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WORKING PAPER

Inequalities in Girls' Learning Opportunities via EdTech: Addressing the Challenge of Covid-19

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Reviewers

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Abbreviations and acronyms

AI	Artificial intelligence
GRP	Gender Responsive Pedagogy
LMICs	Low- and middle-income countries
ICT	Information and communications technologies
TEGA	Technology Enabled Girl Ambassador

Abstract

The onset of the Covid-19 pandemic prompted school closures, which affected nearly 1.5 billion learners globally. Girls are likely to have experienced learning losses during the pandemic to a greater extent, as there are multiple barriers that influence gender disparities in accessing and benefiting from EdTech, including social inequalities or norms and technological constraints. Equity needs to be foregrounded when EdTech interventions are implemented, by considering disparities emerging from digital access, freedom, literacy, pedagogies, and design:

- **Digital access** Potential gender disparities in digital access, including at home, should be considered when EdTech interventions are designed.
- **Digital freedom** Social norms, as well as online discrimination, or violence can influence the extent to which girls are allowed to use EdTech — acknowledging these system-level factors is important to implement equitable EdTech.
- **Digital literacy** Girls are often more likely to have lower levels of digital literacy than their male counterparts — tackling these inequalities and disparities is needed to enable girls and boys to equally make use of EdTech.
- **Digital pedagogies** Issues related to promoting gender bias, discrimination, and misrepresentation can emerge in teaching practices — facilitating professional development opportunities for teachers could be used to make digital pedagogies more inclusive.
- **Digital design** Disparities in learning outcomes can emerge when contextual factors, social inequalities and norms are not factored into the design of EdTech interventions — participatory approaches could be used to align EdTech interventions with local and contextualised needs.

1. Introduction

In March 2020, the rapid progress of the Covid-19 pandemic gripped the world and ushered in an unprecedented level of disruption to education systems, prompting school closures across the globe. By the end of March 2020, over 180 countries had introduced school closures, affecting nearly 1.5 billion learners (↑[UNESCO, 2020a](#)). In the immediate responses, discussion turned to the potential for EdTech to be used to address the challenge of providing educational continuity in the absence of in-person teaching. However, it was also acknowledged that the use of EdTech risked exacerbating socio-economic divides, and access to technology constraints are greater in low- and middle-income countries (LMICs) (↑[Jordan, 2020](#)).

It is now over a year since the initial shock to educational systems prompted by Covid-19, and we are now in a position to start to reflect upon how emergency education responses have fared in practice. Adopting multiple modalities (online, television, radio, for example) for instruction emerged as a strategy in order to try to maximise reach and minimise inequity; however, there can be stark disparities in access and ownership according to context (↑[Dreesen, et al., 2020](#)). Experiences of previous crises suggest that girls can be disproportionately affected by the loss of access to education, and at greater risk of not returning to school. For example, during the Ebola crisis in Sierra Leone, girls were less likely to have access to remote learning in the home, at greater risk of exploitation and violence, and less likely to return to school (↑[Hallgarten, 2020](#)). Understanding the impacts upon girls is important for the reopening of schools, and provision of support to address any emergent disparities.

To this end, here we present a rapid inquiry into the barriers to use of EdTech for girls in LMICs during the pandemic to date, and emerging practices and strategies to mitigate this. While disparities in education according to gender are a global issue, the primary focus of this inquiry was on LMICs. However, evidence from LMICs may be limited, so examples and literature relating to girls' engagement with EdTech in other contexts are drawn upon where appropriate. The study was guided by the following research questions:

- Through the use of EdTech during Covid-19, to what extent were learning losses unequally experienced for girls?
- What are the factors in relation to social inequalities and technological constraints that have likely contributed to intensifying learning loss for girls during the Covid-19 pandemic, in particular for those in LMICs?

Next, we will provide an overview of the factors affecting inequity in relation to girls' education and EdTech. We will discuss each in turn, in detail, before concluding with practical recommendations.

2. Social inequalities, norms and technological constraints

Looking deeper into learning disparities and learning loss, data on girls' education and gender disparities in EdTech often show that girls are disproportionately affected. There are multiple barriers that influence gender disparities in accessing and benefiting from EdTech. These barriers tend to be described as *social inequalities or norms* and *technological constraints* ([↑Malala Fund, 2020a](#)).

Girls' education has been a critical issue long before Covid-19. Globally, approximately 129 million girls were out of school as of 2019 ([↑Malala Fund, 2020b](#)). Social inequalities that directly affect girls accessing education include poverty, violence, and child marriage, among others ([↑The World Bank, 2021](#)). The lockdown measures of Covid-19 amplified gender inequalities, by triggering the shutdown of services in place to support girls and tackle gender norms. For example, factors such as travel disruptions were identified by the Center for Global Development as directly impeding girls from accessing safe spaces for learning and services to prevent early pregnancies or early marriages ([↑Mendez Acosta & Evans, 2020](#)).

