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EDUCATION AND DIGITAL TECHNOLOGIES:

Challenges and strategies for the continuity of learning in times of COVID-19

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PRESENTATION

With the evolution of COVID-19 and the need for social distancing measures, the Internet took on a critical role in enabling at least part of our routine activities to be carried out remotely during this period. The situation was not different with education. More than a year after the onset of the health crisis, approximately half of the students are still facing the consequences of a partial or full closure of schools.[1] Given this reality, governments and school communities have adopted alternatives for the continuity of education during the context of the pandemic, as millions of people have come to depend, more than ever, on the Internet and digital technologies.

In a way, the use of technology has been an important alternative to allow the continuity of school activities, enable communication between schools, families, and students, provide access to pedagogical content, and conduct classes remotely. However, at the same time, the new technologies that were adopted in the daily lives of people and institutions presented many challenges for education and demanded a reassessment of curricula and teaching methodologies in educational spaces.

Although technology enables new and good solutions, it can also highlight existing socioeconomic discrepancies, which were further evidenced by the pandemic. In Brazil, 4.8 million children live in households with no Internet access.[2] In a context of school closure, it is important to assess how this population can have an equitable and quality education without access to digital technologies.

Even among the population with Internet access, a significant portion may not have the knowledge or skills needed to use the tools efficiently. In fact, a considerable part of the population has been using these new tools for the first time. In this sense, the advance in the digital literacy of the population is of fundamental importance to obtain results in this scenario.

Inequality can also be evident in the case of the populations that only have a mobile phone as a means of accessing the

1 More information available at: https://en.unesco.org/covid19/educationresponse
2 More information available at: https://cetic.br/en/pesquisa/kids-online/indicadores/

Internet. The lack of devices that are adequate for each application is a critical challenge for the effectiveness of public policies for digital inclusion. On the other hand, people who were already accustomed to using technology for remote activities started to do so with greater frequency and intensity, thus generating a greater demand for good connection and adequate tools, which, in turn, have also been improved based on their increased use by the public.

During social isolation, a period in which many people's routines migrated to the online world, it is essential that the network infrastructure has the capacity and resilience to support the high demand for services via the Internet. In this regard, the Brazilian infrastructure demonstrated its robustness in the face of very high traffic during the pandemic. The Internet Exchange Points of IX.br|NIC.br played a key role in this context, as they were able to adequately meet a double demand in relation to the average and had a satisfactory behavior even during peak times.

There are several factors that can influence the experience of Internet usage, and overcoming digital inequalities in Brazil should always be endeavored. It should be noted, however, that the Internet was built so that all people would be able to access everything that it offers, according to the Internet universality principle. The Internet became an important means for social and human development, capable of contributing to the construction of an inclusive and non-discriminatory society. In this sense, the Internet principles,[3] elaborated by the Brazilian Internet Steering Committee (CGI.br), are an important reference in the field of Internet governance in Brazil and worldwide. They also serve as a constant guide for the activities carried out by such committee.

This publication, developed by the Regional Center for Studies on the Development of the Information Society (Cetic.br|NIC.br), comprises five chapters that address different perspectives and experiences on the use of technologies for the continuity of education during the pandemic. By presenting measurements, studies, debates, and data in this book, we hope to con-

3 More information available at: https://principios.cgi.br/

tribute to reflections on the role of technologies in education and provide inputs that can significantly help formulate public policies in this area.

The publication of this Sectoral Study is in line with the initiatives carried out by the Brazilian Network Information Center (NIC.br), which favor the development of the Internet in Brazil. The production and dissemination of knowledge and data on the access to and use of ICT foster the expansion of the debate on the role of the Internet in Brazilian society.

Enjoy your reading!

Demi Getschko
Brazilian Network Information Center – NIC.br

PROLOGUE

Educational platforms and surveillance capitalism in the Global South

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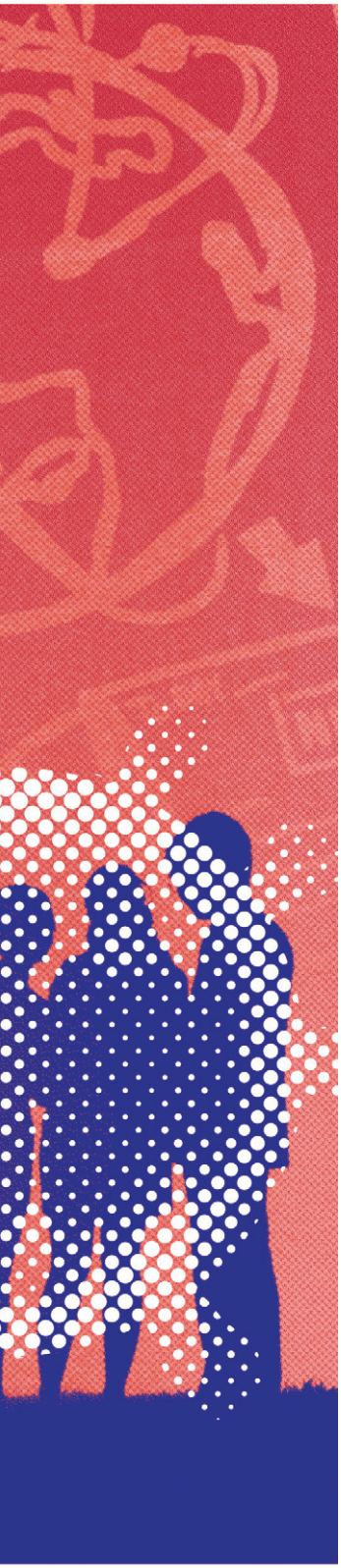

The Internet, in addition to the digital platforms that operate on it, was a great lifeline for countless activities in the prolonged scenario of the COVID-19 pandemic. For people in different office roles, working from home has become the norm. Eating has lost its social aspect and has become something we do to survive, although the pleasure of cooking and eating good food has been rediscovered by some. People who do not do well with ovens and pans, however, have become highly dependent on delivery people, who risk their lives on a daily basis – whether in traffic or facing a virus that is still around – so that we can protect ourselves at home. Even leisure has become "remote," with virtual concerts, movies on demand, messaging services, and even digital parties through video calls. Life was deported to the platforms.

It was no different for education. After a brief interruption that lasted a few months – when we as a society were still tricking ourselves into believing in the virus' transient nature –, school activities were shifted to the platforms. In general, there was almost no adaptation; each institution addressed the situation clumsily in their own way, without much discussion or coordination, almost always choosing the "easy" solution, most at hand, ignoring local, social, and class realities, until this process became frustrating and had to be reformulated due to its clear ineffectiveness. If there was little coordination to deal with a deadly virus, let alone to maintain some level of quality in a sector that is never seen as an actual priority, although it is part of everyone's discourse. Just as in healthcare, if anything has worked in education it is thanks to the selflessness of the professionals who deliver this service, who sacrifice themselves beyond their means.

However, the solutions adopted in emergency situations – especially for unforeseen events that arise without an established protocol – are not always the best. The intentions may be noble, but just like a broken bone that has been poorly immobilized, they run the risk of being calcified and becoming permanent imperfections; in this case, leading to injustices, inequalities, political asymmetries, precariousness, and dependencies.

When the pandemic broke out, I had the opportunity to write some essays (Evangelista, 2020; Evangelista & Firmino, 2020) in which I argued that the way those events were interpreted revealed the development projects and political ambitions of different social groups. The sectors that saw the pandemic as a brief state of *exception* sought, in fact, to maintain an already established social scenario or to minimize current trends. On the other hand, those who understood the emergence of widespread practices as preventive measures against COVID-19 – remote work and learning –, in addition to social interactions via platforms – as approaches that should be permanent –, made up the *acceleration* group, keeping an eye on the increase in social and technological development trends that were previously given. Those who considered the tragic conditions brought about by the pandemic – such as the deaths that victimize black and poor populations disproportionately (Gragnani, 2020) and the inability of states to support their populations – because of historical inequalities, tended to see the moment as an opportunity for a breakthrough. To overcome the difficulties of the moment, and mainly to be better prepared as a society to face times like these, it would be necessary to leave orthodox solutions behind and be critical of traditional structures, with a plan to tackle historical inequalities.

This interpretive framework with these three perspectives helps us to understand different stances on concrete issues, such as the use of information technologies in schools and in teaching and learning practices. None of these three stances exist in total isolation at all. They mix and match on a daily basis, which results in policies and stances for real problems.

The inequalities, lack of funding, and challenges in basic and higher education obviously date back to before the pandemic. Platforms and informational technologies were already being studied, discussed, and implemented. They were presented as inexorable realities in face of the various digitalization processes underway in society, or even as solutions for improvements in the processes of resource management and school communication, as well as in teaching and learning.

However, critical sectors tried to discuss and, to some extent, slow down this process in education. They pointed out how these initiatives are often tainted with what political scien-

tist Evgeny Morozov (2013) calls "technological solutionism": the tendency to treat complex social processes, with multiple determinations, as if they were a one-dimensional problem of information asymmetry, which can be solved by the most advanced digital technology. In the support of such initiatives lies a well-intentioned, unreflective optimism about new technologies – which is typical of our time, when we are bombarded with the wonders of gadgets engineered in the Silicon Valley while we are discouraged by traditional institutions. In addition, solution providers are interested in deploying technologies in the best way possible to support their business models, which are often based on the use of personal data.

The pandemic is hence seen as an opportunity to accelerate technological solutionism in education. This makes it much more difficult for those who tried to take a critical stance – which should not be confused with a conservative stance or one that denies the problems in the sector –, who are concerned with what a messy and unreflective adoption might represent. Given the specific, prior, and independent conditions of any technological affordance, technologies can often pose new barriers, obstacles, or distortions instead of improving teaching and learning processes. That is, depending on the solutions chosen, there may be impacts both in terms of loss of ownership and technological autonomy by institutions, and in the sense of diminishing the capacity for participation, discussion, and invention by teachers, who are ultimately responsible for the educational processes.

THE JUMBLE OF EDUCATIONAL AND NON-EDUCATIONAL APPS

The process of introducing and researching information technologies in schools has been taking place for decades. Brazilian universities, albeit with limited resources, have been working for years with educational philosophies and methodologies adapted to the country's socioeconomic and cultural realities. Research has shown (De Conti, 2017) how teachers and students often use technologies in a way that diverges from institutional guidelines and differs from expectations, sometimes resisting to them, sometimes making improvements and adaptations.

However, in the last decade, with the rise of the so-called Big Techs, the strengthening and dominance of major platforms that operate on the Internet, in addition to the emergence of an ecosystem of satellite startups, there was a gradual disinvestment in the technological infrastructure of universities and education departments (Cruz, Saraiva, & Amiel, 2019). This disinvestment contemplates the research landscape since at least 2016. The University of São Paulo (USP), for example, announced in 2012 the hiring of an outsourced company to provide e-mail services to employees and students for almost BRL 4 million per year. Nonetheless, in 2017 it entered into a "free partnership" with Google, with which it would save approximately BRL 6 million per year (Parra, Cruz, Amiel, & Machado, 2018).

The process of demobilizing public informational resources in favor of private infrastructures, however, is not exclusive to the Brazilian context or even to the peripheral economies of the Global South. When studying the implementation of the tools of what was then called Google Apps for Education in Swedish public schools,[2] Maria Lindh and Jan Nolin (2016) pointed out that the process relates to pressure, which has been exerted since the 1990s, for public resources to be turned into private resources, in addition to cuts in funding. Through the analysis of that country, they also suggest that, while the platform's advantages are clear to students, Google's business model, which is based on data collection for online marketing, is concealed and not often discussed.

In Brazil, the group of activists and researchers Surveilled Education (Educação Vigiada)[3] has been following the adoption of large international technology companies' educational platforms since before the pandemic. As this information is not recorded in any government database that publicizes these agreements with the companies, legally understood as donations, the group uses a strategy that consists of mapping in which servers the e-mail services of institutions are located. Although these addresses keep

2 Today the company names the program Google Workspace for Education, giving a more integrated character to a package that brings together collaborative tools for text editing, environments for conversations and video lessons, a space for storing files and e-mails, besides specific educational software.
3 More information available at: https://educacaovigiada.org.br/en/about.html

their original domains (e.g.: unicamp.br), they redirect data located on the servers of these companies abroad, generally in the United States (Cruz et al., 2019).

Educação Vigiada recorded, only among Brazilian federal universities and their respective platforms, an increase of up to 150% in the number of agreements.[4] The pandemic was certainly a decisive factor for this increase, as the demand for remote learning systems grew considerably during this period. If before e-mail services were at the forefront of cost-cutting concerns on behalf of managers, with the stay-at-home orders the demand soared for other applications.

WORKING GROUP ON EDUCATIONAL PLATFORMS

The overall scenario of the rapid adoption of informational platforms in education was brought to the plenary of the Brazilian Internet Steering Committee (CGI.br) in its first remote meetings, soon after the outbreak of the pandemic. It was identified that the new scenario demanded follow-up activities, studies, and recommendations, which are part of the committee's mission. Not only do questions arise regarding the handling of personal data of vulnerable populations – e.g.: children and adolescents –, but strategic actions could also be required to improve the use of the Internet in Brazil and to encourage national technological development.

Therefore, CGI.br established the Working Group (WG) on Educational Platforms, whose general objectives are

> to present an overview, through comprehensive information gathering, on the use of educational platforms by Primary, Secondary and Higher Education schools, indicating which platforms are used and the companies that control them; to promote studies on the model, use, and adoption of these platforms in light of the Principles for the Governance and Use of the Internet in Brazil[5] (Resolution CGI.br/RES/2009/03/P), especially with regard to the principles of privacy, freedom of expression, and diversity; to gather local practices and developments, national enterprises, and academic research that meet the requirements of the Brazilian educatio-

4 Unpublished data obtained directly by the author from researchers.

5 The Principles for the Governance and Use of the Internet in Brazil are available at: https://principios.cgi.br/

> nal standards and that can provide infrastructure and services that combine national scientific-technological innovation with multi-sector participation in development; and to prepare a publication proposal compiling studies and any recommendations to be approved by the CGI.br plenary.[6] (CGI.br, 2020)

One of the first activities of the WG was to bring together representatives from the corporate sector, government, from the scientific and technological community, and the third sector to discuss the topic at the Seminar Challenges in Using Digital Platforms for Education in Brazil (Os Desafios do Uso de Plataformas Digitais na Educação no Brasil).[7] The Seminar held three days of debates open to the public and divided into subject matters. The first day brought up the issue of access in a large, unequal country like Brazil. In the second day, data collection and business models of the Big Techs that offer educational platforms were analyzed. The third day presented some national alternatives and collaborative projects that use free software.

Certain points discussed in this debate are noteworthy. Although access to broadband Internet in Brazil is quite widespread, with mobile phone devices in the hands of almost the entire population (89%), approximately 30% of households do not have fixed broadband. These numbers increase depending on the social class and regions of the country, with the southernmost areas and the richest classes obtaining the highest rates (NIC.br, 2021). According to the experts heard, Internet access via mobile phone is not recommended for learning activities, given its limitations for interaction. The need to adopt hybrid methods for

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6 "apresentar um panorama, através de levantamento de informações abrangente, sobre o uso de plataformas educacionais por escolas do Ensino Fundamental, Médio e Superior, indicando quais as plataformas utilizadas e as respectivas empresas que a controlam; promover estudos sobre o modelo, uso e adoção dessas plataformas à luz dos Princípios para a Governança e Uso da Internet no Brasil (Resolução CGI.br/RES/2009/03/P), em especial no tocante aos princípios da privacidade, da liberdade de expressão e da diversidade; levantar práticas e desenvolvimentos locais, empresas nacionais e pesquisas acadêmicas que atendam às exigências das normas educacionais brasileiras e que possam prover infraestrutura e serviços que aliem inovação científico-tecnológica nacional à participação multissetorial no desenvolvimento; e elaborar proposta de publicação reunindo estudos e eventuais recomendações a serem aprovadas pelo pleno do CGI.br."

7 More information available at: https://www.youtube.com/playlist?list=PLQq8-9yVHyOawOJl9qSZ86Sdg9gITzVXV

education – distribution and collection of paper-based materials, use of TVs and radios, etc. – in emergency situations such as pandemics was a consensus. At the same time, public authorities are in charge of improving the conditions of Internet access and of distributing devices to those in need.

The unclear business model of the platforms that provide services to institutions for free was also at the center of the debate. Experts pointed out that, although companies do not monitor or profit from the data transferred in eminently educational services, they do so in aggregated applications, used by students, because those are integrated in the same platform. The same username that is utilized in an environment for watching a remote class, for example, is the identifier of the user profile on the video platform, where data is collected and advertising is shown.

In this scenario, some existing projects were remembered, which are carried out by Brazilian universities and small and medium enterprises using free software and the capacities of technicians and developers working in national institutions. Among these projects, we highlight those carried out by the National Research Network (Rede Nacional de Pesquisa – RNP),[8] a social organization that has offered, among other applications, the Conferência Web RNP software,[9] which makes joint video calls and is frequently used by Brazilian public universities in lectures and thesis defenses. Potential policies for the cooperative integration of servers and applications have been discussed, in order to gather resources to serve the Brazilian educational community.

SURVEILLANCE CAPITALISM IN THE GLOBAL SOUTH

A key concept for understanding the challenges and perspectives regarding educational platforms is surveillance capitalism, although it does not refer to these platforms in particular. The concept has been developed mainly by the philosopher and retired professor of management from Harvard (United States) Shoshana Zuboff. Surveillance capitalism would be typical of the current phase of informational capitalism; in this context, information companies gain leadership in the global exchange system. However, in

8 More information available at: https://www.rnp.br/
9 More information available at: https://conferenciaweb.rnp.br/

surveillance capitalism, the platforms that gain prominence are those that use Big Data technologies to insidiously collect user data not only for the purpose of improving the services provided, but also to produce knowledge about these individuals. This intelligence is then used by the company itself or by other business partners to produce predictions about individuals and create actions to seek changes in their behavior aimed at achieving business and marketing objectives.

Other authors have used similar concepts, but with different emphasis. Nick Couldry and Ulisses Mejias (2019), for example, analyze data colonialism. They investigate the historical process of colonization, which sought to extract natural and human resources from colonies, to observe the creation of social arrangements and data relations in which they are combined and the value that is then extracted. If historical colonialism meant the appropriation of lands, resources, and bodies, data colonialism would consist of the "appropriation of human life through the extraction of value from data" (p. 188). Michael Kwet (2019) uses a similar term – digital colonialism – but with a different focus, which is more infrastructural, and insists that political dominations and controls are at stake between regions and groups of countries, maintaining the colonial system. From Kwet's (2019) perspective, surveillance capitalism is not something new: he recalls surveillance was used, for example, to control enslaved black bodies. In contemporary times, this term would have received new interpretations, which bring together state-corporate surveillance, commercial exploitation, Internet governance, data monetization, and algorithmic discrimination. The technological hegemony of the Global North, with its dominance over the network's hardware and software, would operate an imperial authority. Therefore, alternatives could come from decentralization and the use of free software.

Although I am critical of Zuboff's approach (Evangelista, 2019), I think her theorizing about surveillance capitalism may be important for us to understand the complexity of some issues, guiding us on how power relations change along with technological changes and avoiding the so-called solutionism that Morozov (2013) shows us. Furthermore, it is important not to lose sight of what Kwet (2019) reminds us regarding the permanence of North-South relations. Although the net-

work delocalizes and regionally shuffles different processes and practices, technological development and control were achieved in a context of geopolitical asymmetries that persist. No wonder the United States concentrates the most important information technology companies, followed by China; the Asian country, however, only dominates its own territory, with total market profits seven times smaller (Kwet, 2021).

Based on these issues, I have used a theoretical framework (Firmino, Cardoso, & Evangelista, 2019) which I think is useful to scrutinize relationships emanating from the broad phenomenon of "surveillance capitalism in the Global South," but within specific contexts, such as the adoption of educational platforms during the pandemic in a country like Brazil. It is important to break the dilemma into three topics: surveillance capitalism *in* the Global South, *through* the Global South, and *from* the Global South (Evangelista, 2018).

One fact is the strong penetration of Big Techs, which operate directly or indirectly trading personal data captured through surveillance mechanisms in Brazil. Focusing on communication tools only: Gmail's absolute dominance; the power of video platforms such as YouTube among young people, not only for entertainment consumption, but also for educational and paradidactic purposes; the high dissemination of WhatsApp, not only as a substitute for short message services (SMS) and telephone, but also as transmitter-receiver of audiovisual content, also used in educational emergencies;[10] in addition to the high popularity of social media, initially with Orkut and today with Facebook/Instagram.

It is also worth discussing the manner and margin through which national companies enter this type of business. Some of them have a pioneering role in the formation of markets and development of technologies that work in the Brazilian reality, even though they are often incorporated by international giants in the sector. In the specific case of the education sector, technologies that assist large platforms stand

10 The WG on Educational Platforms heard from teachers using WhatsApp with their students to exchange teaching materials. As WhatsApp benefits from zero-rating policies, poor students, who access the Internet only through their parents' mobile phones, are often able to continue communicating this way, even when they run out of data allowance from the contracted plan. The Seminar is available at: https://www.youtube.com/watch?v=RqiBFpUPfSM

out, whether for the production of content adapted to the country's culture, language, and norms, or for the required legal representation and contract intermediation.

Finally, it is important to consider all these elements from the perspective of the local context and the interests of the populations involved. What regulatory parameters are suitable, taking into account the well-being of local groups? What are the historical and colonial relations (Quijano, 2014) that govern the acceptance or rejection of specific tools? What are the best strategies to overcome the inequalities and asymmetries that are typical of the Global South, as to produce an inclusive education and one that is aimed at the full development of subjects' skills?

