 2. Moderate
 3. Difficult
- How easy is it for you to do the following activities?

	Easy	Moderate	Difficult
Use tools like Excel, Word PowerPoint, etc.			
Search and browse information online			
Access and share digital content like videos, presentations, documents, images etc.			

Use online video conferencing platforms (Zoom, Google Meet, skype etc.)			
Use online communication platforms (e-mail, messaging, etc.).			

- Have you had any class on menstrual health and hygiene?
(Yes -1, No-2)
- Did you receive sanitary napkins from school during this period?
(Yes -1, No-2)
- Do you face any language barrier in attending online classes and using online resources?
 1. Yes
 2. No
 3. Sometimes

IV. Impact

- Are you enjoying online classes compared to normal classes?
(Yes -1, Sometimes -2, No -3)
- If yes, what do you like about the online classes?
 1. *I can concentrate better*
 2. *My performance has improved compared to face to face class*
 3. *I can revisit lectures and notes post classes*
 4. *I can do other things along with classes*
 5. *I don't have to spend time/money commuting to and from school*
 6. *I can attend class from anywhere*
 7. *Others (specify)*
- If not, why don't you like online classes?
 1. *Difficult to concentrate*
 2. *Classes without interaction with friends/peers are boring*
 3. *My performance has worsened*
 4. *Difficult to clarify doubts in real time*
 5. *Online classes are more costly*
 6. *My domestic chores have increased*
 7. *It becomes tiring*
 8. *Others (specify)*

- Are you facing any of the following symptoms during this time? (you can have more than one response)
 1. *Headache*
 2. *Eye related problem*
 3. *Back pain*
 4. *Neck & shoulder pain*
 5. *Fatigue*
 6. *Hearing problem*
 7. *Anxiety/tension*
 8. *Lack of motivation/depression*
 9. *None*
- Have your domestic chores/care work ever reduced your access to remote learning?
(Yes -1, No-2)
- Has your access to remote learning ever been reduced because of involvement in family business/helping family members with paid work?
(Yes -1, No-2)
- Has your access to remote learning ever been reduced because of lack of parental support?
(Yes -1, No-2)
- Since schools have closed, have you also been working somewhere?
(Yes -1, No -2, looking for job- 3)
- While attending online classes, what is your observation?
 1. *Decline in the number of students attending classes*
 2. *Fewer girls than boys are attending classes*
 3. *Fewer boys than girls are attending classes*
 4. *No change*
- If your school opened for a limited period, what was your observation?
 1. *Decline in students returning to school*
 2. *Fewer girls returned to school compared to boys*
 3. *Fewer boys returned to school compared to girls*
 4. *No change*

V. Perspective

- If you had the choice, which mode of classes would you prefer? Why?
 1. *Face to face*
 2. *Online*
 3. *Hybrid*

- Do you feel your boy classmates have better access to devices and the internet than your girl classmates?
(Yes-1, No -2)
- Within your family, do you think the men/boys have better access to devices and the internet than women/girls?
(Yes-1, No -2)
- Do you think boys find it easier to use digital devices and the internet than girls?
Please explain.
(Yes-1, No -2)
- Do you feel you did not learn adequately during this period of remote learning?
(Yes-1, No -2)
- Do you feel more support is needed from the government during this period of remote learning?
(Yes-1, No -2)
- During school closure, what kind of assistance would have helped you learn better?
 1. *Monetary assistance*
 2. *Non-monetary assistance (specify)*
- If online learning was to continue, do you feel you may have to discontinue your school studies?
(Yes-1, No -2, Maybe -3)
- If online learning was to continue, do you think it would affect your plans/opportunities for higher education?
(Yes-1, No -2, Maybe -3)

Appendix 2. Guiding questions for focus group discussions with teachers, parents and CSOs

Teachers

1. Was the transition to remote teaching difficult for you? Why/why not?
2. What are your thoughts on online learning as a medium for teachers and for students?
3. What kind of support did you receive from the school management to guide you through this transition?
4. Was it easier or harder to teach students through online classes? What kind of response did you see from the students when online classes began? Was there any change in the response over time?
5. Was there any difference in the response of boys and girls, in terms of attendance and engagement?

6. Is there any specific support that would have helped you manage the transition better?
7. What kind of training would help you continue with remote teaching? (Can be anything in the domains of pedagogy/online learning and assessment tools/class management/student counselling)
8. Please describe your administrative duties during school closure. Were you required to go to school at any time during this period?
9. What are your thoughts on working from home? What are the advantages and disadvantages it offers you?

Parents

1. What are your thoughts on remote learning? Do you think it is a better or worse medium of education for your child, why?
2. How do you feel about your child spending more time in front of a screen?
3. What challenges have you faced during the transition to remote learning? (Increase in cost of education, time spent looking after children at home etc.)
4. (If applicable) Are there any specific challenges faced by your daughter as opposed to your son?
5. Did you receive any support from the school to help you and your children manage this transition? Do you receive any communication from the school with general information and updates, progress of your child etc.?
6. Is there any specific support from the school that would have helped you manage the transition better?
7. Is there any specific support from the government that would help you during this time? (Better infrastructure, electricity, subsidy for learning materials etc.)

CSOs

1. What issues in remote learning have you seen in your location/your area of work? These could be issues faced by students, parents or teachers.
2. What are the specific issues you have seen concerning adolescent girls?
3. What are some of the non-education issues you have already seen or that you anticipate in the near future? (higher risk of dropout, child marriage, child labour/increased stress among students and other health issues/increase in inequality resulting from inequitable access to education?)
4. Do you think the government was prepared to manage the transition from physical to remote learning? What specific steps could it have taken to ensure fewer barriers and better learning?
5. What kind of support is needed to better equip students, teachers, and parents to manage remote learning?

6. What kind of specific support is needed to equip adolescent girls to manage remote learning? And to address the issues they have faced during this period?
7. What kind of measures have you undertaken to support the transition to remote learning? What have been the results?



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