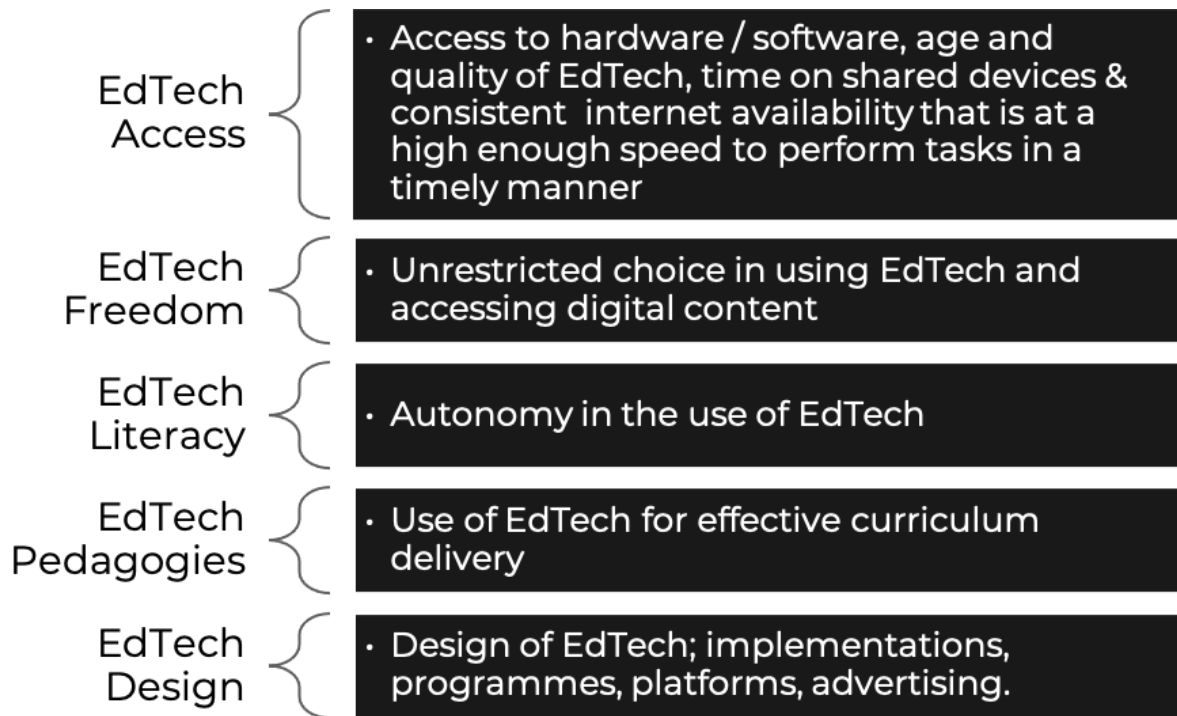
Social inequalities and norms are reflected in the way EdTech is designed, accessed, used, and implemented, often leading to girls not being presented with the same opportunities of benefiting from EdTech as their male counterparts. In this paper, the focus is given to illustrating technological constraints, emerging from social inequalities and norms that girls face in accessing and benefiting from EdTech. Different technological aspects needed to implement an EdTech intervention are explored, including digital access, digital literacy, digital pedagogy, digital freedom, and digital design (see Figure 1):

- **Digital access** Access to hardware / software, age and quality of EdTech devices, time on shared devices, and consistent internet availability;
- **Digital freedom** Unrestricted choice in using EdTech and accessing EdTech content;
- **Digital literacy** Autonomy in the use of EdTech;
- **Digital pedagogies** Use of EdTech for effective curriculum delivery;
- **Digital design** Design and implementation of EdTech programmes, platforms, and advertising.

Case studies of initiatives intending to ameliorate EdTech interventions by making them more inclusive and equitable — particularly in the context of

Covid-19 — are presented and discussed. For the purposes of this inquiry, we define the term EdTech as the use of information and communications technologies (ICT) within the education system, be it in ministries, schools, communities, and homes ([Hennessy, et al., 2021](#)). This includes digital technologies as well as low-tech devices such as non-digital radio and television.

Figure 1: Five factors contributing to digital inequalities.



3. Digital access

Equity in digital access to EdTech can be envisioned as a future where every child would have “access to a device; reliable, high-speed Internet; technical support and repairs; and a safe, supportive space to connect to virtual learning opportunities” (↑[Education Trust, 2020](#)). It is important for children to have access to the required hardware (mobile devices, laptops, desktop computers) and software if they are to benefit from the affordances for EdTech. It is also important to consider that children who share a device with others will have limited time to use EdTech. Access to functioning, up-to-date, quality hardware is also important; for example, older computers can impede workflow with slower processing, graphics and images incorrectly displayed, and breakages. Low-quality computers may also exhibit similar issues of slower processing rates and reduced functionality compared with higher-quality new computers. For some EdTech initiatives, learners need stable access to the internet and connectivity that is at a high enough speed to enable them to access learning content.

Data on digital access reveals a greater extent of inequalities for females. This is especially prevalent in low- and low middle-income countries; across LMICs, 165 million fewer women than men own a mobile device (↑[Lindsey, 2020](#)). A global study of over 3,000 participants revealed that adolescent males are 1.5 times more likely to own any type of phone and 1.8 times more likely to own a smartphone (↑[Vodafone Foundation, 2018](#)).