The adoption of information platforms for educational purposes is not a simple issue, which responds to a univocal movement towards more "modern," "advanced," "intelligent," and "effective" systems. We must take into consideration didactic criteria that are appropriate to the history, culture, diversity, and socioeconomic reality of the different locations, and educational traditions need to be considered together with perspectives of an emancipatory future for those involved: students, teachers, and managers. The education sector is not separate from the rest of society; it is actually subject to the interests of actors who do not always have the education of citizens in mind. Concurrently, it can offer excellent opportunities for growth, development, and social justice.

This publication was conceived in the context of the different challenges posed to education during the pandemic, especially those related to digital technologies. In the following chapters, different initiatives, policies, and partnerships carried out at national and international levels for the continuation of education and to overcome the barriers posed by COVID-19 will be presented, as well as studies that map the challenges of different countries in this scenario, including Brazil, and the lessons learned so far. Lastly, this publication addresses possible implications of the growing use of digital technologies in this context – especially proprietary platforms – and possible consequences regarding privacy, in addition to discussing alternatives for this scenario.

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CHAPTER 1

Emergency distance learning: From emergency responses to more open, inclusive, and quality education systems

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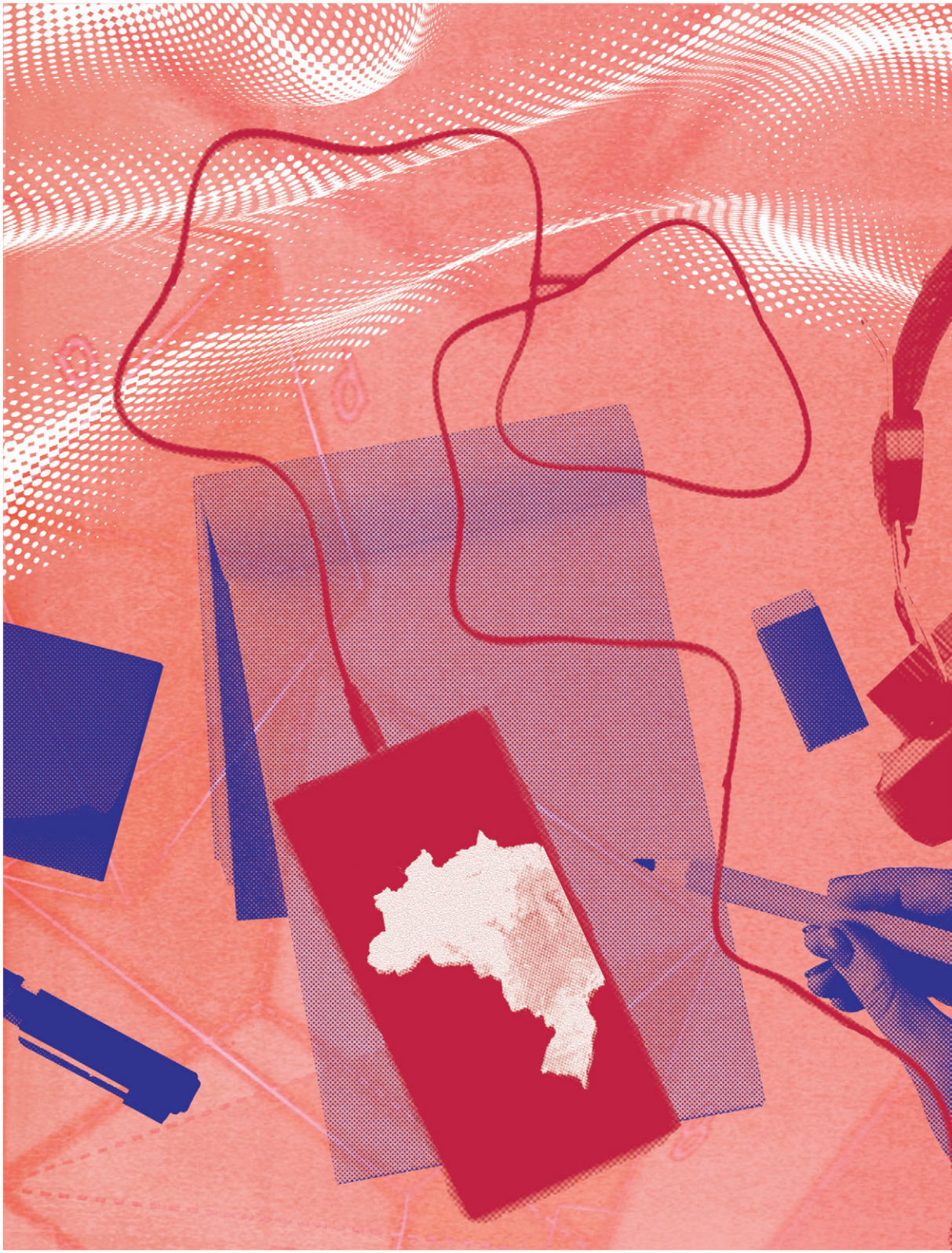

INTRODUCTION

Before the worst pandemic of modern history disrupted the world in an unprecedented way, education systems in most countries in the Global South were already struggling to advance towards the Sustainable Development Goal (SDG) 4 to ensure inclusive and equitable quality education and promote lifelong learning opportunities for all (UN DESA, n.d.).

According to the United Nations Educational, Scientific and Cultural Organization's (UNESCO) Institute of Statistic (UIS), in 2015 about 617 million children and adolescents worldwide were not achieving minimum proficiency levels in reading and mathematics (UIS, 2017). This number is equivalent to three times the population of Brazil being unable to read or undertake basic mathematics with proficiency. These staggering figures were further expanded on the first-ever projections on progress towards SDG 4 (UIS & GEM Report, 2019) and indicated a learning crisis: more than half of children and adolescents were not learning worldwide. In Latin America and the Caribbean, the percentage of children and adolescents not reading proficiently in 2015 was 36% (UIS, 2017). The situation was particularly concerning for adolescents, given that more than one half (53% or 19 million) were unable to meet minimum proficiency levels by the time they should be completing Lower Secondary Education.

Other organizations, such as the World Bank (2019), also stressed that the education crisis was a concern for international leaders given that millions of children were reaching young adulthood without basic skills like calculating the correct change from a transaction, reading a doctor's instructions, or understanding a bus schedule. Similarly, the European Commission highlighted that by the end of the period stipulated for the accomplishment of the 2030 Agenda for Sustainable Development, about 800 million young people will not have basic skills and half of them are girls (UIS, 2019). This prediction impacts all sectors of society and generates a critical global issue: not only are governments failing to ensure their citizens the right to quality education, but also millions of young people will not have basic skills for life and

will not enter the job market with skills needed for relevant employment that responds to their country's needs.

Before COVID-19, however, the world was already failing to deliver on its education promises. The challenge was significant, and there was already a critical need to improve the quality of education while expanding access to ensure that no one was left behind. On top of the above-mentioned challenges, the world faced in 2020 one of its most disruptive global emergencies, impacting on learners, teachers, and families with no exception.

UNESCO estimates that, at the peak of the pandemic, 1.6 billion children and youth enrolled in schools or Higher Education Institutions (HEI) were unable to attend classes due to the closure of institutions on account of COVID-19, depriving them of opportunities for growth and development (UNESCO, 2021c). Education systems were urged to increase their efforts to mitigate the impact of the shutdown, particularly for more vulnerable and disadvantaged communities, and to facilitate the continuity of learning for all through distance learning.[2] However, only 25% of low-income countries, compared to 96% of high-income countries, reported regular or extra expenditure on digital learning (UNESCO, UNICEF, World Bank, & OECD, 2021). It was clear that investment in distance learning solutions – hi-tech, low-tech, and no-tech – and innovative approaches was and is required to help establish and develop more open, inclusive, flexible, quality, and resilient education systems to meet the needs of the current situation, but also to advance in the accomplishment of the SDG 4.

Unfortunately, because of emerging variants and inequitable access to vaccinations, we are just starting to see the first wave of the impact of the crisis; in this regard its hardest effects may not yet have been experienced.[3] Even though many African nations have not suffered the full impact of

2 In the Democratic Republic of Congo, for example, the Education Cannot Wait (ECW) and UNESCO's Capacity Development for Education (CapED) programs are co-financing education response activities on remote learning via radio, especially community radio, with the aim of reaching over four million learners. More information available at: https://www.educationcannotwait.org/ and https://en.unesco.org/themes/education/caped

3 As an example, less than 1% of Africa's population has been fully vaccinated at the time of writing this chapter.

the pandemic when compared to other countries, more than four million people have died globally; families are suffering an intolerable burden of loss. More than 1.5 million children (National Institute on Drug Abuse, 2021) around the world are estimated to have lost to COVID-19 at least one parent or significant caregiver who lived with them, generating an unforeseen impact on education that is yet hard to measure.

In this challenging context, international organizations are coming together under different innovative coalitions and alliances. These initiatives reinforce the importance of inter-sectoral and multi-stakeholder international cooperation to advance multilateralism, international solidarity, and knowledge sharing to chart a new course for remote and hybrid learning, with technology at the disposal of learners, teachers, and education communities.

This chapter showcases how UNESCO has been responding to the COVID-19 pandemic, leading international efforts to support countries to build back better, and offering a set of recommendations for policymakers and other education stakeholders. Furthermore, it aims to offer answers to the following questions: what have we learned about distance learning responses across the different modalities, as well as the combination of technologies deployed, the educational resources and tools made available, and the support provided by different stakeholders to teachers, learners, and education communities? How can we build education systems that are prepared for the future? What is the way forward to tackle the urgent and unprecedented need for continuity of learning as the pandemic disrupts education systems across the world?

The chapter is divided into eight sections. It begins by describing emergency distance learning responses and presenting key elements for using digital technologies in education. Then, it addresses the impact of COVID-19 on many regions of the world and discusses the digital divide that affects the right to education, as well as the urgent need of connectivity for learning. Next, it demonstrates the relevance of inter-sectoral and multi-stakeholder international partnerships in prioritizing education for all children and youth during the pandemic and beyond. The following sections discuss whether hybrid learning is the way forward and analyzes potential

implications. Next, key digital technologies in education are proposed to better recover from the pandemic but also as an opportunity to reimagine education. The last section offers final remarks based on the lessons learned during the pandemic, aimed at calling for more open, inclusive, and quality education systems.

EMERGENCY DISTANCE LEARNING RESPONSES

In contexts of crises, such as when there are natural disasters, bombings, armed conflicts, and extreme weather incidents, governments and the education community tend to implement quick emergency distance learning strategies to make it possible to continue teaching and learning even when school buildings are closed. Learning activities are rethought during the crisis and continued offsite with the support of teachers, the education community and in collaboration with students and families. However, integrating information and communication technologies (ICT) effectively into teaching and learning is not a simple one-step process and requires adequate planning: it should involve stakeholders that work in the intersection of education, emergencies, and ICT, prioritizing the most disadvantaged communities. Prior to any meaningful discussion on emergency distance learning, it is important to first assess who is able to access these technology-supported models of education and who is being left behind.

The right to education, treasured in the Universal Declaration on Human Rights in 1948 and reinforced in numerous subsequent international instruments, should be ensured in emergency distance learning responses, also guaranteeing that the most marginalized populations have access to the tools and support needed to engage with this modality of learning. As alerted by the UNESCO Chair in ICT for Development – ICT4D[4] and EdTech Hub,[5] all responses that include the use of digital technologies in education must prioritize the poorest and the most marginalized populations:

4 UNESCO Chair in ICT4D is a group of researchers and practitioners committed to excellence in the use of ICT for development. More information available at: https://ict4d.org.uk/about/

5 More information available at: https://edtechhub.org/about-edtech-hub/

> Digital initiatives that focus only on reaching the "next billion", be that in terms of mobile broadband, or access of schoolchildren to the Internet, will only further increase inequalities, because those without those technologies will be left even further behind. Educational initiatives that seek to focus on the 'low-hanging fruit,' such as countries or regions with good infrastructure or a large market, will likewise increase inequality. (Unwin et al., 2020, p. 26)

In sum, distance learning responses, whether in emergency contexts or not, should have an inclusive and equitable approach.[6] In this regard, relevant education stakeholders (including families and civil society) should be convened to identify – through the analysis of data, interviews, and information – the main issues that need to be addressed. In addition, any distance or hybrid learning (Broadband Commission for Sustainable Development, 2021)[7] strategy should be developed in alignment with the national global education sector plan and the Education 2030 priorities.

In such emergency contexts, conducting a diagnosis of the education sector (Box 1) can provide an overview of the current situation and an analysis of the causes of system weaknesses (e.g., lack of digital readiness,[8] infrastructure, poor teacher ICT skills, etc.). This can be done by examining equity and quality elements and enabling factors, such as connectivity, and by identifying the relationship among different stakeholders in the national learning ecosystem, including

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6 Inclusion is a process that helps overcome barriers limiting the presence, participation, and achievement of learners. Equity is about ensuring fairness, in which the education of all learners is considered equally important (UNESCO & Tang, 2017).

7 Based on the latest discussions at the Broadband Commission Working Group on Digital Learning, hybrid learning enables students to study in flexible ways, online or face-to-face, according to circumstances and preferences. The online and ICT components are often used to supplement or even supplant "seat time" activities. A hybrid teaching session may consist of students that are present in the classroom and students that participate in class remotely (heterogeneous learner groups). It is crucial that students have some control over time, place, path, and/or pace of study (Broadband Commission for Sustainable Development, 2021).

8 According to Horrigan (2016), an operational definition of digital readiness includes: (i) digital skills, that is, the skills necessary to initiate an online session, surf the Internet and share content online; and (ii) trust, that is, people's beliefs about their capacity to determine the trustworthiness of information online and safeguard personal information. These two factors express themselves in the third dimension of digital readiness, namely use – the degree to which people use digital tools in the course of carrying out online tasks.

education content producers and education providers. In this process, it is important that gaps and bottlenecks in Internet access and teacher readiness be identified. Topics such as financing and management of the education system, as well as its efficiency and effectiveness, should also be addressed. This country review can bring the education sector plans[9] up to speed[10] to be managed through a whole-of-government and whole-of-society approach, through the implementation of national quality assurance mechanisms and by engaging with different ministries, parent associations, civil society, and other key actors. In this way, by revising the education system in line with the right to education principles, more equitable access to quality education will be pursued.

BOX 1 – MAIN ELEMENTS OF THE EDUCATION POLICY PLANNING CONDUCTED BY UNESCO AND MEMBER STATES

- Design a holistic policy review by analyzing previous national education plans in the context of ongoing education reforms, including the ICT in education policy framework and results.
- Identify policy gaps based on education sector diagnosis in the light of SDG 4 Education 2030, the right to education, and the Education 2030 Incheon Declaration (UNESCO, 2016).
- Map main local stakeholders, including international donors, and other agencies that are part of the national learning ecosystem, such as parents' and caregivers' associations, private sector, Open Educational Resources (OER) developers, academia, etc., generating multi-stakeholder partnerships.
- Guarantee national ownership through consultations and capacity building of main stakeholders and the policy development cycle.
- Reformulate policy priority and strategies embedded within a common inter-sectoral and whole-of-government approach (e.g., Ministries of Education, ICT, Innovation, Economy, etc.).

9 An education sector plan presents the policies and strategies for national education reform, a powerful tool for coordinating partners and for mobilizing additional resources, signaling to all potential investors that their education policies are credible, sustainable, and worthy of investment (IIEP & GPE, 2015).

10 More information on ICT in Education policy planning at: GEC (n.d.c), UNESCO & McKinsey & Company (2020), and Miao, Mishra, Orr, & Janssen (2019).

- Review existing dialogue mechanisms with development partners on the ground, offering an evidence-based case for increasing national and international investments in education and research, and creating recommendations as a catalyst for international cooperation, using simulations for planning, including costing.
- Ensure appropriate pedagogies for distance or hybrid learning and alignment with the national curriculum.
- Improve the Monitoring and Evaluation system.

SOURCE: BROADBAND COMMISSION FOR SUSTAINABLE DEVELOPMENT (2021).

Emergency distance learning, when implemented in accordance with the abovementioned criteria, can help to create safe and quality learning spaces (Hodges, Moore, Lockee, Trust, & Bond, 2020). Such spaces can offer hybrid learning solutions including hi-tech, low-tech, and no-tech design options, with online communication synchrony varying from asynchronous, synchronous, or a blend of both. This includes the combination of radio, TV, mobile communication, computing devices, basic technologies such as paper-based learning materials, voice, text messages, etc. Additionally, online and offline options and contents can be combined in a hybrid learning model to ensure different channels to get to students that are hard to reach.

When conducted adequately, emergency learning responses can bring opportunities to reinforce innovative pedagogies towards hybrid learning for inclusive, equitable, and quality education. This may include long-term solutions that can contribute to SDG 4 targets, addressing the inequities in education that are greatly exposed when schools close. In this regard, the international community has been trying to work towards this direction using different modalities of inter-sectorial and multi-stakeholder responses.

WHEN SCHOOLS ALL OVER THE WORLD CLOSED THEIR DOORS

The response of governments to facilitate the continuity of learning during the period of the pandemic was crucial in face of such an extreme disruption. Despite the disruption,

the pandemic has also revealed the enormous potential for innovation and reform of education systems (Box 2). As stated by UNESCO's Assistant Director-General for Education, Stefania Giannini,

> [...] we are facing an unusual situation with a large number of countries affected by the same issue at the same time. We need to come together not only to address the immediate educational consequences of this unprecedented crisis, but to build up the longer-term resilience of education systems. (UNESCO, 2020d)

In the context of the pandemic, investment in distance learning, including hi-tech, low-tech, and no-tech solutions, was needed to both mitigate the immediate disruption caused by COVID-19 and establish approaches to develop more innovative, open, inclusive, flexible, and quality education systems for the future, rather than a one-off event effort. Nevertheless, the lack of investments was a reality in many regions of the world and without appropriate funding; education systems struggle to respond to connectivity issues[11] and develop other enabling factors for implementing quality distance learning. According to UNESCO's figures on 25 countries in Latin America and the Caribbean, educational spending would have increased by 3.6% between 2019 and 2020 without the pandemic (IIEP, 2020; ECLAC, 2020); however, because of the economic contraction, it was estimated that the resources available for education would drop more than 9% in just one year, with the real budgetary consequences coming to light in 2021 (ECLAC, 2020).

11 More information available in the section: "The challenges of the digital divide: Connectivity for learning" (p. 45).

BOX 2 – SENEGAL: EXPANDING ACCESS TO DISTANCE LEARNING TO SUPPORT THE MOST VULNERABLE AND DISADVANTAGED COMMUNITIES

Among the initiatives to support the most vulnerable and disadvantaged communities, UNESCO has called upon governments to generate innovative multi-stakeholder partnerships. In Senegal, for instance, the Ministry of Education, Microsoft, and Huawei are supporting tens of thousands of teachers and students to continue learning during the COVID-19 crisis, an initiative that has enrolled 82,000 teachers and 500,000 students who have been able to continue their learning.

Furthermore, UNESCO is also supporting teacher trainings so that they can become "master trainers": a cascading approach was adopted in which teachers train other teachers, and devices have been distributed by Huawei to improve connectivity of the master trainers. Other partners were called to bring connectivity to hard-to-reach populations. It should also be noted that all coalition members have committed to an ethic of do no harm in their treatment of data related to learning. UNESCO has also encouraged partners to demonstrate commitment to ethical principles (GEC, n.d.b) to protect learner information, privacy, and security.

SOURCE: UNESCO (2020B).

THE CHALLENGES OF THE DIGITAL DIVIDE: CONNECTIVITY FOR LEARNING

The right to education has become — at the global level and with almost no warning — dependent on the connection to networks and devices: over three-quarters of national distance learning solutions available during the peak of the COVID-19 pandemic relied exclusively on online platforms. Yet as many as 465 million children and youth, or almost 47% of all Primary and Secondary students, did not have access to these platforms because they do not have Internet connections at home (UNESCO, 2021a). These figures reflect a wider context of global digital divides: close to half of the world's population, (that is, roughly three billion people) have no access to the Internet and its many portals to education. In this regard, it can be noted that not only does connectivity remain far from universal, but significant gaps exist across and within countries.

Nonetheless, connectivity goes beyond Internet access.[12] The human element of connectivity, such as teachers and learners' digital skills readiness, educational resources, and other pedagogic elements that help empower learners and teachers are also critical for distance learning. Hence, the connectivity gaps facing education systems are associated with a wide range of societal factors and intersectionality of different inequalities, including those related to education, age, gender, income status, skills, geographic location, and disabilities, impacting on a fundamental human right: the right to education.

The pandemic has laid bare these long-standing connectivity divides, as well as exposed new divides and, overall, has given their resolution a new sense of urgency (UNESCO, 2021a). To respond to this emergency, the United Nations (UN) has called governments to rise to this challenge, bringing responses to attend the needs of the most disadvantaged communities, focusing particularly on girls, given that 11 million girls may not return to school. According to UNESCO (2021e),[13] in many countries, women are 20% less likely than men to use the Internet on a mobile phone, which limits the capacity of girls and women to keep up with online distance learning during school closures. As learned from previous crises (Tauson & Stannard, 2018; Czerniewicz, 2020; Winthrop, 2020), including the Ebola epidemic, we must advance towards fulfilling the right to education by finding innovative approaches to overcome the learning disruption and losses.