“This study also estimated that in Bangladesh 53% of adolescent girls had a mobile phone versus 85% of adolescent boys and in Rwanda, 39% of adolescent girls compared to 62% of adolescent boys.”

– ↑[Vodafone Foundation, 2018](#)

Covid-19 has contributed to further increases in the number of girls who do not have access to digital devices (↑[USAID, 2020](#)). Remote education has required more regular and sustained lengths of time using technology. When learning remotely at home, males are often prioritised for access. A study conducted by the Malala Fund found that 61% of fathers in Nigeria reported actively discouraging their daughters, and not their sons, to use the internet. This study also found that fathers were 36% more likely to support and assist their sons’ learning using EdTech during Covid-19 than their daughters’

(↑[Malala Fund, 2020a](#)). However, gender inequities need to be considered in context for girls and boys and boys can also be negatively impacted. For example, a study in Peru, Ethiopia, and India found that boys often lost out on education in having to go to work during Covid-19 (↑[Young Lives, 2021](#)).

Gender inequalities and social norms are only one side of this problem, as some populations do not have access to the internet or technology at all. After the first few months of the pandemic, ↑[UNESCO \(2020b\)](#) reported that 500 million children and youth from marginalised groups did not have access to the internet at home during the pandemic. This lack of connectivity may exclude these children from public educational provision. For example, in Bangladesh and Malawi, those who may afford some sort of mobile EdTech may face the challenge of having no electricity (↑[Save the Children, 2020](#)). ↑[Save the Children's \(2020\)](#) survey of children from marginalised groups in Bangladesh showed that 90% of children were not able to receive any content from their schools while closed due to the Covid-19 pandemic.

Where digital infrastructure is not well developed, the loss of learning among school-going boys and girls during the pandemic has been even more alarming. In Malawi, young people and their communities are being encouraged to explore new and innovative ways of mitigating learning loss due to Covid-19 and a lack of digital infrastructure (↑[UNICEF, 2020a](#)). As part of the UNICEF Malawi Covid-19 Youth Challenge, an offline mobile learning application called 'Inspire' was developed to support distance learning in the country with poor Internet infrastructure. The application was developed "to reimagine education in Malawi and offer equal opportunities for continued learning to a boy or girl in a remote village and a privileged urban child with high-end devices" (↑[UNICEF, 2020a](#)). Inspire has been used to help many girls and boys in remote villages to continue learning even when face-to-face classroom activities are not possible due to lockdown. A key advantage of the application is that it can run on low-cost devices such as KaiOS (a mobile operating system for feature phones) and be coupled with radio communication.

Figure. 2. *Mercy Corps — an initiative ameliorating digital access.*

In recognition of gender disparities in digital access during Covid-19, Mercy Corps, through the 'Supporting the Education of Marginalized Girls in Kailali II (STEM II)' project in Nepal, conducted a set of assessments to learn more about how the move to remote learning was affecting girls and offer ways to ameliorate the learning loss (↑[Mercy Corps, 2017](#)). The findings from the assessments suggested that girls were concerned about exams as they reported having less access to EdTech at home than their male counterparts. To ameliorate this lack of

access and concern about exams, the Mercy Corps introduced a set of radio classes in June 2020 at the height of the pandemic. These classes covered the four core subjects — Maths, Science, English, and Nepali — with 15-hour long recordings for each subject designed as revision for exams. Local radio stations were used in Kanchanpur and Kailali, which reached 500,000 learners.

4. Digital freedom

Digital freedom encompasses digital rights, freedom of information, the right to internet access, freedom from internet censorship, and the right to treat all internet communications equally ([↑Time, 2014](#)). Having access to EdTech does not necessarily allow freedom of use. While males are often encouraged to use EdTech to enhance and extend learning, in some contexts females are highly discouraged from use. For example, in Bangladesh and India, a study reported that, in some contexts, girls seen using mobile phones are likely to receive harsh negative judgements based on social norms. As Rosni, a 16-year-old girl from Bangladesh notes: “People say that the girl who touches the phone is a bad girl” ([↑Vodafone Foundation, 2018](#)).

Another study illustrated that families living in rural areas in Afghanistan were reluctant to the idea of allowing girls to adapt to online learning during Covid-19 “due to norms and habits, and the fact that girls using the Internet and online platforms was seen as unacceptable.”

– [↑Khlaif, et al., 2020, p.9](#)

Research shows that girls are more likely to become victims of online sexual solicitation, coercive sexting, and cyber dating violence ([↑Stoilova, et al., 2021](#)). For example, a UNICEF study reported that 63% of girls in East Asia had an upsetting experience online within the first 12 months of Covid-19 ([↑UNICEF, 2020b](#)). With these concerns, community and family members have grown to have safeguarding concerns. This can lead families to restrict or deny access to try to protect girls from unwanted and dangerous attention and from reading or viewing sexual content. This restricted or denied access to the internet can also reduce or halt girls engaging in the affordances of these technologies for learning. In a recent study conducted in Palestine, as learners made the transition to remote learning during Covid-19 there was a notable dropout rate among girls and, the educational leaders interviewed believed that this was due to parental concerns about online safety ([↑Shraim & Crompton, 2020](#)). This led to parents closely supervising their daughters when accessing online education. Having an adult supervising can be very helpful in providing support and guidance; however, it can also limit girls’ freedom or lead to reduced time accessing EdTech, as they might have work responsibilities and other childcare commitments.

It is important to note that digital freedom can also be influenced by national policies and incidents, as it is often heightened further when network

providers block the use of selected apps, thus limiting the freedom and agency of individuals. For example, the online environment in Pakistan is tightly controlled by the government and authorities have blocked 900,000 websites with political, religious, and social content, and at times of unrest will shut off Internet connectivity ([↑Freedom House, 2020](#)). This has caused great disruption to learning during the pandemic.

Figure 3. *Digital Rights Foundation — an initiative ameliorating digital freedom.*

The Digital Rights Foundation was created to advocate for Digital freedom, underpinned by the goal of providing females a right to internet use. The foundation works by empowering women to discuss their rights and the technology security tools that exist to support and promote online safety. 'Hamara Internet' translated as 'Our Internet' is one such initiative based in Pakistan ([↑Internet Society, 2015](#)). Females were offered workshops which are attended by girls wanting more freedom to access the internet. Internet access is important in allowing children access to the learning tools available, such as connectivity to teachers, and access to information, learning games and activities.

5. Digital literacy

Digital literacy is the ability to use information and communication technologies to find, evaluate, create, and communicate information, requiring both cognitive and technical skills ([↑American Library Association, 2013](#)). A recent report from [↑GSMA \(2020\)](#) found that mobile users across multiple lower-income countries experience digital literacy as the greatest barrier to using technology, which would inhibit using technology for education. A lack of digital literacy can often be caused by not having access to or freedom to use technology. Learners without access to the internet at home will also be less likely to have skills in locating, using, and evaluating internet content. Lack of access to EdTech and connectivity in these cases will contribute to lower levels of digital literacy ([↑Pew, 2013](#)).

A lack of digital literacy skills is a barrier for girls and boys to benefit from EdTech. Studies show that digital literacy is tilted unfavourably towards girls as they usually exhibit lower levels of digital literacy than boys ([↑Amaro, et al., 2020](#); [↑Gebhardt, et al., 2019](#)). During Covid-19, UNICEF conducted multiple indicator cluster surveys to uncover the technological skills of people within eight countries in sub-Saharan Africa ([↑Amaro, et al., 2020](#)). The findings revealed a gender gap with girls having lower digital literacy skills in seven of the eight countries involved.

In Ghana, 16% of boys had digital literacy skills to 7% of girls. Zimbabwe had the highest figures of digital literacy with 20% boys to 14% girls, and Sierra Leone had the least with 2% of boys to 1% of girls digitally literate.

([↑Amaro, et al., 2020](#))

Where EdTech is available, girls will be less likely than boys to be able to learn using EdTech without skills or knowledge of how to locate, open and explore that learning content. Within schools, teachers and peers can ameliorate the lack of digital knowledge and skills with support as needed. Within remote learning, those supports are less accessible and often confounded further as support may be available through apps and email; however, digital literacy of these devices is needed to access that support in the first place.

Figure 4. *Tech4Girls — an initiative ameliorating digital literacy.*

To support the development of digital literacy skills for girls, Tech4Girls is a workshop series developed to increase the skills and confidence of girls in using EdTech and to even encourage them to seek future careers in EdTech (↑Beresford, 2021). The one- to five-day workshops took place in Kenya, Pakistan, Trinidad and Tobago, Jamaica, and the US, during which 442 young girls undertook training. Girls in the Tech4Girls programme are provided with hands-on sessions to introduce them to basic EdTech and even into mobile app development. Following the Tech4Girls project, participants can advance onto the EQUALS Badges programme to extend their digital literacy further and gain recognition for these accomplishments.

6. Digital pedagogies

Digital pedagogy is defined as the integration of EdTech into teaching and learning for effective curriculum delivery ([↑Sailin & Mahmor, 2018](#)). Digital pedagogy can use different synchronous and asynchronous EdTech tools to deliver educational content, to communicate and engage in learning among learners, parents, and teachers. There is a need for teachers to be equipped with the know-how related to digital pedagogy to take advantage of the benefits of EdTech, as replicating traditional pedagogies in EdTech needs to be questioned ([↑Crompton et al., 2021](#)). Digital pedagogy requires teachers to have knowledge of how to integrate technology, the subject matter (e.g., numeracy or literacy) and pedagogy, to achieve learning outcomes effectively.

Digital pedagogies also encompass tackling issues related to discrimination in teaching approaches. In a study on gender bias in online education, findings show that teachers were 94% more likely to respond to discussion forum posts by white male learners than by other learners within an online platform ([↑Baker et al., 2018](#)). Teaching practices also encompass tackling issues related to gender discrimination or misrepresentation in the educational material that is created or shared with learners. For example, when selecting online videos as part of a curriculum, considerations of how females are portrayed and represented should be part of digital pedagogy practices. As argued by ([↑Reilly, 2020](#)), “The curriculum, for example, can portray a narrow view of what a girl can achieve. Representations of women in domestic or caregiving roles and men as engineers, doctors or labourers can reinforce negative stereotypes.”