CONNECTIVITY FOR LEARNING AND THE RIGHT TO EDUCATION

The gap in access to broadband networks and new technologies is a significant contributor to persistent and widening disparities across economies, societies, and education systems. Equally important is the human element of connec-

12 On a broader sense, the UNESCO's Internet Universality Indicators propose a framework for better understanding the Internet and measuring compliance with human rights, evaluating its openness and accessibility, and assessing the involvement of multi-stakeholder actors in its governance (UNESCO, n.d.b).

13 UNESCO has recently finalized a global study to further understand the gendered impacts of COVID-19-related school closures which includes the documentation of good practice to ensure continuity of learning and return to school (UNESCO, 2021e).

tivity, such as digital skills readiness and related solutions, tools, education resources and content that can help empower learners, teachers, and entire communities once connectivity for learning has been established. In this regard, UNESCO is supporting Member States to develop a universal declaration on connectivity for learning which will broaden established understandings of the right to education. The working document of the Global Declaration on Connectivity for Education (UNESCO, 2021d) reinforces the principles of free and equitable connectivity and aims at a new direction for integrating connected technology in education in a way that is financially sustainable.

The Global Declaration draft currently highlights the following principles: (i) connectivity should be centered on the most marginalized; (ii) investments should be expanded in free and high-quality digital education content, and (iii) pedagogical innovation is essential for the digital transformation of education (UNESCO, 2021d). UNESCO aims to support Member States to have a declaration that can assert that educational transformation accompanying the integrations of new technology, far from being inevitable or outside our control, can be steered with focused policies, actions, regulations, and incentives (UNESCO, 2021d).

BOX 3 – OVERARCHING THEMES ON THE RIGHT TO CONNECTIVITY

With the aim of further contributing to the current discussion on how to advance towards a more humanistic approach of connectivity that can be used as a tool for learning, within the scope of UNESCO's Global Education Coalition initiatives on connectivity (GEC, 2021), the following set of overarching themes and questions were proposed:

1. Connectivity as an enabling factor for learning

What resources are available in terms of connectivity, hardware, software, and human at the physical school location, at students' homes, in community study spaces and other student learning environments? How can the equity and inclusion dimension of connectivity for learning be recognized?

2. Connectivity models

What are the effective connectivity models for underserved contexts? How can offline

digital education resources be used in limited connected areas? What are the recommended combinations of connectivity models used during pandemics?

3. Digital readiness for connected learners
What is the learner readiness required to embrace digital connected learning? What set of skills are necessary to overcome under-resourced digital learning environments? What is the role of parents' and caregivers' basic knowledge and awareness of the Internet, including its benefits and risks?

4. Digital readiness for connected teachers
What are the ICT competencies needed to connect teachers in underserved contexts? What are the key actions to overcome barriers when bringing connectivity to teachers with low literacy and/or absenteeism that may be impacting their learning environments?

5. National regulations and education policy impact on connectivity for learning
How can the country's regulatory framework, national education policies, and government's support impact connectivity for learning? How can it be ensured that connectivity adequately supports the right to education? What are the innovative, inclusive, and sustainable financing mechanisms for connected learning?

6. Learning leadership and communities: The human factor for a thriving connected learning environment
How can educators, learning communities and ecosystems take the lead to eliminate digital and literacy barriers for all learners and teachers? The human factor is key for making connectivity work for pedagogical transformation. How can connectivity-enabling factors be ensured? How can barriers be overcome and previous pitfalls be avoided?

WHEN THE WORLD BEGAN MOVING AGAIN: INTER-SECTORAL AND MULTI-STAKEHOLDER INTERNATIONAL RESPONSES

The United Nations Secretary-General, António Guterres, called on governments and donors to prioritize education for all children and youth during the pandemic, renewing efforts to his Roadmap for Digital Cooperation (UN, 2020). As the pandemic further revealed and amplified inequalities in this field, inter-sectoral and multi-stakeholder international responses were mobilized to actively support learning during the closure of schools and educational environments.[14]

14 Multi-stakeholder partnership models are not new, since an innovation system that is formed only by one single sector or organization provides a very limited source of ideas, initiatives, and solutions for the complex challenges we face today.

It should be noted that HEI are also part of partnership models. During COVID-19, universities were very cohesive in sharing resources, expertise, and good practices. For example, some HEI offered training sessions to academic staff and in-service teachers on how to deliver online teaching; others created portals and offered content and programs free of charge (e.g., Harvard LabXchange,[15] part of UNESCO Global Education Partnership, etc.).

Literature emphasizes that in the last decades, many HEI have been adopting a partnership route based on the Triple Helix (TH) model defined by Henry Etzkowitz (2008, 2017), where the university-government-industry relationship has been moving from the traditional top-down, government-controlled system of innovation to non-linear and interactive approaches. In this regard, a question that may arise is: why have civil society and intergovernmental organizations (IGO) not been included in the institutional mechanisms that enable the development of new forms of knowledge creation and transmission to counter the world's most challenging problems (Mendes, 2011; Cavallini, Soldi, Friedl, & Volpe, 2016)? The answer is that they have been working through diverse partnership models that have been generating Quadruple and Quintuple Helix experiences where university, government, industry, civil society, and IGO are coming together to answer the world's pressing challenges.

Given the severity of the COVID-19 pandemic, which forced governments to close their education centers, UNESCO was the first international organization to react and generate a coordinated response to the education crisis through the creation of a new Global Education Coalition (GEC) (GEC, 2021), formed by different categories of partners, including academia, the UN, international and regional organizations, the private sector, non-profit and civil society groups, and the news media. The UN agencies are supporting countries to strengthen the resiliency of their education systems to ensure the continuity of learning during the current and future crises.

15 More information available at: https://www.labxchange.org

BOX 4 – MULTI-STAKEHOLDER RESPONSE: MEASURING THE QUALITY OF INTERNET CONNECTION IN BRAZILIAN SCHOOLS

Investing in ICT projects in education is a key strategy adopted by the Brazilian Ministry of Education (MEC) to face existing connectivity challenges and to bridge the digital gap regarding access to the Internet in public schools, as well as to promote the development of digital skills. In this context, Brazil provides an example of a partnership for the advancement of Internet connectivity in Basic Education involving public, private, third sector institutions, and international organizations.

Prior to the COVID-19 pandemic, MEC had established a partnership with the Center of Study and Research in Network Technology and Operations (Ceptro.br), department of the Brazilian Network Information Center (NIC.br), to offer the Internet Traffic Measurement System (*Sistema de Medição de Tráfego Internet* – SIMET)[16] for public schools across the country. This system allows the monitoring of the Internet quality in public schools to ensure that they are receiving the recommended speed defined by the National Innovation Policy Connected Education (*Programa de Inovação Educação Conectada* – PIEC)[17] and to provide policymakers and education actors with real time data on the quality of Internet connection offered by Internet Service Providers (ISP). Given the need to further develop connectivity in schools, the project was expanded with the addition of new partners such as the Lemann Foundation and the Innovation Center for Brazilian Education (*Centro de Inovação para a Educação Brasileira* – CIEB). Furthermore, a partnership with the United Nations Children's Fund (UNICEF) has allowed such measurements to contribute to the GIGA Connect initiative[18] that maps connectivity at a global level by producing comparable data on the Brazilian context.

By July 2020, the SIMET had been installed in more than 22,000 public schools in 3,553 Brazilian municipalities. The data collected by this system provides an overview of school connectivity for policymakers and educators at different administrative levels – federal, state, or municipal – and reveals the inequalities of Internet access across and within Brazilian states, which is of even greater relevance in the context of COVID-19.

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16 More information available at: https://beta.simet.nic.br/

17 The National Innovation Policy Connected Education was launched in November 2017 by MEC and is aimed at fostering the pedagogical adoption of ICT in Brazilian schools.

18 More information available at: https://gigaconnect.org/

UNESCO COVID-19 RESPONSE: FROM DISRUPTION TO RECOVERY AND BEYOND

As highlighted by UNESCO Director-General, Ms. Audrey Azoulay, the COVID-19 outbreak is a global public health crisis that resonates deeply at the heart of the organization's mission. UNESCO is committed to supporting governments

for distance learning, open science, knowledge, and culture sharing, as fundamental means to stand together and tighten the bonds of our shared humanity (UNESCO, n.d.a). It is the only UN agency with a mandate to cover all aspects of education, and has also been entrusted to lead the Global Education 2030 Agenda through SDG 4 (UN, 2016). Under this framework, the UN agency reacted quickly and in an agile way to support countries in bringing back to learning 91% of the world's school population – which have seen their learning disrupted by COVID-19 (UNESCO & GEC, 2021). Moreover, about 100 million teachers and school personnel were impacted by the sudden closures of learning institutions (UNESCO, 2020c).

At the beginning of the COVID-19 pandemic in March 2020, UNESCO implemented different actions to support countries. In this context, the GEC, launched by UNESCO as a platform for collaboration and exchange to protect the right to education during the pandemic and beyond, was created as an international multi-sector partnership bringing together institutional partners from the UN family, civil society, academia, and the private sector to meet the urgent and unprecedented need for continuity of learning as the pandemic disrupted education systems across the world.

GEC: Global cooperation model

The GEC has become a force for change with 180 partners operating in 112 countries, deploying large cross-country missions, and conducting large-scale data collection and advocacy. It is a community committed to protect education, build resilience, and reimagine education to leave no one behind, in line with SDG 4. The unique partnerships forged from the coalition engage new actors that would not have been obvious partners, such as telecommunication companies, the education technology industry, academia, UN agencies, civil society, and media organizations, to complement and support national and regional efforts to ensure continuity of learning. The diversity of partners across industries, sectors, and geographies, the focus on country needs, and the support provided to local ecosystems are at the heart of the competitive advantage of the GEC compared to similar multilateral initia-

tives; therefore, the GEC is a valuable platform to accelerate, scale up, and advance educational recovery, resilience, and re-imagination in support of SDG 4.

As the pandemic reveals and amplifies inequalities in education, the coalition partners are mobilized to actively support continuity of learning around three central flagships: (i) increasing access to distance learning (connectivity and devices); (ii) offering support for teachers to reduce the negative impact of COVID-19; and (iii) addressing gender challenges in school closures (UNESCO & GEC, 2021). These flagships are based on an analysis of country needs matched against the expertise and support that can be provided by the coalition partners. To implement these flagships, the coalition has identified four missions, each with a large-scale target (Table 1).

TABLE 1 – GEC MISSION AND TARGETS

MISSION	TARGET
Global Skills Academy[19]	Equipping one million youth with employability skills.
Global Learning House[20]	Helping one million learners benefit from remedial learning in Science, Technology, Engineering, Arts and Mathematics (STEAM).
Global Teacher Campus[21]	Providing one million teachers with remote learning skills.
Keeping Girls learning[22]	Supporting five million girls to fulfill their right to education in the 20 countries with the greater gender disparities in education.

SOURCE: PREPARED BY THE AUTHOR.

Currently, building on its achievements and innovative partnerships, the GEC continues its response to the COVID-19 crisis, building recovery plans, supporting resilient education systems, and building the blocks for re-imagining education. The diversity of partners, the broadness of geographic reach and the wealth of programs, initiatives, and resources

19 More information available at: https://globaleducationcoalition.unesco.org/global-skills-academy
20 More information available at: https://globaleducationcoalition.unesco.org/global-learning-house
21 More information available at: https://globaleducationcoalition.unesco.org/global-teacher-campus
22 More information available at: https://unesdoc.unesco.org/ark:/48223/pf0000375256

brought by the partners' in-kind contributions are invaluable; however, managing and sustaining such a coalition requires smart approaches, strong partners commitment, increased capacities, and resources to fully maximize benefits.

Looking into the future of a post-COVID-19 world and in alignment with SDG 17,[23] the United Nations Secretary-General's Roadmap for Digital Cooperation and the 2030 Agenda, GEC has been leveraged to fulfill the large remaining gaps towards achieving SDG 4.[24] In sum, it is dedicated to working with governments to find solutions in order to leave no one behind and elevate the importance of equity and gender equality in educational responses to the COVID-19 crisis.

23 More information available at: https://www.un.org/sustainabledevelopment/globalpartnerships/
24 More information available at: https://en.unesco.org/themes/education2030-sdg4

BOX 6 – PILLARS OF THE GEC

The GEC has been an important driver of innovation and partnership. Since the UN General Assembly in 2020,[25] GEC members have shared their perspectives in global events such as the Mobile Learning Week and the Global Education Meeting. Most importantly, their responses to the COVID-19 pandemic are becoming more integrated in ambitious flagships and missions to support teachers, educators, and learners, strengthen education systems and equip youth with employability skills. Among GEC's actions, selected activities are described in each pillar of the coalition:

Pillar 1: Country support
This pillar engages with countries and eventually supports cross-country actions based on common needs, language, and challenges. Interventions include adopting distance learning modalities by adapting existing content to TV, radio, and digital platforms, supporting crisis-sensitive planning, and creating awareness raising plans for students, parents, and local communities.

Pillar 2: Global flagships
Three flagships have been identified based on preliminary discussions with Member States and partners: (i) connectivity: aims to overcome both human and technical barriers to connectivity, spanning digital skills and literacy, digital learning content, affordability, and access to devices, with special attention to including socio-economically disadvantaged populations, rural children, youth, girls, and women;

25 More information available at: https://en.unesco.org/news/strong-support-unescos-global-education-coalition-united-nations-general-assembly-high-level

(ii) teachers: aims to valorize teachers' roles and offer professional development opportunities to strengthen digital and pedagogical skills; through high-quality, large scale learning opportunities, this flagship intends to reach teachers with training and ensure that quality and equitable teaching can continue; and (iii) gender: unites coalition members working together to highlight and address the gender dimensions of the COVID-19 school crisis, aimed at safeguarding recent progress on gender equality in education by countering the gendered impact of educational disruption. For each of these, short concept notes are being produced, and key issues are being identified and shared with partners to seek their engagement, while also recognizing the direct country needs.

Pillar 3: Advocacy, communication and outreach

The objective of this pillar is to amplify the messages of the GEC, including those related to country interventions and global flagships. Specifically, actions have aimed to leverage partners and media to deliver the coalition's message more widely around the world.

SOURCE: UNESCO (2021A).

GEC IN ACTION: DISTANCE LEARNING AND TRAINING STRATEGIES

Project implementation in Peru

According to the United Nations High Commissioner for Refugees (UNHCR), UN refugees agency, by the end of 2019 Peru welcomed over 867,800 Venezuelan refugees and migrants (67% of whom were women and children), making it the second main destination country for this community. It was also the country that received the highest number of asylum claims from Venezuelan refugees in the world, with a total of almost 487,100 asylum claims filed by the end of that year. Peru is also one of the countries most impacted by the COVID-19 pandemic, greatly affected in the field of education: children and adolescents are in pressing need of support to engage with the Peruvian education system. In face of this situation, the coalition – through UNESCO Lima Office – is implementing the Education Response to COVID-19: Distance Learning and Training Strategies (*Respuesta del Sector de Educación a la COVID-19: Estratégias de Aprendizaje y Formación a Distancia*) project in the country (GEC, 2020). The initiative, managed by UNESCO, funded

by the German Federal Ministry for Economic Cooperation and Development (*Bundesministerium für wirtschaftliche Zusammenarbeit und Entwicklung* – BMZ), and supported by the company Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), aims to strengthen digital and socio-emotional skills in migrant and refugee children and adolescents ages 6 to 16. This will be conducted through a virtual course with the support of professional tutors and psychologists that are also available for socio-emotional help to all participants (GEC, 2020).

The GEC Peruvian project has also worked as a seed funding for the Multi-Year Resilience Program in Peru called Education Cannot Wait (*La Educación No Puede Esperar*),[26] receiving a total amount of USD 1.5 million to bring it to scale. Moreover, the project will also be replicated in the Peruvian region of Arequipa supported by UNHCR. Furthermore, Peru has also created a national chapter of the Global Education Coalition; thanks to this initiative, it has been possible to bring together more than 40-member organizations that have shown their solidarity to the country's most marginalized students through various actions.

Project implementation in the Caribbean

During the pandemic, teachers were tasked with the challenge of implementing blended[27] and distance learning modalities, often without sufficient guidance, training, or resources. Although web-based meetings and messaging applications have become useful tools for communicating with learners and within the community during this crisis, in the Caribbean, teachers in remote areas or facing low connectivity or lack of access to devices missed out on such support. Also, since not all teachers in the region received minimal training in digital skills, many have been largely unprepared to support continuity of learning and adapt to new teaching methodologies.

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26 More information available at: https://www.unicef.org/peru/educacion-no-puede-esperar-peru

27 Blended learning "combines face-to-face teaching with online learning activities. All students generally engage in the same activities and keep a similar pace. Teaching activities are designed to make good use of media and setting" (Broadband Commission for Sustainable Development, 2021, p. 2).

To respond to these pressing needs, through UNESCO Cluster Office for the Caribbean, the Global Education Coalition is implementing the Education Response to COVID-19: Distance Learning and Teacher Training Strategies project in 20 countries in the region (GEC, 2020), which builds on a pilot initiative with GEC member Blackboard, a well-established global education software provider.[28] The program prepares teachers, academic staff, and education leaders through a train-the-trainer model. It will deliver high quality teaching and learning with technology focusing on the development of practical skills, with the goal of training 10,000 teachers across the region. In order to localize the program, the University of the West Indies and local stakeholders are joining the new phase of the project. A teacher regional reference group has also been created engaging with the Teachers Task Force (TTF),[29] which will leverage its regional members, knowledge sharing and creation contents. TTF's expertise and network of partners plays a relevant role for the program.

Lastly, the Caribbean program's methodology, which combines Blackboard's digital skills knowhow with local teacher training expertise, is being transferred to other regions (e.g., anglophone West Africa). Moreover, other synergies were built with UNICEF Jamaica, which enabled the initiative to reach another 5,000 teachers and helped mobilize additional funds (GEC, 2020).

Companies in the information technology (IT) sector, when in liaison with local teacher training institutions and following ethical criteria, can play an important role in supporting the proliferation of high-quality digital training programs that enhance teacher ICT in education competencies. Governments can stimulate trustful public-private partnerships to facilitate the scaling up nationwide of industry-led reskilling and upskilling programs (Broadband Commission for Sustainable Development, 2021).

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28 Blackboard offers courses in many languages and is fully committed to delivering training experiences that conform to the highest levels of global accessibility standards as well as being platform agnostic, free from any ties to a specific platform or product.

29 More information available at: https://teachertaskforce.org

Gender programs

Experience shows that public health outbreaks have marked gendered impacts, and the COVID-19 pandemic is no exception. Any disruption to education has immediate and long-term effects on gender equality, particularly for the most marginalized, including girls and boys living in emergency contexts such as refugee camps.

Through the "gender flagship" members of the GEC have been working together to address the gender dimensions of the COVID-19 school crisis and safeguard progress made on gender equality in education in recent decades.[30] It targets countries with the widest gender disparities in education through action in three areas: data and research, advocacy and communication, and country-level intervention (GEM Report, 2020a).

In at least 20 countries, mostly in sub-Saharan Africa but also in Belize, Haiti, Pakistan, and Papua New Guinea, hardly any poor rural young women have completed Upper Secondary Education (GEM Report, 2020a). In this context, Technovation[31] joined forces with other members of the coalition to engage and support 10,000 girls[32] ages 10 to 18 from under-resourced communities, which participated in a multi-week technology entrepreneurship program. The initiative focuses on teaching girls and young women about Science, Technology, Engineering, and Mathematics (STEM), aimed at reducing the gender gap, and supporting them to become tech leaders. With volunteers, mentors, and parents' help, girls work in teams to code mobile apps that address real-world problems; to help ensure that girls learn and receive the community support they need, 3,600 educators, parents, and mentors are provided with capacity building training. This civil society organization is also supporting students through live online classes,[33] and educa-

30 More information available at: https://globaleducationcoalition.unesco.org/home/flagships/building-back-equal

31 Global tech education non-profit organization that empowers girls to become leaders, creators, and problem-solvers. More information available at: https://technovationchallenge.org/

32 GEC partners for the 2021 edition of the program include Ericsson, SAP, Siemens Stiftung and Qualcomm. The UNESCO Associated Schools Network is also joining recruitment efforts. More information available at: https://unesdoc.unesco.org/ark:/48223/pf0000379797

33 More information available at: https://www.youtube.com/watch?v=M7C3fgE2DUE

tors, mentors, and parents through regular webinars, office hours, community forums, and a global parent community.

Another example is the Flagship's global Keeping Girls in the Picture campaign (UNESCO, 2021b) that reached more than 360 million people, who are now sensitized to the importance of girls' return to school. Over 30 influencers from all five regions of the world joined the campaign. This includes Nobel laureate and girls' education activist Malala Yousafzai, through the Malala Fund, calling on girls to go back to school, and on parents, teachers, and leaders to help girls re-enroll in a video available in different languages. The campaign targets girls, communities, and education stakeholders at country and regional levels, with a specific focus on South Asia and sub-Saharan Africa. Campaign materials were developed in ten languages and launched through a dedicated website, including a comprehensive social media pack, inspiring videos added to a YouTube playlist, toolkits (for youth advocacy and community radios), testimonials from the field, and other resources to engage youth networks and communities and more.[34]

GLOBAL PARTNERSHIP FOR EDUCATION IN RESPONSE TO COVID-19: UNESCO, UNICEF, AND THE WORLD BANK

When the pandemic began to significantly impact the education sector, UNESCO called for a combined action among international organizations to respond to the crisis. In this context, the Global Partnership Education (GPE) created the COVID-19 global grant Innovation for inclusion (GPE, 2021). The USD 25 million grant funded a consortium composed by UNESCO, UNICEF, and the World Bank (2020), which leverages global expertise to generate solutions to the learning crisis. Actions are clustered around three main areas in line with GPE's Continuity of Learning approach, with an emphasis on reaching the most marginalized: (i) global and regional coordination (led by UNESCO); (ii) learning continuity at scale that reaches the most marginalized (led by UNICEF

34 For example, Keeping Girls in the Picture campaign (UNESCO, 2021b) and Social media pack (more information available at: https://trello.com/b/IKxRV754/girls-back-to-school).

and the World Bank); and (iii) monitoring, evidence, learning, and preparation for future emergencies (led by UNESCO).