Applying a gender lens to digital pedagogies also raises questions related to curriculum delivery.

A study conducted by the Malala Fund in Pakistan presented findings on gender disparities in the time available for studying using EdTech, with girls having to dedicate regular chunks of time to chores and care work.

([↑Denham et al., 2021](#))

Considering gender disparities in terms of the time available for studying and level of flexibility in accessing EdTech at a given time could enable teachers to make inclusive decisions on curriculum delivery. For example, the provision of pre-recorded sessions — which can be watched at any time — may be more equitable than online live education.

Gender Responsive Pedagogy (GRP) is often introduced as an approach to implement equitable teaching practices in classrooms ([↑UNESCO, 2019](#)). This pedagogy is often practically implemented by facilitating teachers' professional development opportunities targeted at tackling gender learning gaps and / or discriminatory teaching practices. However, how to effectively and practically support teachers to apply GRP to digital education is still to be defined.

This is part of a bigger picture that often illustrates a general lack of access to professional development opportunities that teachers often face, especially in low- and middle-income countries (LMICs). Due to the lack of digital pedagogical knowledge among teachers, developing strategies to apply effective teaching with and through EdTech was often not possible during Covid-19, even where radio, TV, and affordable social media platforms were available. For example, in Zimbabwe, a study reported that the majority of teachers were not well enough equipped to apply digital pedagogies to teach online ([↑Chigona & Chigona, 2019](#)). They reported needing to be trained on how to integrate EdTech into their teaching and adapt their pedagogies to teach remotely. In recognition of this problem, the Ministry of Education in Zimbabwe worked with UNESCO to develop a teacher professional development programme to equip and support teachers to learn about digital pedagogy ([↑UNESCO, 2021](#)). This is resulting in more teachers being trained on EdTech integration into pedagogy and, in turn, improving learning outcomes.

Figure 5. *Forum for African Women Educationalists — an initiative ameliorating pedagogies.*

The Forum for African Women Educationalists developed a toolkit to help teachers implement Gender Responsive Pedagogy (GRP) in classrooms ([↑FAWE, 2018](#)). This toolkit presents classroom activities to practically implement GRP, it also introduces reflections and best practices gathered from GRP initiatives in different African countries. As previously mentioned, how to apply GRP to EdTech is still to be explored.

7. Digital design

Digital design for education is the conceptualisation and planning of EdTech for universal usability ([↑]Newell & Gregor, 2000). Designing an EdTech tool or intervention should be carefully conducted to ensure that it does not trigger negative or unintended outcomes. Disparities in outcomes for different groups of learners can be formed during a design process, for example by prioritising one group over others, or not considering all possible groups of users. Digital design is very closely interconnected with digital access and literacy, as to implement an EdTech intervention, structural inequalities and the context of the intervention need to be considered during its design process. For example, if an intervention is designed to have children learning while using the internet and only 50% of the learners in the programme have access to the internet, the conceptualisation of this intervention would not be equitable nor subject to creating fair educational outcomes.

Digital design without actively considering structural factors and norms can often lead to gender inequalities and affect girls disproportionately. There is a large body of research providing evidence that gender bias towards girls can be found in the design of software and the advertisement of these tools ([↑]Stumpf, et al., 2020). A lack of inclusiveness in EdTech design can create disparities in learning outcomes and also reinforce the idea that technology is a topic for boys, which may also lead to fewer girls seeking technology-related future careers.

Research has revealed that promoting inclusiveness and equity in designing EdTech improves participation and motivation and enhances positive attitudes toward learning and technology, in addition to also improving learning outcomes for girls and boys.

(Heemskerk, et al., 2009)

In recent years, the uptake of artificial intelligence (AI) has highlighted further gender bias. This concern stems from AI programmes drawing from large data sets that reflect negative social biases towards girls. AI requires data to perform tasks and developers often use large datasets generated by humans from past data. Therefore, the AI systems, if left unchecked, can be drawing responses from data containing many of the gender biases that have emerged from structural and historical gender inequalities and this data then amplifies these inequalities. For example, as children look at occupations through some of the Google AI systems, bias can be found with doctors and

soldiers, shown as only males and nurses as females. It is critical that EdTech is designed and run by data that does not carry these gender biases.

During Covid-19, as learners turn to EdTech to continue learning, gender inequalities stemming from digital design are negatively impacting girls. For designers to positively address gender inequalities, it could be relevant to explore gathering data from girls to better understand how they can be supported. This could be explored by implementing participatory approaches to Edtech design (e.g., co-design) or democratising processes of EdTech design. For example, an initiative based on co-creating digital solutions with adolescent girls in Mongolia and Indonesia was conducted by UNICEF. Co-designing approaches were used to ensure that girls' needs, ideas, and experiences were considered in designing this EdTech intervention and reflected in the proposed tool ([UNICEF, 2021](#)).

Figure 6. *Hear Her Voice — an initiative ameliorating digital design.*

To gather data on girls using EdTech during Covid-19, Hear Her Voice gathered information from girls in Bangladesh, India, Malawi, Nigeria, and the US ([Hear Her Voice, 2020](#)). Girls worked as Technology Enabled Girl Ambassadors — TEGA — and used a Girl Effect's Digital Research Tool to collect real-time insights into their peers ([Girl Effect, 2016](#)). This girl-led research approach can feed into more gender-responsive EdTech designs in the development of EdTech tools and systems.

8. Conclusion

This paper has illustrated how, and why, girls tend not to be presented with the same EdTech opportunities as their male counterparts. We have discussed this by presenting and discussing technological constraints that have emerged from social inequalities and norms. These technological constraints need to be considered throughout EdTech interventions to enable girls and boys to access equitable learning outcomes, especially during the Covid-19 pandemic as millions of children are currently accessing education through digital tools. The EdTech implications presented below could be used to improve children's learning outcomes as part of Covid-19 responses and recovery, and beyond.

8.1. Digital access

Digital access should be considered by exploring the extent to which learners have access to given hardware and the reported quality of such hardware to effectively deliver digital education. Gender disparities were found in the number of girls who have access to certain hardware and in their contingency to equally access EdTech at home — and these potential disparities need to be considered when EdTech interventions are designed, implemented and evaluated. When digital access is at a critically low level, it can be useful to explore the potential of low-cost, offline mobile learning applications, as they have been shown to be viable for improving learning outcomes in such circumstances.

8.2. Digital freedom

Social norms and inequalities often drive the extent to which girls are given the freedom to use and benefit from EdTech. In addition, girls are often more likely than boys to become victims of online sexual solicitation, coercive sexting, and cyber dating violence. Approaches to enable all to pursue autonomy and agency in the use of technology and EdTech are needed. These could include shaping policies and initiatives to directly tackle online gender violence, allocating designated chaperones to support EdTech use and raising awareness of the importance of equitable and safe use of EdTech.

8.3. Digital literacy

Ongoing programmes designed to improve digital literacy skills are important to meet the needs of all learners. Lack of digital literacy can be a major barrier to using and benefiting from EdTech. To enable girls to equitably use and benefit from EdTech, potential gender disparities in digital literacy have to be

acknowledged and explored. This could involve implementing or prioritising digital literacy training for girls or including activities targeted at improving digital literacy for girls as part of EdTech interventions.

8.4. Digital pedagogies

Issues related to promoting gender bias, discrimination and misrepresentation were found in certain digital pedagogic practices. In addition, gender disparities in terms of the available time for studying, and level of flexibility in accessing EdTech at a given time have been found, illustrating that such disparities need to be considered when shaping and delivering online curriculums. Approaches to align digital pedagogies with equitable teaching practices could involve including activities related to discussing gender discrimination as part of teachers' professional development initiatives.

8.5. Digital design

Those responsible for designing and advertising EdTech interventions should be invited to recognise that disparities in outcomes could emerge for different groups. Promoting inclusiveness and equity when designing EdTech interventions shows great potential to increase participation and motivation, and enhance positive attitudes toward learning and technology, and improve learning outcomes for girls and boys. To endorse inclusiveness and equity in EdTech design, participatory approaches and processes to democratise EdTech design are potential ways to include girls' perspectives into EdTech interventions, which could, in turn, increase their engagement and use of an EdTech tool.

9. Bibliography

- Amaro, D., Pandolfelli, L., Sanchez-Tapia, I., & Brossard, M. (2020). *COVID-19 and education: The digital gender divide among adolescents in sub-Saharan Africa*. UNICEF.
<https://blogs.unicef.org/evidence-for-action/covid-19-and-education-the-digital-gender-divide-among-adolescents-in-sub-saharan-africa/>
- American Library Association. (2013). *Digital literacy, libraries, and public policy: Report of the Office for Information Technology Policy's Digital Literacy Task Force*. American Library Association (ALA).
http://www.districtdispatch.org/wp-content/uploads/2013/01/2012_OITP_digitalreport_1_22_13.pdf
- Baker, R., Dee, T., Evans, B., & John, J. (2018). *Bias in Online Classes: Evidence from a Field Experiment* (CEPA Working Paper No.18–03). Stanford Center for Education Policy Analysis.
<https://cepa.stanford.edu/content/bias-online-classes-evidence-field-experiment>
- Beresford, L. (2021). *Calling the tech industry: Hear from your next generation of female digital talent*. GSMA.
<https://www.gsma.com/tech4girls/news/2020-workshop-series/>
- Chigona, A., & Chigona, W. (2019). Teacher education for realities of 21st-century learners in rural South Africa. In *Human learning in the digital era* (pp. 21–26). UNESCO.
<https://marcelo.pimenta.com.br/wp-content/uploads/2019/11/Human-Learning-in-the-Digital-Era.pdf>
- Crompton, H., Burke, D., Jordan, K., & Wilson, S. (2021). Support provided for K-12 teachers teaching remotely with technology during emergencies: A systematic review. *Journal of Research on Technology in Education*.
<https://doi.org/10.1080/15391523.2021.1899877>
- Denham, L., Fry, L. & de Souza, S. (2021). *Girls' education and COVID-19 in Pakistan* | Malala Fund Newsroom.
<https://malala.org/newsroom/archive/girls-education-and-covid-19-in-pakistan>
- Dreesen, T., Akseer, S., Brossard, M., Dewan, P., Giraldo, J.-P., Kamei, A., Mizunoya, S., & Ortiz, J. S. (2020). *Promising practices for equitable remote learning: Emerging lessons from COVID-19 education responses in 127 countries* (Innocenti Research Brief). UNICEF.
<https://www.unicef-irc.org/publications/1090-promising-practices-for-equitable-remote-learning-emerging-lessons-from-covid.html>