GLOBAL AND REGIONAL COORDINATION

The GPE has been focusing its work on Africa, Asia, and the Pacific in this area, led by UNESCO, targeting countries with acute education challenges perpetuated by COVID-19, and focusing on reaching vulnerable populations.

In francophone West Africa and Sahel countries, as well as Pacific Island Small Developing States, interventions follow a two-pronged approach – supporting those digitally isolated, while making learning more effective for those having access to distance learning platforms through high quality learning resources. For instance, the program is printing and distributing offline educational resources and 60,000 resources were already curated. Thanks to partnerships with distribution channels of Ministries of Education that are responsive to deliver educational material in remote locations, the program has been handing over materials to students in disconnected areas.

The program is mainly centered on the development and scaling up of distance learning platforms,[35] diversification, and contextualization of educational resources, as well as the development of capacities for teachers and other education personnel on a subregional scale. The Francophone West Africa and Sahel component has the potential to be replicated in other West and Central African countries, including Anglophone African countries. As an example, the French-speaking African regional online learning platform called Imaginecole.africa was created by UNESCO as a key component of the GPE funded project to improve the quality of distance education in ten countries. It delivers high-quality resources, based on inclusive and quality assurance criteria, to Benin, Burkina, Cameroon, Côte d'Ivoire, Guinea, Mali, Niger, Senegal, Chad, and Togo. Imaginecole.africa offers a large-scale learning platform for distance education for 6.6 million students and first round of professional development support

35 The program has developed distance learning platforms and is training local educators and supporting the local education ecosystem to help to produce more resources and scale them up. More information available at: https://imaginecole.africa/

for 10,000 teachers with over 600 free educational resources. The education contents were curated following inclusive quality assurance guidelines and each of the ten countries are sharing their own resources to be added to the platform with the aim of ensuring national curriculum alignment.

Furthermore, the marginalization of persons with disabilities has become far more accentuated during the pandemic, as they often require special support and teaching tools that are not always available in traditional distance learning. A part of this subcomponent is dedicated to empowering teachers of persons with disabilities and developing an emergency response plan to ensure their continuity of learning and right to education, with a focus on Asia. Five modules and accompanying video scripts have been completed under the collaboration with the Southeast Asian Ministers of Education Organization Secretariat (SEAMEO). Moreover, the project has completed the translation of 700 books (100 per country) into Dari and Pashto (Afghanistan), Bengali (Bangladesh), Khmer (Cambodia), Lao (Lao People's Democratic Republic), Nepali (Nepal), Urdu (Pakistan), and Tetum (Timor-Leste), and 56 titles out of 100 have been translated into Dzongkha for Bhutan. Concurrently, all partners are continuing to work on converting these translated reading materials into accessible formats for children with disabilities (UNESCO Bangkok, 2020).

This effort will be integrated in the Global Digital Library (GDL), a multi-stakeholder collaborative endeavor led by the Norwegian Agency for Development Cooperation (Norad), which collects existing high-quality open educational reading resources, and makes them available on the Web, via mobile and for print in 76 languages. GDL contents are also available offline via Kolibri,[36] created by the non-profit Learning Equality (also member of GEC).

36 Kolibri is an adaptable set of open solutions specially developed to support learning for the students without Internet access. Centered around an offline-first learning platform, the Kolibri product ecosystem includes a curricular tool, a library of open educational resources, and a toolkit of resources to support training and implementation in formal, informal, and non-formal learning environments.

LEARNING CONTINUITY AT A SCALE THAT REACHES THE MOST MARGINALIZED

The component, led by UNICEF and the World Bank, supports countries in the planning and roll out of multi-faceted remote learning that includes the effective use of print, radio, television, and mobile technology for remote learning in low-resource environments (World Bank, 2020). A short and long-term plan is under development for the creation of different resources/tools, curation of existing experiences, and content to be deployed via remote learning, focusing on how to make additional content available. Multimedia will be used to share information about remote and online learning opportunities while content will be aligned with existing curricula, ensuring that the learning opportunities correspond to educational objectives.

Some toolkits[37] and multimedia resources[38] are available to students, such as girls' education toolkit,[39] toolkit for teachers,[40] caregivers, and policymakers, with a focus on supporting the most marginalized[41] students in low-resource environments (e.g., practical guide to blended/remote learning and children with disabilities).[42] This work encompasses both home-based learning and accelerated learning programs in schools. Based on existing multi-country initiatives, content available on the Learning Passport[43] will be expanded with support from Microsoft and Cambridge Education. To help learning to continue, helpdesks are being created to support caregivers, teachers, and students, while existing and new tools for teachers will be made available on remote, asynchronous learning, and assessing learning. Specific emphasis is

37 More information available at: https://www.worldbank.org/en/topic/edutech/brief/edtech-toolkit-for-remote-learning

38 More information available at: https://www.worldbank.org/en/topic/education/brief/read-at-home

39 More information available at: https://www.unicef.org/reports/reimagining-girls-education

40 More information available at: https://www.worldbank.org/en/topic/teachers/brief/technology-for-teaching

41 More information available at: https://www.unicef.org/reports/resources-catalogue

42 More information available at: https://www.unicef.org/reports/practical-guide

43 According to UNICEF, the Learning Passport is an online, mobile, and offline platform that enables continuous access to quality education. It is highly flexible and adaptable, allowing countries to adopt the Learning Passport easily and quickly as its national learning management system or use it to complement existing digital learning platforms. More information available at: https://www.learningpassport.org/faqs

placed on supporting the use of existing low-tech and no-tech (including offline) solutions while also supplemental guidance and support on how to use and access remote learning content will be developed and made available to students, caregivers, and teachers.

MONITORING, EVIDENCE, LEARNING, AND PREPARATION FOR FUTURE EMERGENCIES

Knowledge generation, curation, brokering, and mobilization are essential to support governments in responding to the current context of social, economic, and educational disruptions caused by the COVID-19 pandemic. Robust data, evidence, monitoring, and evaluation are essential to understand the variety of education responses to COVID-19 in different contexts and draw lessons learned to build more resilient education systems that are better prepared for the future. This component is producing joint surveys, rapid impact assessments in Asia, Pacific and West and Central Africa, and reports on the gender impact of COVID-19 (UIS, n.d., 2021). The UIS, through its leadership in the data collection, has implemented the development, administration, and reporting of surveys: the work was conducted in 142 countries in collaboration with the World Bank, UNICEF (UNESCO, 2020a), and the Organisation for Economic Co-operation and Development (OECD) (in the third iteration). There have been three iterations of surveys which provided up-to-date information on the education policy interventions and global responses to the pandemic to support subsequent educational planning and programming.

BOX 7 – STUDIES ON NATIONAL RESPONSES TO COVID-19 SCHOOL CLOSURES

Although COVID-19 has disrupted learning globally, it has also revealed the enormous potential for innovation and reform of education systems, according to the latest report of the Survey on National Education Responses to COVID-19 School Closures (UNESCO, UIS, UNICEF, UNICEF Office of Research – Innocenti, & World Bank, 2021). In this third iteration, 142 countries responded to the survey, which covered four levels of education: Pre-primary, Primary, Lower Secondary, and Upper Secondary (UNESCO Asia and Pacific Regional Bureau for Education, 2021). The survey showed that only 25% of low-income countries – compared to 96% of high-income countries – reported regular or extra expenditure on digital learning during the pandemic; moreover, only 27% of low- and lower-middle-income countries had a fully operationalized policy on ICT in education accompanied with explicit guidance. If governments aim to advance in inclusive hybrid learning and in digital skills acquisition by teachers and learners, it will be necessary to improve country digital readiness, increase investments and create new national sector-wide and whole-government policies focusing on the most marginalized.

Studies are also underway[44] on the longer-term impact of the crisis on education system planning and management. They aim to draw lessons for future responses to mitigate the impact of school closures.[45] Such studies focus on three areas: the impact of the crisis on learning; on equity and inclusion (global survey on gendered effects) (UNESCO, 2021e); and on financing.

Focused on the impact of the crisis on learning, a study (UNESCO Dakar, *in press*), initially conducted in six countries, is collecting evidence the effectiveness of measures taken to support learning during school closures. Participating countries include Côte d'Ivoire, Democratic Republic of the Congo, Gambia, Guinea, Mali, and Tanzania. The study also aims to introduce a new method for learning assessment in the target countries, drawing on the recent efforts by UNESCO and the World Bank to pool items from different assessments, to create an education test that measures globally referenced competency levels and develops the capacity of countries to monitor learning after the crisis.

Another study focused on the impact of the crisis on financing, assessed the consequences of pressures of domestic and international public financing for education. It builds on ongoing work of the Global Education Finance Platform that was recently launched by the World Bank in cooperation with International Monetary Fund (IMF) and key stakeholders (GEM Report, 2020b). Results from this work and related analyses on the financial impact of COVID-19 on education were published in three policy papers – Aid to Education (GEM Report, 2020b), Financing Gap for SDG 4,[46] Equity in Education through Financing[47] – and a special publication on global education financing trends is underway.

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44 More information available at: UNESCO (2021e) and UNESCO Asia and Pacific Regional Bureau for Education (n.d.).

45 More information available at: http://covid19.uis.unesco.org/covid-planning-units/

46 More information available at: https://en.unesco.org/gem-report/COVIDcostSDG4

47 More information available at: https://en.unesco.org/gem-report/financing-for-equity

IS HYBRID LEARNING THE WAY FORWARD?

The pandemic has moved digital learning or learning supported by technologies from a nice-to-have component to the center of education systems. According to the joint survey carried out by UNESCO, UIS, UNICEF, the World Bank, and OECD (2021), most countries (89%) have introduced at least one measure to increase access to the devices and connectivity needed for online learning during the pandemic. This most frequently took the form of making access available from mobile devices or offering Internet access at subsidized or no cost.

School closures also exposed the digital divide within and across countries, which remains an important challenge. We have also witnessed the many ways through which connected educational technologies can heighten learning inequalities. A study funded by the Inter-American Development Bank (IADB) estimated that the transition towards remote learning had resulted in a significantly higher dropout risk in Secondary Education in Brazil (365% higher than before the pandemic, an increase in nearly four times). The paper argues that the transition to remote learning in the context of COVID-19 could lead to dramatic setbacks for school enrollment and learning outcomes, especially in developing countries (Lichand, Dória, Neto, & Cossi, 2021).

Despite this and other challenges – that must be addressed in any planning on using remote or hybrid learning –, countries employed a mix of high- and lower-tech distance education modalities or combination of them, ranging from online learning, messaging, short message services (SMS), radio, and TV to take-home resources and paper-based materials (Broadband Commission for Sustainable Development, 2021). Around the world, there have been promising examples of connectivity and digital resources being harnessed for education. However, more evidence and studies analyzing these practices are needed.

In the past months, the Broadband Commission Working Group on Digital Learning has worked as a key cluster to provide inputs to the international community dialogue on education and training recovery, resilience, and future development, with a specific focus on digital learning (Broadband Commission for Sustainable Development, 2021). During this work, UNESCO led the discussions on hybrid learning, aimed

at understanding the human dimension that facilitates effective hybrid learning, including analysis on appropriate roles for teachers and educators, sustainable models of curriculum-aligned resource production and dissemination, and successful household and blended pedagogical learning practices.

Since many schools and learning centers will potentially keep social distancing measures, reducing the number of students per classroom, it is possible to include some days of remote schooling through technology. It is expected that hybrid education will be increasingly adopted, despite there being little evidence available as to hybrid learning's effectiveness when implemented on a large scale. In this regard, all these new experiences should be monitored and evaluated. Some organizations and studies are seeing hybrid learning as an opportunity for the digital transformation of education systems and to promote learning with greater quality, inclusion, and flexibility. Hence, the pedagogical approach of hybrid models should be guided, to the extent possible, by "deep learning," that is, learning that involves student-based experiences, is individualized, relevant and engaging, and which generates learning and skills that can be used throughout life (Ortiz, Brechner, Alfaro, & Vásquez, 2020).

Although different teaching methods have been referenced and categorized to date in hybrid learning practice, there is no single model; therefore, education systems and teachers will need to develop their own hybrid model choosing what is best suited for their context. Yet, most models coincide with having the pedagogical focus on student-centered, active, and collaborative learning and applying the target concepts to solve problems.

Nonetheless, teacher-centered content delivery can still be applied. As the Open University's Emeritus Professor, Mike Sharples,[48] argued at the Broadband Commission Working Group, there are many occasions when teacher-centered content delivery can be valuable, for example, in learning languages, science topics, arithmetic, and mathematics.

48 More information available at: https://iet.open.ac.uk/people/mike.sharples

It is important not to replace one teaching method with another, but to adapt teaching to learning needs. For example, a new topic in mathematics, such as trigonometry, might first be taught by teacher demonstrations of its use in everyday life, then teacher-led explanation of key principles and methods, then individual practice with worked examples, followed by group problem solving with formative feedback, and then perhaps situated exercises. All these actions are equally important for an effective learning.

The emphasis should be on how each model/method can be enacted in a hybrid mode: face-to-face classroom, online, and a combination of both. The flipped classroom model, for example, could be done entirely at home (with students learning from laptops, then having a teacher-guided session), or entirely online (with the teacher-led discussion and support via Zoom, for example), or in a combination of both.

According to Professor Sharples, the following potential benefits and challenges can be identified in different teaching methods (Table 2).

TABLE 2 – BENEFITS AND CHALLENGES OF DIFFERENT TEACHING METHODS

TEACHING METHOD	BENEFITS	CHALLENGES
All online	Students can access classes from any location.	Socialization of students, can be tiring and requires high bandwidth, access to a quiet location with a computer, etc.
All in face-to-face classroom	Easier for the teacher and institution to manage; students can socialize and engage in variety of groupwork.	May not be possible in an emergency, since requires travel.
Student choice of online or classroom	Student choice and flexibility.	Much more difficult for the teacher and institution to manage.

SOURCE: PREPARED BY THE AUTHOR BASED ON DISCUSSIONS WITH PROFESSOR MIKE SHARPLES IN THE CONTEXT OF ELABORATING THE BROADBAND COMMISSION FOR SUSTAINABLE DEVELOPMENT REPORT (2021).

Moreover, Charley Wright, Connected Education Lead at the UNHCR, in his contribution to the Broadband Commission Working Group on digital learning,[49] argued that the delivery

49 Based on discussions in the context of elaborating the Broadband Commission for Sustainable Development report (2021).

of hybrid learning implies the analysis of six areas: (i) models of hybrid learning; (ii) teacher support and role expansion; (iii) tools and strategies; (iv) content and OER; (v) digital skills building; and (vi) system level interventions.

BOX 8 – HYBRID LEARNING: KEY TOPICS FOR ANALYSIS

Models of hybrid learning
Considers the most appropriate hybrid learning delivery modality or the combinations and situations in which they may work best.

Teacher support and role expansion
Considers the changing role of the teacher in the context of hybrid learning and the types of teacher support (training in ICT and pedagogy skills, emotional, design, etc.) needed to help with this new role, and ways in which systems might provide teachers this support.

Tools and strategies
Maps the range of tools, both digital and analog, that support and complement hybrid learning and create a more seamless, engaging student experience online and offline and resource allocation strategies.

Content and OER
Emphasizes the critical need for contextually relevant, appropriate, and free digital content aligned with national curricula.

Digital skills building
Looks at the interplay between digital skills and hybrid learning, and the ways in which they mutually reinforce one another. It is key to understand the digital readiness, the digital skills and ICT support capacity required by teachers, students, schools, and parents to support hybrid learning.

System level interventions
Analyzes interventions at system level, including whole-of-government approaches, which support the digital transition of education and training systems and specifically the sustainable implementation of hybrid learning.

SOURCE: ADAPTED FROM CHARLEY WRIGHT CONTRIBUTION TO THE WORK TO PREPARE THE BROADBAND COMMISSION FOR SUSTAINABLE DEVELOPMENT REPORT (2021).

Finally, digital technologies have supported education and training systems, economies, and societies during the pandemic and the recovery phase. At present, we observe the emergence of a new global information infrastructure, where Artificial Intelligence (AI), machine learning and Data Analytics distributed digital ledgers such as block-chain, 5G, Augmented Reality (AR), and Virtual Reality

(VR). New cloud-to-edge architectures of the Internet can potentially create a new foundation for societies, impacting how we design and deliver hybrid learning; however, this will only be a reality if there is an inclusive approach to digital skills – if students, teachers, and families can develop the right set of digital skills and competencies. We must ensure that digital skills strategies are designed with the aim to establish digitally inclusive societies for all, including the most marginalized groups, so that all citizens are equipped with the digital skill sets they require to access and use technology in a responsible, safe, and empowering way.

DIGITAL SKILLS BUILDING IN THE CONTEXT OF HYBRID LEARNING

Digital skills are broadly defined as a set of abilities to access, manage, understand, integrate, communicate, evaluate, and create information safely and appropriately through digital technologies for learning, employment, decent jobs, and entrepreneurship. These include competencies that are variously referred to as computer literacy, ICT literacy, information literacy, and media literacy (UNESCO, 2018b). Digital skills and competencies exist on a graduated continuum, from basic functional skills to higher level, that can be defined and developed within and beyond formal curricula and should consider disadvantaged groups. Nonetheless, the question of how digital skills and competencies can be developed on a sustainable basis by all people – young and old, girls and boys, rich and poor – is an ongoing challenge for governments around the world (Atchoarena et al., 2017).

More recent digital skills developments go from introducing basic digital literacy in national curricula to developing advanced AI literacy across a full range of education contexts, which include schools, colleges, HEI, and non-formal provision and training, as there is a significant digital skills gap all over the world.

In a hybrid learning context, the digital skills of teachers and families must also be considered. In the OECD countries, for example, 56% of adults had no digital or ICT skills or had only the skills to fulfill the simplest set of tasks in technology-rich environments (OECD, 2016). In addition,

in all the countries participating in the Programme for the International Assessment of Adult Competencies (PIAAC), there were many adults with no experience using computers, with extremely limited ICT skills, or with low levels of proficiency in problem solving in technology-rich environments domain (OECD, 2019).

As mentioned, discussions about models of hybrid learning usually focus on the ways in which they enhance flexibility, personalization, and student agency over when, where, and how they learn. Therefore, an open question to be answered by educators is: which are the right set of digital skills (including basic and intermediate) that learners need to develop to enjoy a student-centered, active, collaborative, and problem-solving hybrid learning experience? These may encompass collaborating, managing identity and safety, engaging in citizenship, developing content, programming, data analysis, etc., moving toward proficiency across several relevant competencies.

Not all students will equally have the same levels of proficiency for each one of the combinations of hybrid learning described. Therefore, it is critical to equip learners with the skills to learn by themselves, be motivated, resilient, and empowered (Barron, Cobo, Ciarrusta, & Muñoz-Najar, 2021). Most of these skills go beyond the "digital skills set" and are designed to empower students' voices and ensure that learning is a student-driven process. For instance, the International Society for Technology in Education (ISTE) standards for students could work for different hybrid learning models as it showcases how to bring to a learning environment a set of student standards. These could include the following: Empowered Learner, Digital Citizen, Knowledge Constructor, Innovative Designer, Computational Thinker, Creative Communicator, and Global Collaborator.[50] In other words, some of the most relevant "digital skills" arise from developments that may not involve the direct use of digital technology. Moreover, digital skills must work in concert with other complementary cognitive and non-cognitive

50 More information available at: https://www.iste.org/standards/iste-standards-for-students

skills, such as strong literacy and numeracy skills, as well as a host of intrapersonal and interpersonal skills, including critical and innovative thinking (UNESCO, 2018a; 2018b).

The UN established that Sustainable Development and Global Citizenship Education are at the core of SDG 4 Target 4.7 (ONU, 2016), which aims to ensure that all learners acquire the knowledge and skills needed to promote sustainable development, including, among others, education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non-violence, global citizenship, and appreciation of cultural diversity and of culture's contribution to sustainable development. SDG 4 Target 4.7 and all SDGs must be deliberately part of any hybrid learning model: the good news is that there is already an indicator to measure progress o n the percentage of youth and adults who have achieved at least a minimum level of proficiency in digital literacy skills. To reach this target, it is imperative to define a broader understanding of digital skills that have relevance in a hybrid learning context.

Time will tell if hybrid learning is the way forward; nonetheless, this is currently far from being a clear, evidence-based approach, since it still requires strong analysis of learning benefits and teaching issues for each of its potential model and combinations. In this regard, strategies to improve remote learning will continue to be relevant when most schools have reopened, and hybrid learning becomes the main operating model (World Bank, 2021a). For an effective shift to hybrid learning, teachers, students, and families should have an active voice and ownership in the design of the best suitable model for their context.