- Education Trust. (2020). *COVID-19 education equity guide: Digital access*. <https://edtrust.org/resource/covid-19-education-equity-guide-digital-access/>
- FAWE. (2018). *Gender responsive pedagogy: A toolkit for teachers and schools*. 2nd ed. Forum for African Women Educationalists (FAWE). <https://www.unicef.org/esa/media/6726/file/GRP-A-Toolkit-for-Teachers-and-Schools-2020.pdf>
- Freedom House. (2020). *Freedom on the net, 2020: Pakistan*. <https://freedomhouse.org/country/pakistan/freedom-net/2020>
- Gebhardt, E., Thomson, S., Ainley, J., & Hillman, K. (2019). *Gender differences in computer and information literacy: An in-depth analysis of data from ICILS*. Springer Nature. <https://library.oapen.org/handle/20.500.12657/22956>
- Girl Effect. (2016). *TEGA*. <https://global.girleffect.org/what-we-do/mobile-platforms/tega/>
- GSMA. (2020). *Connected women: The mobile gender gap report 2020*. GSMA. <https://www.gsma.com/mobilefordevelopment/wp-content/uploads/2020/05/GSMA-The-Mobile-Gender-Gap-Report-2020.pdf>
- Hallgarten, J. (2020). *Evidence on efforts to mitigate the negative educational impact of past disease outbreaks*. K4D Helpdesk Report.
- Hear Her Voice. (2020). *Hear her voice: COVID-19 stories: Girls' lives under lockdown*. <https://voices.girleffect.org/>
- Heemskerk et al. (2009) *Gender Inclusiveness in Educational Technology and.pdf*. (n.d.). Retrieved April 29, 2021, from <https://files.eric.ed.gov/fulltext/EJ835240.pdf>
- Heemskerk, I., ten Dam, G., Volman, M., & Admiraal, W. (2009). Gender inclusiveness in educational technology and learning experiences of girls and boys. *Journal of Research on Technology in Education*, 41(3), 253–276. <https://doi.org/10.1080/15391523.2009.10782531>
- Hennessy, S., Jordan, K., Wagner, D., & The ETH Team. (2021). *Problem analysis and focus of EdTech Hub's work: Technology in education in low- and middle-income countries*. EdTech Hub. <http://doi.org/10.5281/zenodo.4332693>
- Internet Society. (2015). *Hamara Internet*. Internet Society. <https://www.internetsociety.org/beyond-the-net/grants/2015/hamara-internet/>
- Jordan, K. (2020). Covid-19 school closures in low- and middle-income countries: Emergent perspectives on the role of educational technology. *Journal of Learning for Development*, 7(3), 399–415.

- Khlaif, Z. N., Salha, S., Affouneh, S., Rashed, H., & ElKimishy, L. A. (2020). The Covid-19 epidemic: Teachers' responses to school closure in developing countries. *Technology, Pedagogy and Education*, 0(0), 1–15. <https://doi.org/10.1080/1475939X.2020.1851752>
- Lindsey, D. (2020). *Why COVID-19 has increased the urgency to reach women with mobile technology*. GSMA. <https://www.gsma.com/mobilefordevelopment/blog/why-covid-19-has-increased-the-urgency-to-reach-women-with-mobile-technology/>
- Malala Fund. (2020a). *Girls education and Covid-19 in Nigeria*. Malala Fund. https://assets.ctfassets.net/0oan5gk9rgbh/4SoYwXYgLMilWPqvdikb0W/4d2ebc3b8289b2beaae33867d79af698/Nigeria_Report_22.pdf
- Malala Fund. (2020c). *Girls education and Covid-19 in Pakistan*. Malala Fund. https://assets.ctfassets.net/0oan5gk9rgbh/5NYWB1DMSyo5a8VaQfOg7t/0386baa8673eecf0c4589be9f5c1be73/Pakistan_Report_16_MF.pdf
- Malala Fund. (2020b). *Girls' education and Covid-19: What past shocks can teach us about mitigating the impact of pandemics*. Malala Fund. https://downloads.ctfassets.net/0oan5gk9rgbh/6TMYLYAcUpjhQpXLDgmdla/3e1c12d8d827985ef2b4e815a3a6da1f/COVID19_GirlsEducation_corrected_071420.pdf
- Mendez Acosta, A., & Evans, D. (2020). COVID-19 and girls' education: What we know so far and what we expect. *Center For Global Development*. <https://www.cgdev.org/blog/covid-19-and-girls-education-what-we-know-so-far-and-what-we-expect-happen>
- Mercy Corps. (2017). *Supporting the education of marginalized girls in Kailali (STEM II)*. <https://nepal.mercycorps.org/project/supporting-the-education-of-marginalised-girls-in-kailali-ii-stem-ii/>
- Newell, A. F., & Gregor, P. (2000). "User sensitive inclusive design"— In search of a new paradigm. *Proceedings on the 2000 Conference on Universal Usability*, 39–44. <https://doi.org/10.1145/355460.355470>
- Pew. (2013). *How teachers are using technology at home and in their classrooms*. Pew Research. <https://www.pewresearch.org/internet/2013/02/28/how-teachers-are-using-technology-at-home-and-in-their-classrooms/>
- Reilly, A. (2020). Good teaching is inclusive for all, so why focus on marginalised adolescent girls? *The Education and Development Forum (UKFIET)*. <https://www.ukfiет.org/2020/good-teaching-is-inclusive-for-all-so-why-focus-on-marginalised-adolescent-girls/>