BUILDING BLOCKS TO BUILD BACK BETTER: DIGITAL TECHNOLOGIES IN EDUCATION

The inter-sectorial and multi-stakeholder international cooperation examples mentioned in this chapter show that collaboration is the way forward when facing pressing challenges such as the COVID-19 pandemic. In order to advance in the use of digital technologies to support learning in the period of recovery from the pandemic and take this as an opportunity to reimagine education, the following key

messages should be considered by policymakers working on digital transformation programs (GEC, n.d.c).[51]

ALIGNMENT WITH NATIONAL EDUCATION STRATEGY AND WHOLE-OF-GOVERNMENT COLLABORATION

The emergency distance learning strategy should be aligned with the Ministries of Education's priorities and ICT in Education policy and master plan, identifying the current needs and the knowledge gaps in this field. The strategy should also be built within common inter-sectoral and whole-of-government understanding of the critical educational issues, constraints, needs, and overall strategic goals for the education system. It should promote cross-ministry coordination, joint initiatives, and policy alignment for connectivity and infrastructure in relation to hybrid learning, with stable and sustainable financing plans. It is about connecting the planning and delivery of education before, during, and after the crisis, following a "crisis sensitive planning" approach, avoiding a one-off effort, contributing to building a country-wide ICT in education readiness as well as strengthening its education system.

ACCESS, PRIVACY, AND SECURITY

There should be an increase in the affordability, availability, and accessibility of distance learning solutions, such as zero-rating access to educational content through different measures –and with strong dialogue among government, practitioners, donors, technology industry, families, and other multi-stakeholder partners. At the same time, it is crucial to create measures for safe educational data management, privacy, security, and ownership.

EQUITY AND INCLUSION

Equity should be put at the heart of education emergency responses. Plan for equality, inclusive, and quality distance learning solutions. Consider students' wellbeing, following

51 More information available at: https://unesdoc.unesco.org/ark:/48223/pf0000373305

Universal Design principles, addressing the needs and rights of the most vulnerable groups including students with learning difficulties, children, and youth with disabilities, attending to girls' specific needs, refugees, displaced and migrant population, and those currently without access to any distance learning opportunities.

CONTEXT

Being aware of context and critical factors, during and after the crisis, is fundamental, since students, families, and teachers are not in a regular learning environment. Besides, it is not just them who are under pressure: everybody in their communities is facing multiple challenges and students do not have access to a functioning learning ecosystem. Furthermore, most parents are unprepared for distance learning and home-schooling, potentially lacking digital skills; in this regard, parents with limited education and resources are especially impacted by this lack of preparedness.

HI-TECH, LOW-TECH, AND NO-TECH

It is important to design the emergency distance learning plan or hybrid learning modalities combining hi-tech, low-tech, and no-tech solutions, and students grade bands, aligning with typical Primary, Lower Secondary Education, Upper Secondary Education, Technical and Vocational Education and Training (TVET), and Higher Education levels. In addition, when implementing tech solutions, one should be aware of sustainability and scale factors. Technology maintenance and teacher training costs should be taken into account, since this will contribute to better learning outcomes after the crisis and during hybrid learning, and also to set up contingency capacities that mitigate and manage future emergencies.

TEACHER'S SUPPORT

It is fundamental that the critical roles that teachers, trainers, and facilitators play in any school closure response and recovery are recognized, as they facilitate learning processes and improve psychosocial wellbeing. In this regard, adequate teacher support and training should be

provided. Furthermore, improving teachers' ICT and pedagogical competencies, as well as Sustainable Development and Global Citizenship Education (SDG 4, Target 4.7), will contribute to develop these skills in their students. In addition, ICT use can help students become collaborative, problem-solving, creative learners, and innovative and engaged members of society (UNESCO, 2018b).

STUDENTS' ENGAGEMENT

It is important to improve student engagement through different pedagogical approaches according to age groups, as well as merge technology and digital tools appropriately, whatever hybrid learning model, with a pedagogy that develops socially active online learning (when feasible), games, and fun activities. Furthermore, cooperative interaction and collaborative learning should be encouraged, in addition to group work to improve engagement and effective learning to avoid student dropout (even in low-tech scenarios, radio and TV, combinations of multi-modal media can be used – SMS, messaging applications such as WhatsApp, Telegram, combined with TV, radio, Internet, etc.).

OPEN EDUCATION RESOURCES

It is fundamental to build on existing OER, fostering international exchange of resources and language and context-sensitive OER sharing. In this regard, it is key for new initiatives to draw on existing and established resources to support their programming, as well as align digital resources with a locally contextualized curriculum.

MONITORING AND ASSESSMENT

It is essential that a formative monitoring, assessment, and feedback system is created, providing direct individual online daily check-ins for students with learning difficulties as well as observing the overall wellbeing of students. This formative monitoring can contribute to students re-joining their level of schooling and competency once the crisis is over.

FINAL REMARKS

UNESCO had signaled a "learning crisis" threatening progress on achieving the SDGs before COVID-19. However, the ongoing pandemic is generating severe economic, social, and educational setbacks, pushing more than 88 million people into extreme poverty and two thirds of an academic year lost on average due to worldwide school closures (World Bank, 2021b). During the pandemic, in some countries, a full academic year was lost, increasing the risk of dropouts.

Structural inequality ingrained in most developing countries creates barriers to citizens, generating an intersectionality of discrimination and representing the main challenge for progress towards fair and sustainable development (UNESCO & Tang, 2017). Hence, without clear and concerted efforts, we risk a generation of children and young people never returning to education.

After almost two years into the pandemic, even with school reopening efforts, education and training systems still face significant disruptions to their education and an increase of learning losses. Latin America and the Caribbean countries had the most days lost (as of March 2021, 5 months – 20 weeks of complete nation-wide closures on average[52]). Ensuring the continuity and recovery of education systems, including hybrid learning, remains a top priority. Comprehensive national distance learning strategies should consist of planned rapid responses to solve immediate problems now, but they also need to formulate a vision for a more resilient future.

Education is the cornerstone of the 2030 Agenda (UN, 2016). It fuels sustainable development, and it is at the core of building human capital that allows all SDGs to be fulfilled. Therefore, these are alarming figures both in terms of the waste of human potential and for the prospects of achieving sustainable development.

In this chapter, we learned about how distance learning remediation responses across the diversity of modalities were deployed, and we also analyzed some educational resources and tools made available, and the support provided by different stakeholders to teachers, learners, and education

52 More information available at: https://en.unesco.org/news/unesco-figures-show-two-thirds-academic-year-lost-average-worldwide-due-covid-19-school

communities. In this regard, we saw that although remediation programs are essential, a lifelong and life-wide holistic learning strategy is needed to continue recovering learning losses and attract this generation to flexible and quality learning ecosystems. COVID-19, perhaps the greatest challenge we have faced since World War Two, continues to impact learners, teachers, and families in many countries. Therefore, the international community and governments must design bold and wide-ranging policies, innovative strategies, and programs to support those most in need paving the way to 2030 and beyond.

In this chapter, we also discussed how to build future ready education systems. Based on a better understanding of the intersectionality of inequalities reinforced by the pandemic, we called for holistic approaches[53] that contribute to a whole-of-government and society response to the learning crisis, reinforcing equity and inclusion in learning ecosystems, boosting OER solutions, generating flexible learning pathways. All actions should respect learners privacy, security, and their context, focusing on vulnerable populations with: (i) inclusive multi-modal hybrid learning strategies; (ii) supporting and empowering teachers while improving student engagement; (iii) continuing measurement of the impact of the distance and hybrid learning responses; and (iv) developing and reviewing education policies, operationalizing[54] digital transformation strategies to generate more open, inclusive, and quality education systems, focused on accelerating progress towards SDG 4.

The COVID-19 pandemic has shown existing deficiencies on the achievement of the 2030 Agenda (ONU, 2016) for education and has deepened them, making the challenges confronting the world more significant than ever. Only a joint effort and innovative approaches with a focus on an agenda that puts fairness and equity at its heart and that draws together actors from every part of the education agenda can get us back on track and provide hope of quality education for all.

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53 More information available in the section: "Building blocks to build back better: Digital technologies in education" (p. 70).

54 Only 27% of low- and lower-middle-income countries had a fully operationalized policy on ICT in education accompanied with explicit guidance (UNESCO et al., 2021).

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CHAPTER 2

Exploring the deployment, perceived effectiveness, and monitoring of remote learning[1] [2]

Maria Barron Rodriguez,[3] Cristóbal Cobo,[4] Alberto Muñoz-Najar,[5] and Iñaki Sánchez Ciarrusta[6]

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1 This text is an excerpt of a homonymous publication by the World Bank about the perceived effectiveness of remote learning during the early months of the COVID-19 pandemic. The full publication is available at: https://openknowledge.worldbank.org/handle/10986/36061. The study Remote Learning During the Global School Lockdown: Multi-Country Lessons is part of a larger global study conducted by the World Bank and is available at: https://www.worldbank.org/en/topic/edutech/brief/how-countries-are-using-edtech-to-support-remote-learning-during-the-covid-19-pandemic. Profound gratitude is extended to Leandro Costa – Senior Education Specialist for the Education Global Practice at the World Bank, as well as to all the people who collaborated with this article.

2 This disclaimer informs readers that the opinions expressed in the text belong to the authors, and not necessarily to the World Bank. The information contained in this chapter was collected between May and November 2020, and given the space and time constraints, it does not guarantee completeness of country responses to COVID-19.

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6 Aeronautical Engineer and a teacher passionate about education. As an analyst with the World Bank's global EdTech team, he works on issues at the intersection of technology use and education in middle- and low-income countries, on the support and coordination of different communities of practice; strategic support to Bank management and clients; development of new knowledge products; engagement with external partners; and development of knowledge in areas such as digital infrastructure and blockchain technologies.

INTRODUCTION

The COVID-19 pandemic has caused the largest school closure (totally or partially) in recent history. In view of this situation, simulations across different countries suggest that learning gains previously achieved by students will be partly lost (Centro de estudios MINEDUC, 2020), specially by children from disadvantaged backgrounds, who suffered this educational crisis even more and can be at a higher risk of dropping out of school. In this period, countries had to rely on emergency responses using remote learning that was mostly based on videos, audio/radio, computer technologies, and/or printed material.

To better understand the effects of this educational crisis, as well as to analyze the perceived effectiveness of remote learning solutions, the World Bank Group's Technology and Innovation in Education (EdTech) team conducted an exploratory study synthesizing the main national education actions to mitigate learning losses (Barron Rodriguez, Cobo, Muñoz-Najar, & Ciarrusta, 2020) deployed by a group of selected countries from the regions of Africa and the Middle East, Asia and Eastern Europe, and Latin America and the Caribbean. The main focus of this research was to better understand the perceptions of education experts regarding the effectiveness of remote and remedial learning programs implemented in their countries. To evaluate outcomes, this study follows a holistic approach when referencing the term "effectiveness" by not only associating effectivity to learning outcomes, but also to the quality of remote education programs and policies to foster student engagement, increase coverage and usage, and reduce implementation costs and time.

This chapter is an excerpt of this exploratory study composed by three phases and guided by the principles developed by the World Bank in the report Reimagining Human Connections (Hawkins, Trucano, Cobo, Twinomugisha, & Ciarrusta, 2020) and by the framework of the report The COVID-19 Pandemic: Shocks to Education and Policy Responses (World Bank, 2020d). The research findings that emerge from this study are structured in five pillars: (i) design EdTech policies with a clear purpose, taking into consideration the desired academic

changes and the related social and emotional aspects; (ii) develop remote learning programs that are contextual and inclusive to achieve scale and sustainability for all; (iii) guarantee sustained teacher training and in-service support to ensure teachers' interaction with students; (iv) engage a broad set of stakeholders of the education community to enable and/or continue distance learning; and (v) monitor processes and outcomes to better understand the effectiveness of the strategy, the learning outcomes and to troubleshoot. This chapter represents an abridged version of the complete study, which was included in a recent publication of the World Bank.

METHODOLOGY

This chapter is divided into three main sections that correspond to three different phases of an exploratory study conducted by the World Bank's EdTech Group. The sections have been organized in chronological order.

The first section presents the findings of a review of secondary sources on education emergency responses in low- and middle-income countries. Over 40 research studies, policy documents, articles, and datasets were reviewed to provide a general overview of the emergency education responses of over 120 governments from April to May 2020. It was conducted early on to provide a broad overview of how countries in different regions (Africa and the Middle East, Asia and Eastern Europe, and Latin America and the Caribbean) responded to the emergency of the situation, and to guide the next phases of the study.

The second section draws on an in-depth analysis of five countries (Brazil, Kenya, Nigeria, Peru, and Sierra Leone) in order to understand the perceived effectiveness of remote learning. To do so, this section provides a comprehensive understanding of education responses to COVID-19 through the voices and perceptions of key education experts in each of the countries, which were purposefully invited to participate in this stage of the study, since they were implementing innovative approaches to respond to the COVID-19 pandemic. Sixty semi-structured interviews were conducted between May and July 2020 with key informants, such as policymakers from the Ministry of Education, teacher union officers, and leaders of non-governmental organizations (NGO), among other experts.

To complement, over 70 documents and online resources of the five selected countries were reviewed in this section.

The third section presents an analysis across 13 countries to understand what works with remote and remedial strategies. For this phase, the data collection process followed a multi-method approach that included semi-structured surveys and interviews with at least three profiles of education experts: an EdTech policymaker, the head of a local education unit or an NGO, and a researcher or academic in the field of education. In total, over 70 surveys and interviews were conducted between September and November 2020. The country selection criteria focused largely on low- and lower-middle-income countries from the three regions addressed in the first phase of the study. Additionally, as the focus of this study was also to learn from countries with vast remote learning experience, two high-income countries were included in the report. In this phase, the countries prioritized are all part of the International Development Association (IDA), of which six were low-income countries, namely Afghanistan, Haiti, Malawi, Mozambique, Niger, and Rwanda; and five were lower-middle-income countries, namely Cambodia, Cameroon, Kenya, Nepal, and Pakistan. Also, two high-income countries, Estonia and Uruguay, were included because both governments have been building technical capacity for remote teaching and learning for several years.

This research aims to provide rich descriptions provided by education experts in the selected countries, contributing to a broader understanding of education responses to COVID-19, including the perceived effectiveness of the remote and remedial programs implemented. The findings of this study not only apply to cases in which this research is based, but can also be applied to other places with contexts that are comparable with the present case study.

THE FIVE PILLARS: A SUMMARY OF MAIN FINDINGS

The main findings of this study can be translated into five pillars described in this section and that also guide the analysis of this chapter. The selected themes are in line with the key principles identified by the World Bank in aforementioned reports that address Education Systems and EdTech (Box 1).

BOX 1 - KEY PRINCIPLES: EDUCATION SYSTEMS AND EDTECH

The World Bank advocates attention to five key principles of education systems that invest in EdTech.

Principle 1: Ask why
Design EdTech policies with a clear purpose, considering both the desired academic change and the socio-emotional aspect.

Principle 2: Design and act at scale, for all
Develop remote learning programs that are contextual and inclusive to achieve scale and sustainability for all.

Principle 3: Empower teachers
Secure sustained teacher training and in-service support to ensure teachers' interaction with students.

Principle 4: Engage the ecosystem
Engage a broad set of stakeholders of the education community to enable and/or continue distance learning.

Principle 5: Be data-driven
Monitor processes and outcomes, to better understand the effectiveness of the strategy, the learning outcomes, and troubleshooting.

SOURCE: HAWKINS ET AL. (2020).

Pillar 1. Delivery systems: Adopt delivery systems with an inclusive approach

Multimodal delivery systems are effective to increase coverage but need to be complemented with a clear communication strategy and contextualized according to the local needs. While a clear communication strategy is a critical first step to let students and caregivers know the program, equally important is adjusting the delivery systems to the local needs to ensure an effective use by the target population. Access to devices for remote learning, Internet connectivity, prior experience with the delivery system, teacher preparedness and capacity, and quality of contents are among the contextual factors that need to be evaluated when designing and deploying remote education programs. Cambodia's government, for example, understood the country's infrastructure limitations and, with support from the Global Partnership for Education (GPE),

provided school block grants to procure basic equipment to support continuous learning, including paper-based learning materials for the most vulnerable students (GPE, 2021a). The large-scale paper-based strategy was complemented with short message services (SMS) and Telegram.

Equally important in education responses to COVID-19 was to implement delivery systems following a Universal Design for Learning (UDL) approach to effectively reach a diverse student population. Since students within a classroom have diverse needs, the UDL approach recognized that delivery systems should follow a design that takes into account their necessities. In Peru, TV learning sessions were supported with sign language, the website was adapted for students with disabilities and radio content was delivered in nine native languages.[7] Likewise, in Mozambique, TV programs were supported with sign language, self-study materials were distributed to reach vulnerable children, and radio learning programs had content both in Portuguese and other local languages (Education Cannot Wait, 2020).

Pillar 2. Curriculum adjustments: Adjust the curriculum to ensure effectiveness

Adjustments to the curriculum and content curation are effective to reduce costs and use time more efficiently. Especially for countries that were experiencing distance education for the first time, lacked a repository of contents or had limited TV or radio airtime, content curation, and curriculum adjustments were necessary. For example, in Nepal, education experts perceived that adjusting the curriculum was a highly effective strategy to reduce costs when implementing remote learning programs; in fact, Nepal's Ministry of Education worked in collaboration with the Curriculum Development Center and nonprofit organizations to adjust the curriculum to just focus on core subjects and foundational knowledge for Pre-primary and Primary schools (UNESCO, 2020). Pakistan's Ministry of Federal Education selected English, Mathematics, and Sciences as core subjects to be prioritized through the TeleSchool re-

7 More information available at: https://www.youtube.com/user/perueduca/playlists%22%20

mote learning program (Zacharia, 2020). According to education experts in the country, this strategy enabled the education departments to reduce costs, be more responsive, and ensure that the content was rolled out quicker.

Curriculum adjustments should not only focus on academic competencies that are examinable but also on competencies that are relevant in the current situation of the pandemic. In this regard, policymakers have to consider prioritizing non-academic competencies to support students coping with challenging situations they might be facing at home due to the COVID-19 pandemic. Countries that have considered these competencies have seen students gain autonomy and discover new ways of learning (France, 2020). For example, in Estonia, the study Children's Experiences with Digital Learning During COVID-19 Period[8] conducted by the Independent Polling System of Society (IPSOS) and the World Childhood Foundation has shown that approximately 90% of students were satisfied with remote learning, and they were happier, healthier, and enjoying remote independent learning during the period of school closures due to higher levels of self-directed learning.

Pillar 3. Teacher support: Secure sustained teacher training and in-service support

Sustained professional development through preservice and in-service teacher training, and remote coaching programs, are effective strategies to equip teachers with the tools required for remote and remedial teaching–learning. The state of Edo in Nigeria trained all 11,000 Primary school teachers who were part of the Edo-BEST program in the past two years to effectively use digital technologies in the classroom (Oviawe et al., 2019). Uruguay's Institute for in-Service Teacher Training (*Instituto de Formación en Servicio* – IFS) took a coaching program online that provided pedagogical support to teachers prior to COVID-19 (IFS, 2021). Moreover, Uruguayan teachers could access a comprehensive toolkit of teaching resources (Plan Ceibal, 2020) such as dis-

8 More information available at: https://www.ipsos.com/en/childrens-experiences-digital-learning-during-covid-19

cussion forums, virtual training, and guidelines for remote teaching through CREA platform, a Learning Management System (LMS) used by teachers for several years. Over 90% of Uruguayans were satisfied or very satisfied (Ripani, 2020) with the remote training received during the pandemic. Thus, prior training and coaching worked to pivot toward remote teaching-learning during COVID-19.

During the pandemic, although guidelines for remote education have helped to clarify the enhanced role for teachers, an excessive administrative workload may have generated burnout and reduced pedagogical effectiveness. Our research found that the pandemic evidenced the need to recalibrate how teachers divide their time between direct teaching and administrative workload, because too much attention was given to the latter. In Brazil, according to a survey conducted by Instituto Península (2020), 83% of teachers did not consider themselves being prepared to teach remotely, 67% were anxious, and 38% felt tired; in addition, less than 10% of teachers were satisfied. Countries took note of these problems and redesigned the reporting system to reduce the "burnout" problem. Therefore, efforts to free teachers' time from administrative tasks were critical in a time when students needed support to catch up and deal with socio-emotional issues.

Pillar 4. Monitoring and evaluation: Leverage institutional capacities while ensuring sustained monitoring and evaluation

Prior experience with distance learning programs has allowed education systems to rapidly implement existing solutions as a response to COVID-19. Some of the countries that were part of this study pivoted toward remote learning because their governments had been building technical and digital capacity for several years. Sierra Leone leveraged an existing radio learning program and relaunched it on April 6, 2020, within less than one week after schools were closed in the country (GPE, 2020b), whereas Malawi also leveraged an already existing Interactive Radio Instruction program, which was adapted to the COVID-19 context, and the lessons were then more child-centered and structured (Gondwe, 2020).

While leveraging institutional capacities gained prior to and during the pandemic was critical to ensure learning continuity, it was also important to continually monitor and evaluate education processes and outcomes to understand the effectiveness of the whole remote education strategy used to reach all students, sustain learning engagement, and increase learning outcomes. Most of the selected countries for this study focused on the supply side by designing and implementing remote learning programs and monitoring processes, while fewer focused on monitoring the demand side. Since April 2020, Peru's Ministry of Education started regularly monitoring the adoption of the national remote learning program, focusing on key indicators such as students' satisfaction with remote learning and the proportion of teachers providing constant feedback to students, among others (Perú, 2020a). In a smaller set of countries, schools and teachers started conducting formative and summative assessments. For example, in Estonia, as of June 2020, 71% of students used online formative assessments (Telia Company, 2020) and 64% received feedback from teachers. Therefore, as countries innovated in their monitoring and assessment solutions, it was again critical to consolidate institutional capacities to process and use the data gathered for guiding decision-making and make adjustments.