- Sailin, S. N., & Mahmor, N. A. (2018). Improving Student Teachers' Digital Pedagogy through Meaningful Learning Activities. *Malaysian Journal of Learning and Instruction*, 15(2), 143–173.
<https://doi.org/10.32890/mjli2018.15.2.6>
- Save the Children. (2020). *Protect a generation: The impact of Covid19 on children's lives*. Save the Children.
https://resourcecentre.savethechildren.net/node/18218/pdf/vr59-01_protect_a_generation_report_en_0.pdf
- Shraim, K., & Crompton, H. (2020). The use of technology to continue learning in Palestine disrupted with COVID-19. *Asian Journal of Distance Education*, 15(2), 1–20. <https://doi.org/10.5281/zenodo.4292589>
- Stoilova, M., Livingstone, S., & Khazbak, R. (2021). *Investigating risks and opportunities for children in a digital world: A rapid review of the evidence on children's internet use and outcomes*. UNICEF.
<https://www.unicef-irc.org/publications/pdf/Investigating-Risks-and-Opportunities-for-Children-in-a-Digital-World.pdf>
- Stumpf, S., Peters, A., Bardzell, S., Burnett, M., Busse, D., Cauchard, J., & Churchill, E. (2020). Gender-inclusive HCI research and design: A conceptual review. *Foundations and Trends® in Human-Computer Interaction*, 13(1), 1–69. <https://doi.org/10.1561/11000000056>
- The World Bank. (2021). *Girls education*.
<https://www.worldbank.org/en/topic/girlseducation>
- Time. (2014). *Is it possible to wire the world? Meet the guy who has a plan to make it happen*. Time.
<https://time.com/130477/internet-human-right/>
- UNESCO. (2020a). *COVID-19 impact on education*.
<https://en.unesco.org/covid19/educationresponse>
- UNESCO. (2020b). *Global Education Coalition facilitates free internet access for distance education in several countries*. UNESCO.
<https://en.unesco.org/news/global-education-coalition-facilitates-free-internet-access-distance-education-several>
- UNESCO. (2019). *Training trainers on gender responsive pedagogy*.
<http://www.iicba.unesco.org/?q=node/337>
- UNESCO. (2021). *UNESCO targets teachers to improve distance and online learning in Zimbabwe*. UNESCO.
<https://en.unesco.org/news/unesco-targets-teachers-improve-distance-and-online-learning-zimbabwe>
- UNICEF. (2021). *Accelerating results for children with technology and digital innovation*. UNICEF.

<https://www.unicef.org/media/83011/file/Accelerating-results-for-children-with-technology-and-digital-innovation-2020.pdf>

UNICEF. (2020a). *Malawian youths offer solutions to COVID-19 challenges in their communities*. UNICEF.

<https://www.unicef.org/malawi/press-releases/malawian-youths-offer-solutions-covid-19-challenges-their-communities>

UNICEF. (2020b). *Our lives online: Use of social media by children and adolescents in East Asia—Opportunities, risks and harms*. UNICEF.

<https://www.unicef.org/eap/media/4691/file/Our%20lives%20online.pdf>

USAID. (2020). *USAID digital strategy*. USAID.

https://www.usaid.gov/sites/default/files/documents/15396/COVID-19_and_Gender_Digital_Divide.pdf

Vodafone Foundation. (2018). *Real girls, real lives, connected: A global study of girls' access and usage of mobile, told through 3000 voices*. Vodafone Foundation.

https://static1.squarespace.com/static/5b8d51837c9327d89d936a30/t/5bbe7bd6085229cf6860f582/1539210418583/GE_VO_Full_Report.pdf

Young Lives. (2021). *COVID-19 could reverse two decades of progress: Emerging policy recommendations to support young people in developing countries*. Young Lives.

<https://www.younglives.org.uk/sites/www.younglives.org.uk/files/YL-Snapshot-Covid-19-Dec20.pdf>