Pillar 5. Remedial programs: Consolidate national strategies to remediate learning losses

Several countries planned to or implemented extra support programs to remediate learning losses when schools reopened. Some governments took an *ex-post* approach toward remedial learning by postponing these programs until after schools reopened and students were assessed to identify the magnitude of the learning loss problem. Rwanda's government, for instance, designed a national diagnostic assessment for Primary and Lower Secondary schools to identify students with lower scores; after assessments took place, a remedial learning program targeted students with a poorer rate of academic progress and those at risk of repetition or dropout (GPE, 2021c). In contrast, other countries followed an *ex-ante*

approach, in which first students were supported to catch up and avoid dropping out by introducing remedial learning or accelerated learning programs, under the assumption that a large group of students was affected by school closures. For example, Mozambique's government adjusted the school calendar to first focus on catch-up strategies for students who were falling behind (GPE, 2021b), especially for grades 7, 10, and 12, as students in these grades had to sit for examinations.

The specific strategies used in the selected countries to support students in catching up varied considerably. This study identifies four main packages to remediate learning losses. First, a group of countries linked its curriculum adjustment efforts with the remedial programs implemented. Second, governments adjusted the schedules to remediate learning losses by extending class time at the end of the day or during weekends and extending the calendar year by introducing summer classes. Third, the learning format followed to remediate learning losses varied by country: while some education systems reopened schools fully to conduct such programs in classrooms with reduced class sizes, others implemented remedial programs through a blended learning approach. Fourth, countries implemented targeted catch-up programs to support students: some countries implemented remedial programs that targeted students with a poorer rate of academic progress and were generally designed to give them the individual attention needed, while others implemented accelerated learning programs designed to be completed quickly through short, intensive, and rigorous phases of learning.

Therefore, the COVID-19 pandemic presents unique opportunities to innovate the traditional school model. In this regard, although countries should seize these opportunities to build more inclusive, efficient, and resilient education systems (World Bank, 2020d), they should avoid replicating the failures of pre-COVID-19 education systems.[9] This crisis

9 An example of such failures before COVID-19 is Learning Poverty, a concept constructed by the World Bank and UIS. Many children around the world were not learning to read proficiently nor acquiring fundamental skills. 53% of children in LMIC could not read and understand a simple story by the end of Primary school. In poor countries, the level was as high as 80%. School closures have deepened this problem (World Bank, 2021a).

revealed that governments can rethink how to simplify the curriculum, adjust high-stakes examinations, and invest in building effective data gathering systems to monitor processes and learning outcomes.

WHAT CAN WE LEARN FROM EDUCATION EMERGENCY RESPONSES IN LOW AND MIDDLE INCOME COUNTRIES?

Several Low and Middle Income Countries (LMIC) reacted quickly to mitigate the effects of school closures to their respective education systems. This section analyzes governments' education responses to the COVID-19 pandemic from April until May 2020. As of this date, most LMIC focused more on coping with the emergency by designing and implementing remote learning programs aimed at reaching all students and teachers, but less on monitoring progress and designing programs for remedial learning (Table 1).

TABLE 1 – EDUCATION EMERGENCY RESPONSES IN FIVE MAIN PILLARS

DELIVERY SYSTEMS	CURRICULUM ADJUSTMENTS	TEACHER SUPPORT	MONITORING AND EVALUATION	REMEDIAL PROGRAMS
Most countries implemented multimodal learning solutions aimed at reaching all students, but the type of systems used varied across regions.	It was not a priority to adjust the curriculum at the beginning of the pandemic. Nonetheless, remote education programs were aligned with the curriculum of their respective countries.	Governments and third-sector organizations implemented support systems and training programs for teachers to help them adapt to the new normal.	Few countries demonstrated plans to conduct diagnostic evaluations or monitor progress.	By assessing learning loss, there was a need for systems to develop remedial programs to prevent an exacerbation of the achievement gap. However, at the time this section of the study was conducted, no data on remedial programs were gathered.

SOURCE: ADAPTED FROM UNICEF (2020).

This phase of the study follows a framework developed by the World Bank (2020b, 2020e) to help countries mitigate short- and long-run costs to education through three overlapping phases: (i) coping – protecting health and safety and then doing everything possible to keep students engaged through remote learning and other connections with the school; (ii)

managing continuity – as rules on social distancing are gradually relaxed, systems need to ensure that schools reopen safely, student dropout is minimized, and learning recovery starts; and (iii) building back better – avoiding replicating the failures of the pre-COVID-19 systems, in order to build toward improved systems and accelerated learning for all students. This section will focus on policies that have been adopted for coping during the pandemic, and also on the lessons learned to build back better.

This study also draws on the World Bank's guiding principles to design and implement remote learning strategies through different channels: offline, broadcast, and online (World Bank, 2020a). While evaluating the design and delivery of distance learning plans in different regions, the data analysis that follows has been guided by a concern for equity and inclusion, as well as by a need to tackle both immediate requirements and long-term objectives.

COPING POLICIES IN LATIN AMERICA AND THE CARIBBEAN

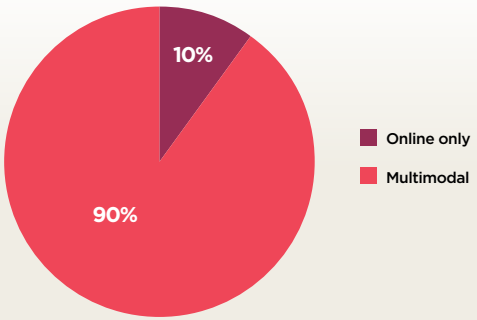
As of May 2020, prolongued school closures caused by the pandemic affected more than 140 million children in Latin America and the Caribbean (LAC) (UNICEF, 2020). Similarly to what had occurred elsewhere, the situation had negative repercussions in the region, especially in countries that lacked effective mechanisms to deliver remote learning, according to the needs of households (Ortiz et al., 2020).

According to the report developed by the Inter-American Development Bank (IDB), although most countries in Latin America already had some digital educational resources for students and teachers, few had LMS, robust learning platforms, or digital content repositories (Ortiz et al., 2020). Even more critical were the difficulties faced by the governments in the region to plan and manage nation-wide education systems; thus, doing so remotely introduced complications, especially because most countries did not have a national strategy for distance learning. Despite the aforementioned factors, governments across the LAC region were flexible and innovative to design and implement remote education systems (Cobo, Hawkins, & Rovner, 2020).

In this chapter, we stress the importance of assessing each country's infrastructure and resources to implement remote learning solutions contextualized to the local needs (World Bank, 2020e). Interestingly, according to Ortiz et al. (2020), all countries in the LAC region developed or strengthened some type of learning platform to provide remote education during the COVID-19 pandemic. However, on average, only 24% of the households of those countries had access to the Internet. At the same time, 81% of households in the region had access to a TV and 70% to a radio, but not all countries implemented learning programs that could be accessed through TV or radio. Thus, it is relevant to restate that, though digital technologies can offer scalable and engaging solutions, they are not the panacea: countries also need to ensure that content can be used offline. Even though Costa Rica, for example, has one of the highest Internet rate penetrations in the region (World Bank, 2020b), the Ministry of Education of the country planned to deliver hard copy resources for parents with no access to the Internet, which is approximately 35% of households (Statista Research Department, 2021; Cobo et al., 2020).

In this regard, countries should not use specific channels and avoid others to deliver remote learning, but combine a variety of channels more aligned with the local context. According to the United Nations Children's Fund (UNICEF)'s Global Tracker of National Education Responses to COVID-19 (UNICEF, 2020), as of May 2020, 90% of countries surveyed had implemented remote education programs using multimodal rather than unimodal strategies (Chart 1). As teachers need to complement content provided through these channels with the right guidance for students, it is crucial to support them through training so that they adapt to this new environment and improve the pedagogical skills needed to teach remotely. For those who teach in areas with Internet access and whose students have been using digital platforms to learn, the government has to make sure they have the appropriate digital skills to guide students in this process (Table 2).

CHART 1 – SHARE OF COUNTRIES SUPPLYING MULTIMODAL AND UNIMODAL STRATEGIES IN LAC



SOURCE: UNICEF (2020).

TABLE 2 – TEACHER SUPPORT IN LAC

PROGRAM	DESCRIPTION
Comunidad Atenea	Platform that allows teachers in Latinamerica and the Caribbean to share best practices.
Caja de Herramientas	Digital toolbox for teachers in Costa Rica.
Repositorio Recursos Abiertos	Open repository created by teachers for teachers in Uruguay.
Conexão Escola	Zero-rated mobile app for teacher-student interaction in the state of Minas Gerais (Brazil).
Educação em Rede	Practical remote training program for teachers across Brazil.

SOURCE: ADAPTED FROM VARKEY FOUNDATION (2020), MINISTERIO DE EDUCACIÓN PÚBLICA DE COSTA RICA (COSTA RICA, N.D.), PLAN CEIBAL (N.D.), SEEMG (MINAS GERAIS, 2020), AND FACEBOOK (2020).

In the LAC region, the Varkey Foundation launched Comunidad Atenea, a free online collaborative learning community that allowed teachers to upload educational activities to aid their peers in their professional development (Varkey Foundation, 2020). Costa Rica's Ministry of Education created a digital toolbox to support teachers with pedagogical resources, such as a guide for autonomous work (Cobo et al., 2020). In Brazil, the organization Nova Escola partnered with Facebook and created the project Educação em Rede to train over 2 million teachers in digital and pedagogical skills during the COVID-19 pandemic (Facebook, 2020). Uruguay, the only country in the region that had a LMS prior to COVID-19, was able to leverage its existing digital infrastructure to deliver remote learning and support teachers during the pandemic. This system allowed teachers to monitor student learning remotely (Ortiz et al., 2020).

LESSONS TO BUILD BACK BETTER

In addition to the implementation of coping and managing continuity policies, education systems should develop policies for improvement and acceleration of learning. Ministries, local authorities, principals, and teachers should seize the opportunity provided by COVID-19's emergency response to build stronger educational systems (World Bank, 2020d).

A key priority is to improve and scale educational initiatives that proved to be effective and integrate them into the regular education system to ensure they are maintained over time (World Bank, 2020d). Policymakers can use this time to analyze programs that were effective prior to or during COVID-19. For example, Kenya's Tusome early grade reading activity program (Wilichowski, Pushparatnam, Ding, & Molina, 2020) has been operating since 2014 by providing training and coaching to teachers, literacy textbooks to each student, and structured teacher guides to help execute lessons previously aligned with students' textbooks (Wilichowski et al., 2020). The program proved to be successful to improve learning outcomes and was scaled to reach 7 million children across Kenya (RTI International, 2021). Thus, the COVID-19 pandemic presented an opportunity for LMIC to learn from other programs, such as Tusome, when education policymakers redesigned their strategies for learning recovery as schools reopened (Wilichowski et al., 2020).

At the same time, it is crucial to learn from practices that did not work to either adapt them or avoid replicating mistakes of the past. For example, in Peru, the well-intentioned teacher support system designed by the Ministry of Education as part of the COVID-19 education response generated burnout. When Peru started implementing Aprendo en Casa (AeC) (Aprendo en Casa, 2020), a multimodal remote learning strategy, teachers received guidelines (Perú, 2020a) that stressed the importance of observing teaching sessions through their preferred channel, to communicate with students and families, and to subscribe to massive online learning courses through the national website for teacher training, among other activities (Peru21, 2020). In addition to these guidelines, Regional Directions of Education and Local Education Units designed complementary guidelines

to what the Ministry of Education had already developed. For instance, in the region of Lambayeque, Local Education Units requested teachers complete daily reports of the work carried out with students (Diario Correo, 2020), support system that generated teacher burnout and discontent. After listening to teachers' feedback, Peru's Ministry of Education published a new resolution to align the guidelines of these three institutions and reduced teachers' administrative workload (Perú, 2020c). Peru's government was open to receive feedback from teachers; additionally, the country adapted quickly by redesigning the support system that was provided for them.

Care must be taken that administrative requirements of teachers, such as daily filling of reports, do not hinder their ability to be pedagogically effective. In addition, it is equally important that education policymakers consider how the COVID-19 pandemic can be used as an opportunity to improve teachers' pedagogical and digital skills before they return to school (Wilichowski & Cobo, 2020). Teachers' ability to instruct remotely requires a combination of digital and pedagogical skills, and, as return to schools will occur gradually, they have to learn how to combine multiple modes of delivery, such as online, offline, and blended or hybrid learning modes [10] (Barron Rodriguez, Cobo, Muñoz-Najar, & Ciarrusta, 2021) to effectively facilitate learning in these new scenarios (Wilichowski & Cobo, 2020). Furthermore, many countries have designed multimodal remote learning programs to be sustainable over time, as a complementary resource for on-site classroom-based education; thus, teachers' ability to combine digital and pedagogical skills will be useful to build back better educational systems (France, 2020). Thus, school systems can learn from other countries that have developed teacher training programs and virtual support systems to follow up with teachers in the process of improving their digital pedagogical competencies, such as some examples presented in Table 3.

10 Hybrid or blended learning is any combination of in-person and remote learning.

TABLE 3 – SUPPORTING TEACHERS IN THE COVID-19 PANDEMIC AND BEYOND

INITIATIVE	DESCRIPTION
Lebanon Teacher Training	Virtual teacher coaching and training in Microsoft Teams.
Education Development Center	Interactive toolkit for radio instruction during an emergency crisis.

SOURCE: ADAPTED FROM AZZI-HUCK, BLOM, AND BEND (2020) AND EDUCATION DEVELOPMENT OFFICE (EDO) (2020).

POLICY TAKEAWAYS: EDUCATION EMERGENCY RESPONSES TO COVID-19 IN LMIC

Several LMIC responded quickly to the COVID-19 pandemic with remote learning strategies to mitigate learning losses. Overall, there was a connection between the guidelines for coping policies provided by Ministries of Education and the implementation of such policies within countries, but the ways in which those policies were executed varied in different contexts. While most countries have implemented multimodal learning solutions as an emergency response aimed at reaching all students, the type of systems used varied across regions and country income level. TV, online platforms, and mobile applications were the most used channels in Asia and Eastern Europe, while radio programs were less prevalent in Central Asia and Eastern Europe in comparison to Africa, the Middle East, and Latin America and the Caribbean. More specifically, as of May 2020, while only 21% of countries in Central Asia and Eastern Europe implemented radio learning programs, 70% of countries in Latin America and the Caribbean did so. In regard to income level, around 9 out of 10 high-income countries reported providing remote learning through online channels compared to 64% of low-income countries (UNESCO et al., 2021).

Governments and third-sector organizations implemented support systems and emergency training programs for teachers to help them adapt to this new normal. As mentioned, Costa Rica created a digital toolbox to support teachers with pedagogical resources, such as a guide for autonomous work and a content repository made especially for teachers. Uruguay leveraged a LMS that was in place prior to COVID-19 to allow teachers to monitor students, as well as a content repository in which teachers could find high-quality educational content for their lesson plans. Nova Escola, a non-

profit organization in Brazil, partnered with Facebook to train more than 2 million teachers in digital and pedagogical skills through short practical courses,[11] aligned with Brazil's National Curriculum,[12] and provided certificates to teachers who complete them. The Varkey Foundation created Comunidad Atenea, an online community of practice that allowed teachers in Latin America and the Caribbean to share educational resources. However, to ensure effectiveness, governments needed to transition from emergency teacher training initiatives to sustained professional development and remote coaching programs to equip them with the tools needed for remote teaching (Instituto Península, 2020).

The alignment between the guidance and implementation of managing continuity policies to ensure schools reopen safely was not an easy process: it required thoughtful planning to ensure schools were safe for re-enrollment, assessing learning levels, and organizing learning recovery. Across all three regions under analysis, the majority of countries started planning how to reopen schools safely through communication campaigns and the provision of WASH kits;[13] however, as of May 2020, less than half of the countries planned to monitor re-enrollment and outreach to children who did not return to school. Reopening needed to be complemented with objective communication campaigns that promoted re-enrollment to reduce the risk of student dropout and gave special focus to girls and students from marginalized communities. Moreover, while some countries such as Brazil and Egypt demonstrated progress to conduct diagnostic evaluations as schools reopened, as of May 2020, this study did not find similar plans across all countries under analysis.

Focusing on formative assessments was critical to help teachers shape lessons to address gaps in student knowledge, as well as to help students understand their level in relation to curriculum goals and what they needed to learn. To achieve them, teachers needed to adequately align formative assess-

11 More information available at: https://cursos.novaescola.org.br/listagem-cursos

12 More information available at: http://basenacionalcomum.mec.gov.br/

13 WASH is an acronym that refers to Water, Sanitation, and Hygiene. More information available at: https://www.unicef.org/wash

ments with specific learning objectives in the curriculum and units of study. Equally important, large-scale summative assessments were critical to generate data about student learning, understand learning gains or losses during the remote learning period, and provide information for the national government decision-making process. Thus, policymakers needed to ensure that summative assessments were designed considering students' local culture, religions, and the specific situations they faced during the pandemic (Gacicio et al., 2021).

To build back better education systems, it is key to learn from education initiatives implemented either prior or during the COVID-19 pandemic and scale those that have proven to be effective. In fact, beyond the emergency responses, countries have strengthened remote learning practices that were in place prior to COVID-19, as well as learned from those that did not work to avoid replicating mistakes of the past. Governments such as Zambia and Sierra Leone responded to COVID-19 rapidly by leveraging existing remote learning solutions rather than developing new programs. Countries also needed to take the opportunity to adapt in-person learning experiences that proved to be effective to this new remote learning scenario. Kenya's Tusome program for early grade reading activity (Wilichowski et al., 2020) was highly effective at providing training and coaching to teachers and literacy textbooks to improve student learning; such programs need to be adapted to a distance learning setting instead of being stopped. Other countries that had less experience with the implementation of remote learning programs were agile and responded to feedback in the process of planning and executing such programs during the pandemic. For example, when Peru's teacher support system ended up generating burnout, it was quickly redesigned to solve the problem.

Most of what was described in this compendium addressed the emergency plans and actions implemented by different LMIC, as well as the channels deployed by education systems to support remote learning. However, the current challenge is to understand effectiveness in regard to coverage, engagement, and learning outcomes. The following section of this chapter provides an in-depth multicountry analysis on the perceived effectiveness of distance learning programs in five selected countries: Brazil, Kenya, Nigeria, Peru, and Sierra Leone.

IS REMOTE LEARNING PERCEIVED AS EFFECTIVE? AN IN-DEPTH ANALYSIS ACROSS FIVE COUNTRIES

According to UNESCO's Institute for Statistics (UIS) data, as of June 2020, countrywide school closures affected over 100 million students across Brazil, Kenya, Nigeria, Peru, and Sierra Leone. As did many nations around the world, governments of these five countries reacted quickly to mitigate shocks to their education systems. This section analyzes the perceived effectiveness of the education responses in these locations, considering the main themes of this study (Table 4), and especially emphasizes the importance of monitoring and evaluating learning.

TABLE 4 – PERCEIVED EFFECTIVENESS OF REMOTE LEARNING IN FIVE PILLARS

DELIVERY SYSTEMS	CURRICULUM ADJUSTMENTS	TEACHER SUPPORT	MONITORING AND EVALUATION	REMEDIAL PROGRAMS
Multimodal delivery systems are effective to increase coverage if the program is complemented with a communication strategy, teacher-student interaction, and inclusive content.	Prioritization of curriculum and content curation has made the development process of the remote learning strategy more effective.	Sustained professional development courses or remote coaching programs to strengthen teachers' pedagogical and digital skills.	Most countries have monitored coverage, but need to track dimensions such as engagement, frequency of use, and learning progress.	Note: at the time this section of the study was conducted, no data on remedial programs were gathered.
Brazil (São Paulo) Remote learning program complemented with a media campaign to keep teachers informed about learning activities, a task force that contacted families, as well as a mobile application for teacher-student interaction.	**Sierra Leone** Prioritized subjects by systematically analyzing those in which students were not performing: English, Mathematics, and Science. Also, learning sessions were grouped by multigrades.	**Nigeria (Edo)** Trained all 11,000 Primary School teachers that were part of the Edo-BEST program to equip them with tools to use digital technologies for teaching. An existing coaching program for teachers was adapted to be delivered remotely.	**Peru** The Ministry of Education's Monitoring and Evaluation Unit regularly supervised the adoption and effectiveness of the remote learning program with principals, teachers, and parents through phone calls once a month.	

SOURCE: PREPARED BY THE AUTHORS (BASED ON DATA FROM INTERVIEWS WITH POLICYMAKERS AND EDUCATION EXPERTS FROM THE SELECTED COUNTRIES).

MONITORING AND EVALUATION IN FIVE SELECTED COUNTRIES

Education systems that designed and implemented a coherent multimodal strategy, an inventory of content for remote learning, an accelerated curriculum, interactive learning methods, and teacher support systems still had to understand if the whole remote education strategy was effective to reach all students, sustain learning engagement, and increase learning outcomes. This study postulates that education systems that implemented monitoring and evaluation processes to track the mentioned outcomes, as well as a feedback receptive culture, were effective at adjusting remote learning programs to students and teachers' specific needs. Through an analysis of inputs required for an effective remote learning program and outcomes achieved through the implementation of those inputs, this study has explored the perceived effectiveness of those programs in the five selected countries: Brazil, Kenya, Nigeria, Peru, and Sierra Leone.

In Brazil, while some state education secretaries monitored the adoption of remote learning programs implemented during COVID-19, there was still much to be done in terms of evaluation to understand the effectiveness and outcomes of these programs. Third-sector organizations complemented the government's monitoring role and gathered data for policy decision-making. According to a study conducted during May 2020 by the Fundaçao Lemann (FL),[14] although remote learning programs in Brazil have reached 74% of the student population, access was unequal. In the Southern region, 94% of students accessed remote learning resources, wheareas only 52% of students did so in the North. Regarding engagement of those students who had access to remote education resources, on average 82% engaged with the majority of the learning activities sent by schools, and 13% with part of them. Concerning the frequency of use, results varied by education level: while most students in Primary school dedicated between one and two hours per day to study remotely, most students in Middle school and High school studied between

14 More information available at: https://fundacaolemann.org.br/

two and three hours per day. In relation to assessment, several states coordinated with the Center for Public Policies and Evaluation of Education (*Centro de Políticas Públicas e Avaliação da Educação* – CAEd)[15] to conduct diagnostic evaluations after the reopening of schools.

In Kenya, while the Ministry of Education and Kenya Institute for Curriculum Development (KICD) have conducted rapid online surveys to understand the perceptions of the education community on the remote education program, the data were only referential. Similar to what occurred in Brazil, third-sector organizations and other governmental institutions complemented the government monitoring role. According to Uwezo's report (Uwezo, 2020) conducted in May 2020, only 22% of school-going children in the country were accessing digital resources for remote learning. Of these children, 42% accessed through a TV learning program, 27% through WhatsApp, 19% through a radio learning program, and 10% downloaded materials from the Kenya Education Cloud.[16] As in most countries, access to remote learning in Kenya was unequal: students in private schools were twice as likely to access remote learning than those in public schools. According to a survey conducted by Kenya's National Bureau of Statistics (KNBS, 2020), some of those students not accessing remote learning programs through digital or broadcast resources were studying with printed material or using other resources for homeschooling. However, about 25% of households were not using any method to learn at home. Regarding engagement, while one of the main objectives of the program was to make content more interactive to keep students engaged, by the time data was gathered, the Ministry of Education still did not have enough information on student engagement, satisfaction rates, or frequency of use of the remote education program. Concerning assessments, when schools reopen, teaching will start from where it stopped, but the government has not yet planned to conduct evaluations (KICD, 2020).

In the state of Edo in Nigeria, Edo-BEST leveraged its existing quality assurance team to monitor and evaluate the re-

15 More information available at: https://portalavaliacao.caedufjf.net
16 More information available at: https://kec.ac.ke/

mote learning experience. Regarding coverage, as of mid-July 2020, the Edo's remote learning program reached 930 Primary schools in the state (out of 1,000 existing schools), and over 7,000 virtual classrooms (out of 9,000 actual classrooms) were created to deliver remote education. However, during the COVID-19 pandemic, only 29% of Edo's Primary school population accessed the program's interactive mobile-based platform. Concerning engagement, the state's quality assurance team tracked information such as frequency of use, engagement rates, parent support, and perceived effectiveness of teaching and learning in the virtual classroom through a comprehensive survey.[17] In relation to assessments, the Edo-BEST@Home program developed mobile interactive quizzes (Edo State Universal Basic Education Board, 2020) that could be accessed at any time during the day. Quizzes usually had five multiple-choice questions, with an automated feedback on the answer given. While the Edo-BEST team developed tools to monitor and evaluate reach, access, and engagement of students, as of July 2020, the government still did not have sufficient information related to the effectiveness of its remote learning program.

In Peru, the Ministry of Education's Monitoring & Evaluation Unit regularly supervised the adoption and effectiveness of the existing remote learning program with principals, teachers, and parents through phone calls once a month. More than 50,000 members of the education system were surveyed between March and June 2020. Regarding reach, over 85% of students accessed AeC's (Aprendo en Casa, 2020) remote learning program. In April 2020, of those students who accessed AeC's remote learning resources, 74% did so through TV, 17% by radio, and 19% used the website. For students that could not access them, local education units, in coordination with communities, developed different initiatives such as retransmitting radio content (Andina, 2020) through powerful loudspeakers in community centers, which children could attend while social distancing. Concerning engagement, in a survey conducted in May 2020, 82% of students were satis-

17 More information available at: https://docs.google.com/forms/d/e/1FAIpQLScu8aAN6BcM770tJ8VvYKWmoI0_A6Xus2nCa9tZxeoIVhjabQ/viewform

fied with the TV learning program, 64% with the radio program, and 87% with the website. In relation to assessment, while summative assessments were postponed, some teachers constantly provided formative assessments. According to the Ministry of Education's Monitoring & Evaluation Unit survey (Perú, 2020b), 80% of students and parents received support from teachers at least once in the previous week. In May 2020, 96% of teachers who contacted parents requested that students complete and send homework in at least every other day: students completed those activities and sent them back to teachers mainly through WhatsApp.

In Sierra Leone, the Ministry of Education's remote learning program implemented during the Ebola pandemic provided lessons regarding what worked to reach a large number of students, while keeping them engaged and learning (Sierra Leone, 2020). As of July 2020, although the government was yet to track progress regarding coverage, engagement, and learning, the Ministry of Education's COVID-19 education emergency response program (Sierra Leone, 2020) clearly included a plan for review, assessment, and evaluation of the remote teaching and learning processes. During the Ebola crisis, access to the radio learning program was limited by poor radio signal coverage in rural areas and a lack of radio devices in poor households (Powers & Azzi-Huck, 2016). Thus, during the COVID-19 pandemic, Sierra Leone's government partnered with local community radios and installed radio transmitters in remote communities to increase coverage. According to a survey conducted by Innovations for Poverty Action (IPA), while almost 80% of respondents reported that children in their households were spending time on education, the majority were using schoolbooks and less than 20% were accessing radio programs (IPA, 2020). Regarding engagement, anecdotal evidence from studies conducted after the Ebola outbreak (Powers & Azzi-Huck, 2016) showed that radio programming helped students to maintain a link to education during the crisis because the program was taken seriously by both the government and families. During the COVID-19 pandemic, the Teaching Service Commission leveraged prior experience to increase engagement and interaction of students with the radio learning program (World Bank, 2021b).

In sum, these countries were able to assess the percentage of the student population being reached through remote education programs implemented during the COVID-19 pandemic. Coverage was just the first step of the set of outcomes that needed to be tracked to understand the effectiveness of remote learning programs. In that regard, governments needed to track other dimensions such as engagement, frequency of use, usefulness of the pedagogies adopted, and learning progress. Of the five selected countries for this study, those governments that set up strong monitoring and evaluation units prior to the pandemic and built the technical capacity required to monitor progress remotely for several years responded quickly and effectively by gathering relevant data to inform policy. Since it may be challenging to monitor reach, engagement, and learn about the implementation of remote learning solutions, especially those based on one-way education methods such as TV or radio, a way to monitor data may be through rigorous surveys to teachers, parents, and students via phone or other devices. However, it still remains challenging to understand how policy decision-makers used data gathered by either the government or third-sector organizations to adjust the remote learning programs implemented during COVID-19 to better serve students and teachers.

POLICY TAKEAWAYS FROM AN IN-DEPTH MULTI-COUNTRY ANALYSIS

Characteristics of education systems such as availability of resources, institutional development, remote education experience, and decentralization influenced the response of governments to COVID-19. Thus, countries that leveraged them, effectively executed remote learning programs. In fact, prior experience with remote education programs allowed education systems to effectively and rapidly implement their existing distance learning programs to all students. Kenya, Sierra Leone, and the Edo state, in Nigeria, quickly pivoted toward remote learning because their governments had built technical and digital capacity for several years. As these education systems responded rapidly but not necessarily reached the majority of the student population, the question that emerges is: how to transition from quickly pivoting to effectively

scaling up a remote learning program that equitably reaches all students in the education system?

Inclusive multichannel remote learning solutions were effective to reach a diverse student population. In Peru, TV learning sessions were supported with sign language, the zero-rated Web Light platform was adapted for students with disabilities, and radio learning sessions delivered content in nine native languages. 75% of caregivers of children studying in intercultural rural schools knew about the government remote learning program, and 91% were using it. For those students who lived in remote communities and could not be reached with the traditional multichannel strategy, the question that arises is: whether governments should keep focusing on delivering top-down educational strategies, or consider identifying and promoting bottom-up community-based programs?

At the same time, multimodal remote learning strategies present a challenge to align content across different platforms or channels. Coherent articulation across channels used to deliver remote learning were challenging, especially for countries with no prior experience with remote education at scale. In Peru and in some states of Brazil, such as Mato Grosso do Sul, it was a challenge to align content across channels as their ministries lacked content repositories. Delivering content that was not configured in the same way across channels imposed additional pressure on teachers, as they had to provide differentiated feedback to students who accessed lessons through diverse platforms.

While the channels used to deliver remote learning were critical during school closures, even more important was the role of teachers. Education is a social experience, and learning occurs when teachers interact with and provide effective feedback to students, either in face-to-face or remote education environments. For this to occur, governments needed to support and provide guidance to teachers rather than assign them an excessive focus on administrative work.

Sustained professional development and remote coaching programs were effective to equip teachers with the tools to use digital technologies in virtual classrooms. The state of Edo, in Nigeria, trained all teachers who were part of the Edo-BEST program in the past two years to effectively use digital

technologies in the classroom, as well as to adapt an existing coaching program that provides pedagogical and technical tutoring to teachers to be delivered remotely. Thus, prior training and coaching have been critical to pivot toward remote teaching-learning during COVID-19. However, it is still unknown how teachers' digital and pedagogical skills have impacted students' engagement and remote learning experience.

Although the guidelines for remote education have helped to clarify the new role for teachers, an excessive administrative workload generated burnout and reduced pedagogical effectiveness. In Peru and Brazil, support systems ended up generating teacher burnout (e.g., emotional, physical, and mental exhaustion): they needed to complete frequent administrative reports of their plans and results of students' progress. Both countries quickly redesigned the reporting system to reduce the burnout problem; Peru's Ministry of Education published a resolution (Perú, 2020c) to reduce teacher's administrative workload. Also, São Paulo and Minas Gerais states, in Brazil, developed mobile applications. These apps enabled teacher-student communication, but only during specific time periods, a structured interaction that helped to reduce teacher burnout.

In sum, in order to execute effective remote learning programs, education systems needed to consider: (i) leveraging prior remote learning experience or collaboration with those that had experience; (ii) focus on the strengths of multichannel strategies and solve the alignment challenges across channels; and (iii) support teacher interaction with students and prioritize the pedagogical role over the administrative one. Transversely, monitoring and evaluation was the compass required to understand educational progress during that period in order to make adjustments, and allowed for being ready to make adjustments and improvements, and troubleshoot during the implementation phase.

WHAT WORKS WITH REMOTE AND REMEDIAL STRATEGIES? AN ANALYSIS ACROSS 13 COUNTRIES

This section of the chapter builds on key lessons learned during the in-depth analysis of the multicountry experiences explored in the prior section. It also aims to present global

trends of remote learning implemented during school closures and the actions adopted by governments to get ready for remedial learning. The countries prioritized for this analysis are the low-income countries – Afghanistan, Haiti, Malawi, Mozambique, Niger, and Rwanda; the lower-middle-income – Cambodia, Cameroon, Kenya, Nepal, and Pakistan; and two high-income countries – Estonia and Uruguay –, included in this study because for several years these governments have been building technical capacity for remote teaching-learning. This exploratory analysis addresses the main pillars of this study (Table 5) and makes a special emphasis on the importance of getting ready for remedial learning.

TABLE 5 – WHAT WORKS WITH REMOTE AND REMEDIAL LEARNING IN FIVE PILLARS

DELIVERY SYSTEMS	CURRICULUM ADJUSTMENTS	TEACHER SUPPORT	MONITORING AND EVALUATION	REMEDIAL PROGRAMS
Pakistan (Interactivity) TV learning program with animated characters incorporated in the videos as facilitators during lessons.	**Afghanistan** (Core subjects) Selected science and mathematics as core subjects to prepare students for evaluations in such subjects.	**Rwanda** (Emergency training) Remote teaching training programs in information and communication technologies (ICT) for education to over 5,000 teachers. This group of teachers then supported other teachers to become more familiar with the use of ICT for education.	**Malawi** (Monitoring access) Monitoring coverage and quality of distance learning by conducting phone-based surveys and U-Report.	**Cameroon** (Remedial learning to catch up) Extended calendar and setup of a six-week remedial program. Teachers devoted 25% of the time to contents not covered in the previous academic year.
Cambodia (Alignment) Task force-supervised content creation at all education levels to ensure alignment across broadcast, online, and paper-based delivery systems.	**Estonia** (Autonomy) Schools and teachers autonomously deciding the subjects and contents to prioritize.	**Uruguay** (Sustained training) Plan Ceibal provided *ad hoc* training for teachers through its LMS. 92% of teachers were satisfied or very satisfied with the training activities provided (Ripani, 2020).	**Estonia** (Formative assessments) 71% of students have been using online formative assessments; 64% have received feedback from teachers.	**Mozambique** (Remedial learning for examinations) Six-month remedial program for grades 7, 10, and 12, because students in these grades sit for examinations.

SOURCE: PREPARED BY THE AUTHORS (BASED ON DATA FROM INTERVIEWS WITH POLICYMAKERS AND EDUCATION EXPERTS FROM THE SELECTED COUNTRIES).

PREPARING SYSTEMS FOR REMEDIAL LEARNING

While it was critical to monitor processes and evaluate learning outcomes to understand how the education system was progressing, the results of the remedial strategy analysis were the key ingredient to plan a better support to students who were in most need. Countries selected for this study were either planning or implementing a wide range of support programs to help students catch up (UNESCO, UNICEF, & World Bank, 2020), as schools reopened, such as the following: (i) remedial learning programs that targeted students with a poorer rate of academic progress, generally designed to give them the individual attention needed to build skills and confidence; (ii) accelerated programs designed to be completed quickly, through short, intensive, and rigorous phases of learning; and (iii) increased class time through extensions of the school term for active learning.

By analyzing government responses to help students catch up, this study identified that most countries designed top-down, centralized programs, while a few either gave autonomy to schools or to local education units to design and implement remedial programs. Afghanistan's Ministry of Education[18] extended the academic year calendar to increase class time and planned to implement accelerated learning programs, given that a large number of students were not able to access the remote learning contents while schools were closed. Before the COVID-19 pandemic, this country implemented several accelerated learning centers for girls (Awad, 2019) with support from UNICEF, and during 2020 the education system was in a better position to leverage that experience. Cameroon's Ministry of Education[19] also extended the academic year calendar to increase class time and set up a six-week remedial learning program in which teachers devoted 25% of the time to the contents not covered in the previous academic year. In Cambodia and Rwanda, remedial learning programs planned by the central government targeted students with less support at home while schools were closed. Other governments provided basic guidance, financ-

18 More information available at: https://moe.gov.af/en

19 More information available at: http://www.minedub.cm/index.php?id=98&L=1

ing, and tools, besides local education units or schools had the autonomy to design and implement remediation programs. Estonia's government[20] had equipped managers and teachers for several years with the tools needed to run schools; thus, school administrators and teachers were in a better position to plan and implement remedial learning, as there was the understanding that each student was unique and had different learning needs. As a complement, the Information Technology Foundation for Education (HITSA),[21] one of the ministry's EdTech partners, developed a personalized learning path infrastructure and a program which used students' digital footprints to track learning progress digitally and provided additional information for teachers that could later support students that needed to catch up (HITSA, n.d.).

Another difference in the design and implementation of programs to help students was the countries' approach. While some took an *ex-post* approach, other preferred an *ex-ante* strategy for remedial learning. Governments that took an *ex-post* approach planned to implement remedial learning programs after they assessed students and identified the magnitude of the learning loss problem. For example, Pakistan's government reopened schools on September 15, 2020, by phases (The News, 2020), and assessed learning losses during the first weeks of classes: remedial learning in schools began once local and central governments had a clear understanding of those losses. In Rwanda there was a mixed approach — the government designed a national diagnostic assessment for Primary and Lower Secondary schools to identify students with low scores for remedial learning. While this approach seemed to be an *ex-post* strategy, the government had already designed a remedial learning program that would target students with a poorer rate of academic progress and would be focused on core subjects: literacy and numeracy for Primary schools and science, math and English for Secondary schools. These subjects were chosen because prior national examinations showed that learning gaps were mainly present in those subjects. Although Niger had prior experience with remedial

20 More information available at: https://www.hm.ee/en
21 More information available at: https://www.hitsa.ee/about-us

programs (Brown, Kim, & Weiss-Yagoda, 2020), diagnostic assessments were carried out and a significant content loss was noted among students. Thus, the government implemented a 45-day accelerated learning program (from October 15 to November 30, 2020), to help them catch up.

Countries that decided to follow an *ex-ante* approach to help students catch up started remedial learning or accelerated learning programs, as governments understood that a group of students had been severely affected by school closures. Thus, to avoid dropout or continuous poor performance, schools started to conduct such programs before assessing students. For example, in Uruguay, teachers reported that approximately 30% of the student population were not able to actively participate in remote learning programs; in this way, the government increased class time by planning summer classes for February 2021, as in prior years, to help students in vulnerable situations to catch up. In Mozambique, the government readjusted the school calendar, starting from October 2020 up until May 2021, to first focus on catch-up strategies for grades 7, 10, and 12, because they had to sit for examinations, as aforementioned. Thus, the question that remains is: were the *ex-ante* remedial strategies in fact proactive, or did education systems decide to implement remedial or accelerated learning programs only to prepare students for national examinations?

POLICY TAKEAWAYS FROM AN ANALYSIS ACROSS 13 COUNTRIES

In general, multimodal delivery systems were considered as an effective strategy to increase coverage only if education policymakers thoughtfully plan and implement remote learning programs considering contextual factors. The survey results and interview responses illustrated that there was no single best combination of delivery systems. In most low-income countries, education experts said that combinations based on low-tech delivery systems (e.g., radio, TV, and printed material) were perceived as more effective. In other countries, a combination of low- and high-tech solutions were understood as more effective (e.g., printed material combined with mobile-based solutions).

The effectiveness of the multimodal combinations depended on a variety of contextual factors, such as access to devices needed for remote learning, Internet connectivity, prior experience with the delivery system, teacher preparedness and capacity, and quality of contents that are interactive and locally relevant, among other factors. Even with very well-articulated EdTech solutions, the learning experience can be poor if the intervention does not address these contextual factors (Aedo, Nahata, & Sabarwal, 2020).

The adjustment of the curriculum and content curation made the development process of the remote learning strategy more effective, as it allowed for cost savings and time efficiency. Such adjustment was needed to fulfill the main learning objectives of the curriculum, but also needed to consider that replicating the face-to-face teaching-learning practices and the curriculum would not necessarily work in a remote learning environment. In this sense, this study has seen a tendency in most Ministries of Education to adjust the curriculum with a similar objective; however, the strategies or paths followed to do so varied across countries. On the one hand, some countries implemented top-down strategies by: (i) selecting core subjects based on those that had examinations; (ii) prioritizing subjects after carefully analyzing curriculum; and (iii) integrating contents and learning objectives into interdisciplinary clusters that allowed various subjects to be addressed at the same time. On the other hand, fewer countries opted for giving autonomy to schools or to teachers to do bottom-up adjustments.

Especially for countries that experienced remote learning at scale for the first time and that lacked a vast repository of content to deliver remote learning, or had limited TV or radio airtime, content curation and curriculum adjustments were not only more effective, but necessary. The time invested in analyzing the existent content and in its curating around the curriculum's learning objectives was more effective than creating new content (Coflan, Chuang, Kaye, Koomar, & McBurnie, 2020), that took time and was cost-intensive.

Thus, adjustments should not only focus on curricular competencies that are examinable and important to fulfill short-term objectives, but also on those relevant in the sit-

uation of the pandemic, such as self-directed learning, care for oneself and others, socialemotional skills, and competencies that were critical for mid- and long-term learning objectives. Countries that prioritized these competencies witnessed an improvement of students' well-being: they were happier, healthier, and enjoyed independent learning — 90% of students in Estonia, for example, were satisfied with remote learning (Telia Company, 2020). In other contexts, students gained autonomy and discovered new ways of learning (France, 2020).

As education is a social experience: learning occurs when teachers interact with and provide effective feedback to students. Although most governments provided guidelines to clarify the enhanced role of teachers by emphasizing the importance of the teacher-student interaction; some education leaders still perceived that there was an excessive focus on teacher's administrative workload which generated burnout and reduced pedagogical effectiveness (Singer, 2020). The COVID-19 pandemic evidenced the urgent need to recalibrate how teachers divide their time between effective teaching and administrative tasks; thus, efforts focused on freeing time from administrative tasks to be used for direct teaching were highly welcomed by teachers. Examples of such strategies were remote tutoring to support students to catch up (Weale & Adams, 2020), hiring additional teachers to support smaller class sizes, setting up mechanisms to have regular conversations with teachers to receive feedback, and adjusting administrative workloads if needed.

The COVID-19 pandemic revealed the different typologies and strategies from governments around monitoring and evaluation processes. This study has identified three different typologies that define the approach taken by Ministries of Education to assess students: first, while some countries focused on formative and summative assessments as feedback mechanisms for teachers to support students during the pandemic, others prioritized maintaining examinations or large-scale system-level assessments to select learners in a given grade for further schooling or to obtain data at a national level for decision-making. Second, most countries focused their monitoring efforts on the supply of delivery systems and

contents deployed, while fewer governments made efforts to understand the demand; that is, if there was coverage and use of the delivery systems for education, the engagement of students during remote education, and student learning. Third, even though most governments had implemented top-down centralized monitoring systems through phone or online surveys, others developed bottom-up monitoring processes by encouraging citizens to engage through U-Reports (U-Report, 2020), and finally, a smaller set of countries outsourced the monitoring processes to experts, consultants, or NGO. In addition, even though part of the countries had introduced remedial programs to support students to catch up, the specific strategy chosen to help students varied across nations. Some governments decided to take an *ex-post* approach toward remedial learning by postponing these programs after schools reopened, when education would get "back to normal," and students were assessed to identify the magnitude of the learning loss problem. Others followed an *ex-ante* approach to help them catch up by introducing remedial learning or accelerated learning programs; that is, implementing catch-up programs without leading the actions by previous assessments, under the assumption that a large group of learners had been severely affected by school closures.

The COVID-19 pandemic presented, therefore, significant opportunities to innovate and, when possible, transform the traditional school model. This crisis revealed that governments had to reassess the monitoring of both processes and learning outcomes, the conduction of formative or large-scale assessments, and the ways in which teachers could support students to catch up.

POLICY CONCLUSIONS & FURTHER RESEARCH

The following policies have been identified as key areas for governments to build back better and to have more sustainable education systems. The policy recommendations that follow provide a compilation of the results of the global analysis carried out, the different consultations with experts in the countries studied, and the five principles suggested by the World Bank EdTech approach report (Hawkins et al., 2020) when education systems invest in EdTech.

Principle 1 – Ask why: EdTech policies and projects need to be developed with clear purpose, strategy, and vision of the desired educational change.

- Curriculum adjustments need to go beyond the selection of core subjects and foundational knowledge. The pandemic has interrupted in-person education, a situation that brought major challenges, such as providing remote learning in contexts that lack the infrastructure to do so, as well as adapting contents and pedagogies. Although this study has shown a clear tendency to prioritize subjects and contents that are urgent to cover to prepare students for assessments, teachers should also focus on competencies that are contextual and relevant in the scenario that we are currently living in, such as socio-emotional skills to help them cope with challenging situations that might be faced at home. In addition, it will be important to understand that the prioritization of contents will require remedial actions later on to reduce the learning loss that these adjustments might cause.
- Socio-emotional support is urgent for teachers, students, and parents. Remote learning strategies cannot be simply limited to a supply of lessons and contents. Strategies for providing support are also needed. The COVID-19 pandemic and the extended school closures have changed the role of teachers, students, and parents: most of them were not prepared for such change. Similarly, social isolation has affected several students, particularly those at disadvantage; thus, a comprehensive strategy is required for socio-emotional monitoring and psychosocial support them to ensure well-being and avoid their burnout. This strategy has to incorporate monitoring instruments to measure anxiety and identify socio-emotional needs as first steps. It will also be critical to provide guidance material and communication channels for students, teachers, and parents. As countries transition to a more consistently blended learning model, it will be necessary to prioritize strategies that provide guidance to parents, in order to equip them with tools required to help them support students, while keeping frequent communication with teachers.

Principle 2 – Design and act at scale, for all: the design of EdTech initiatives should be flexible and user-centered, with an emphasis on equity and inclusion, in order to realize scale and sustainability for all.

- Sustainability of multimodal delivery systems must be ensured, taking into account contextual factors and avoiding the remote learning paradox. Even though the perceived effectiveness of multimodal delivery systems varies across continents and countries, it is critical to guarantee the deployment and monitoring of the most effective combination of delivery modalities, considering the contextual factors of each country. For example, in countries with high mobile phone penetration, this technology has high potential to improve reach, scalability, and flexibility of teacher professional development, as well as student learning (McAleavy, Hall-Chen, Horrocks, & Riggall, 2020). However, for some countries, low-tech solutions would be more appropriate, while, for others, high-tech delivery channels will be more effective. In this way, education policymakers can avoid the "remote learning paradox" (Aedo, Nahata, & Sabarwal, 2020) situation in which, although governments prioritize online learning solutions to minimize learning losses, students who are most at risk of learning losses cannot access them.
- Remedial and accelerated learning programs need to be carefully implemented and monitored. Although most countries have planned to or are implementing programs to support students to catch up, remedial programs should be carefully stablished, not only by identifying the areas in which students need more support, but also by constantly monitoring their progress. In this sense, the adoption of flexible delivery systems for content delivery and remote teacher-student interactions adopted during the pandemic might open new opportunities for remedial learning programs in the years to come.
- Delivery systems following a UDL approach will be inclusive for all students. That approach recognizes that in a classroom, students are different and have diverse

needs (World Bank, 2020c); thus, remote and remedial learning, designed to follow a UDL, are effective to reach a diverse student population. Examples of inclusive delivery systems for students with disabilities are TV learning sessions supported with sign language, online platforms adapted for persons with disabilities, or radio learning sessions that deliver content in native languages.

Principle 3 – Empower teachers: technology should enhance teacher engagement with students through improved access to content, data, and networks, helping teachers better support student learning.

- There must be sustained professional development and constant teacher support. Emergency crash courses to train them might not be enough to both improve their digital skills and adopt their pedagogical skills to the new context. The pandemic has evidenced the critical role that teachers play; sustained professional development through preservice and in-service teacher education training can be effective to equip them with tools for remote and remedial teaching-learning (Teaching in Focus, 2020). Sustained professional development will impact student attention and avoid a decrease in motivation and engagement that some countries have started to experience (Bhattacharjee, Kumar, Mani, & Vivek, 2020). The proficiency (skills, knowledge, and experience) to teach remotely (synchronously or asynchronously) should not be considered a "sunk cost" or "nice to have" skill for teachers, but critical one to face the current crisis as well as to offer new educational opportunities after the pandemic. Thus, teachers' digital and pedagogical skills are needed to critically assess and decide when and how to effectively adopt remote learning strategies and realistically define their impact to support or enhance learning.
- Teachers' interaction with students must be prioritized. Teaching quality is more important than the delivery systems used to deploy content; thus, there is an urgent need to recalibrate how teachers divide their time between effective teaching and administrative tasks –

pedagogical exchanges need to be prioritized over administrative reports. Efforts focused on freeing time from administrative tasks to be used for direct teaching and support are critical at a time when students not only need support to catch up, but also to overcome challenging socio-emotional conditions. The EdTech strategies adopted for remote and remedial learning need to acknowledge the relevance of having regular (daily, weekly when possible) teacher-student and peer interaction, either by using digital technologies, landline phone calls, or equivalent methods.

Principle 4 – Engage the ecosystem: education systems should take a whole-of-government and multistakeholder approach to engage a broad set of actors and to support student learning.

- Institutional capacities to enable and/or continue distance learning must be leveraged. As remote learning is likely to continue even after school reopenings, Ministries of Education should use their prior experience with EdTech programs to equitably reach all students. This work entails identifying and preparing stakeholders (Bhattacharjee et al., 2020), having an inventory of existing infrastructure and associated costs and benefits, and accounting for funding for set-up and maintenance. At the same time, governments need to invest in remedial education to recover learning losses; thus, external financing is key to support the educational opportunities of students in low- and lower-middle-income countries, in which public education budgets have been cut since the onset of the pandemic (World Bank, 2021c). The COVID-19 pandemic can be an opportunity to inspire and reimagine solutions to build back better education systems.
- Cross-country and multi-stakeholder collaboration approaches must be fostered. As countries have experienced implementing remote learning programs at scale during the COVID-19 pandemic, it is critical to engage a wider ecosystem of allies within and among countries to allow governments to better respond to

the circumstances and deploy remote learning channels faster without having to start from scratch. By fostering cross-country collaboration and partnerships with telecommunication operators, EdTech companies, or third-sector organizations, governments can effectively continue distance learning programs. Such collaborations may allow governments, teachers, and students to access high-quality curated learning materials (partnerships with content providers), increase learning time (partnerships with broadcasters), and access data without paying for the bandwidth (partnerships with telecommunication operators).

Principle 5 – Be data-driven: evidence-based decision-making within cultures of learning and experimentation, enabled by EdTech, leads to more impactful, responsible, and equitable uses of data.

- Monitoring and evaluation are key to understanding the effectiveness of the strategy, the learning outcomes and to troubleshoot. While this study has evidenced that the implementation of monitoring systems has been unequal across countries, it is still relevant to strengthen the governments' monitoring processes to understand students' progress, make the adjustments required, and be ready for continuous improvement when schools start to reopen. In addition to the collection of relevant data, education systems might need to consolidate their institutional capacities to process and effectively use the data gathered for supporting or guiding decision-making, as well as to set high standards for data protection and security concerning children (UNICEF, n.d.), regulate access to educational records, and protect student privacy with regard to educational information.
- Opportunities to innovate formative assessments and large-scale examinations are needed. The COVID-19 pandemic has altered the assessment landscape. Countries have revised or adjusted their systems to provide remote formative assessments, canceled or postponed large-scale examinations, and even transitioned to online assessments. As governments work

> to innovate the assessment solutions, they also have to ensure that these examinations meet certain criteria, such as validity, reliability, and fairness properties of a high-quality assessment (Luna-Bazaldua, Liberman, & Levin, 2020). This is an opportunity to rethink the conduction of formative or large-scale assessments while schools are closed and even after they reopen.

As the report Reimagining Human Connections, education systems need to accept that change is inevitable. Learning-by-doing and making adjustments in the process, as a result of what is learned, is required. It is imperative to avoid replicating failures of pre-COVID-19 systems; instead, build stronger education systems and accelerated learning for all students. No plan will be perfect, but the risks of inaction are greater than the risks of action. As this study shows, from low resource settings to high income ones, countries are rising to this challenge and implementing strategies to support effective learning and guarantee that a generation of students is not lost due to the pandemic. These efforts have required creativity, innovation, planning, and investments from education systems at an unprecedented level, which will make them more resilient to future shocks. That said, the implementation is a challenging process and not all programs are necessarily cost--effective; thus, governments can prioritize practices that have proven effectiveness, such as implementing software designed to help students develop skills at their own rate of progress or combining online and in-person instruction.

In addition to this qualitative study, rigorous impact evaluation research (SIEF, 2020) were required as a complementary effort to better understand the effectiveness of remote and remedial learning interventions. These evaluations urgently need innovative tools and approaches to measure outcomes and make the required adjustments for continuous improvement. The questions that required further qualitative and quantitative research are presented in Table 6, grouped in six sections.

TABLE 6 – FURTHER RESEARCH

CATEGORY	QUESTIONS
Leveraging institutional capacities and cross-country collaboration	1. As remote learning is likely to continue, even when schools start to reopen, how do governments effectively scale up a remote learning program that equitably reaches all students in the education system? 2. How can policymakers build sustained institutional capacities in the fields of innovation and technology and create multi-stakeholder collaborative environments that enable innovation in education?
Inclusive multimodal delivery systems	3. Should governments focus on delivering top-down educational strategies, or consider identifying and promoting bottom-up community-based programs? How can teachers be supported to develop such programs?
Sustained teacher training and support	4. What are the key digital and pedagogical skills that have more effectively impacted the learning experience?
Perceived effectiveness of curriculum adjustments	5. Will the prioritization of contents require remedial actions to reduce the learning loss that these adjustments might cause later on?
National strategies to remediate learning losses	6. Are *ex-ante* remedial strategies in fact proactive, or have education systems decided to implement remedial or accelerated learning programs to prepare students for national examinations?

SOURCE: PREPARED BY THE AUTHORS.

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CHAPTER 3

Education innovation challenges in Uruguay during the COVID-19 pandemic[1]

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1 This text is an edited version of the publication "Plan Ceibal 2020: Education innovation challenges in Uruguay " available at: https://digital.fundacionceibal.edu.uy/jspui/bitstream/123456789/48/1/Plan%20Ceibal%202020_Education%20innovation%20challenges%20in%20Uruguay.pdf

2 Director of Fundación Ceibal, Uruguay. She holds a Masters in Documentary by Practice from the Royal Holloway University, London, England, and a degree in Social Communication from the National University of Rosario, Argentina. She has an extensive experience in the design, implementation, and analysis of public policies for digital education in Latin America. She leads a project of the Alliance for the Digitalization of Education in Latin America (*Alianza para la Digitalización de la Educación en Latinoamérica y el Caribe* – ADELA) and is a specialist of the Working Group on Digital Learning of the Broadband Commission for Sustainable Development.

INTRODUCTION

The COVID-19 pandemic caused one of the most impactful disruptions to society and education in the last century. In 2020, Uruguay was the first country in Latin America to resume in-person classes after implementing a national contingency plan that attained international recognition. The reconfiguration of the education system to a reality in which the physical proximity between people had become a threat to life, demanded the rapid and coordinated design of innovations. Plan Ceibal – the Uruguayan national digital education programme, that provides a computer and educational resources to all students of Primary and Secondary schools – played a central role in developing adaptations and resilient solutions for the new context. It not only showed that it had one of the most robust infrastructures and availability of digital content in the region, but it also showed its capacity for innovation and resilience for overcoming the challenges of the new context.

This has been perhaps one of the most important challenges that Plan Ceibal has faced since its creation in 2007. After 13 years of experience, its technical teams, its digital infrastructure, and content and pedagogical services, along with the networks of teachers, students, and schools took on a remarkable commitment: the innovation of the education system to address an unpredictable reality.

The challenging and non-linear solutions to address such a complex scenario were designed in collaboration with the National Public Education Administration (*Administración Nacional de Educación Pública* – ANEP)[3] and a number of public and private stakeholders. This was key to address the disruption of the education services until the vaccination campaign produced significant progress and results.

3 ANEP is the State agency responsible for the planning, management, and administration of the Public Education System at the levels of Early Childhood, Primary and Secondary levels, and Tertiary Technical Education and Training in Education in Uruguay. More information available at: https://www.anep.edu.uy

SUSPENSION OF IN-PERSON CLASSES IN URUGUAY

Uruguay has a population of 3,461,734 inhabitants (Uruguay, 2019), with 818,621 students enrolled in public and private institutions (Box 1). Since the health emergency was declared on March 13, 2020, a total of 394,445 positive cases of COVID-19[4] have been registered on national territory until November 4, 2021 (Uruguay, 2021a).

Today, the country is carrying out a vaccination campaign against the COVID-19 pandemic; by the beginning of November 2021, 78.02% of the population had received the first dose of the vaccine, whereas 74.05% had already received the second dose and 1,247,627 people had the third dose (Uruguay, 2021b).

In Uruguay, classes were cancelled one day after the identification of the first COVID-19 case in the country and were resumed by the end of the first academic semester, as health conditions improved. In this scenario, the Uruguayan education system went through three different learning modalities:

- in-person: all students attend the educational center full-time, Monday to Friday;
- distance: in 2020, the Ceibal at Home (*Ceibal en Casa*) program was implemented, characterized by combining different platforms, online tools and educational content for three target audiences: teachers, students, and their families;
- blended: a combination of online learning with face-to-face classroom-based learning implemented as the health emergency improved.

In January 2021, ANEP presented the Plan to Resume Classes for the current school year, considering the specificities of the pandemic scenario that the country was still facing. The plan established a series of objectives, including the promotion of strategies that would allow to consolidate blended education (ANEP, 2021b).

After a period of distance and blended classes, due to a resurgence of the COVID-19, in-person teaching and learning was progressively and fully restored across Uruguay until the

4 The capital, Montevideo, located in the state with the highest population density, presents the highest number of cases of COVID-19 to date (179,630).

end of the academic year, in 2020. The analysis of the crisis and further actions to be taken by Plan Ceibal had different approaches, including reflecting on how to build a resilient education system, in which Ceibal Foundation (Fundación Ceibal) took a key role.

BOX 1 – EDUCATION IN URUGUAY IN NUMBERS

Uruguay stands out for its historically high schooling rates but faces the challenge of retaining Secondary level students in lower-income sectors. The public school system serves 83% of students aged between 4 and 15. See below how education is distributed throughout the country (Plan Ceibal, n.d.; ANEP, n.d.).

Number of enrollments in public and private education

Total of public and private institutions: **818,621**

Total of Early Childhood level: **116,880**		Total of Primary level: **300,729**		Total of Secondary level: **357,535**	
Total of public Early Childhood level: **92,340**	Total of private Early Childhood level: **24,540**	Total of public Primary level: **249,942**	Total of private Primary level: **50,787**	Total of public Secondary level: **318,760**	Total of private Secondary level: **38,775**

ANEP teachers and facilities

Number of ANEP facilities (2018):		Number of ANEP teachers (country total in 2020):
Total: **3,445**		Total: **52,084**
Montevideo: **801**	Countryside: **2.644**	

Institutions located in urban and rural areas

Number of urban and rural Secondary level institutions (2019):

Country total: **304**	Total of urban Secondary level institutions: **281**	Total of rural Secondary level institutions: **23**

THE RECONFIGURATION OF THE EDUCATION SYSTEM IN THE COVID-19 PANDEMIC

CONTEXT: PLAN CEIBAL

Since its creation in 2007, Plan Ceibal (ANEP, 2020b) was conceived to provide a personal computer and Internet access in education centers in Uruguay to all students and teachers of public education in Primary and Secondary levels, in addition to offering a wide range of educational resources, programs, and pedagogical services.

Created as an inclusion and equal opportunities plan to support Uruguayan educational policies with technology, its mission is to promote the incorporation of technology in education to drive innovation. Furthermore, its objective is to ensure that girls, boys, and teenagers develop their potential for learning, creativity, and critical thinking as citizens of the world, in addition to building innovative and inclusive education with teachers and the community, thinking about the future. The plan was implemented in three different phases: (i) access for all: equity; (ii) implementation of platforms; and (iii) new pedagogies, summarized below.

The first implementation phase of Plan Ceibal – access for all: equity – focused on access to digital devices for boys, girls, teenagers, and teaching staff in the public education system in Uruguay and the implementation of connectivity, managing free Internet connection from education centers. This was how it helped to reduce the difficulty of accessing computers among the highest and lowest income quintiles.

Technological deployment allowed the plan to advance to a second phase: implementation of platforms. As of 2011, Plan Ceibal worked on the development and availability of programs, resources, and projects for voluntary adoption by teachers. In this phase, educational platforms were developed, for example: platforms for managing educational resources (such as CREA), mathematics teaching and learning platforms (such as the Adaptive Mathematics Platform [*Plataforma Adaptativa de Matemática* – PAM], and Matific), the online platform for loaning and downloading books (Biblioteca País), and the provision of English language distance learning through videoconferences (Ceibal in English

[*Ceibal en Inglés*]). In addition, in this phase, Plan Ceibal promoted computational thinking activities, school robotics, digital laboratories, among other programs (Rivoir & Morales, 2021).

BOX 2 – LEARNING MANAGEMENT SYSTEM, CREA[5]

CREA, the Learning Management System (LMS) from Plan Ceibal, is an educational innovation tool that facilitates blended education and the development of digital citizenship. It is available for all educational levels belonging to ANEP. It allows for the development of a collaborative work environment in which teachers and students can communicate and exchange experiences. Furthermore, teachers can create their virtual classrooms and content, propose tasks, and monitor their students. On the platform, several tools for solving different course management needs are available, speeding up test corrections, didactic content planning, and distribution of material. In addition, it provides access to a wide variety of proposals, content and experiences offered by the different educational programs of Plan Ceibal in the area of professional development and training.

On May 31, 2021, the CREA platform had 760,250 users; of those, 569,404 were active users. Over 24 million comments have been posted by students and teachers on the platform to date, in addition to nearly 21 million submissions of activities carried out by students (Plan Ceibal, 2021a).

5 More information available at: https://www.youtube.com/watch?v=Hef8yno1df4&t=10s

The third phase of Plan Ceibal began in 2014 and focused on new pedagogies. Technological implementation was maintained, and the use of technology as an accelerator of personalized learning processes was intensified.

BOX 3 – PLAN CEIBAL IN NUMBERS

Connectivity

- 100% of educational centers (2,957 institutions) with Wi-Fi network;
- 99.7% of enrollments (773,000 people) access the Internet through a broadband connection;
- 1,482 education centers have videoconference equipment (76 of them with two rooms) and 100 videoconference rooms for Teaching Points in five countries;
- 82 educational environments and 7,200 people have access to the videoconference network via mobile network.

Devices

- 2,556,166 laptops and tablets provided since 2007;
- 567 thousand devices, updated, provided for all students and teachers in Primary and Secondary levels;
- 24,159 laptops in library mode provided to support teachers and students.

SOURCE: PLAN CEIBAL (2021A).

PLAN CEIBAL AT HOME: CONTINGENCY PLAN

Due to the closure of school buildings across the country during the COVID-19 pandemic, the Uruguayan government implemented, in 2020, the contingency program called Ceibal at Home (Ripani, 2020; Ripani & Muñoz, 2020) to mitigate disruption in the education process. Plan Ceibal and ANEP worked in partnership to transform a program based on in-person teaching into a distance solution that would guarantee educational continuity.

The Ceibal at Home program was based mainly on digital mediation and was implemented soon after the announcement of the closures of school buildings, thanks to the fact that it could use the pre-existing digital resources from Plan Ceibal. There was a commitment to a process of transformation and adaptation to the new scenario, advancing from a program that complements and improves in-person classes to a fully digital distance learning solution. This action was only possible thanks to the high level of penetration of Internet in homes, 88% in general and 93% in homes with children aged 14 or less, and because access to computers is

higher than 76%, which in a great extent is due to the devices provided by Plan Ceibal.[6]

Access to devices and the Internet were, therefore, primary starting points for the development of distance education. In May 2021, 100% of education centers had a Wi-Fi network and 99.7% of students enrolled had broadband Internet access.

In addition to the existing high connectivity in the country, efforts were made to generate the necessary infrastructure and connectivity conditions to facilitate access to resources by students in disadvantaged communities and rural areas. With this objective, *ad hoc* solutions were adopted in cooperation agreements between several areas of the government and, in some cases, with the private sector. This allowed access to the content of Plan Ceibal at no cost or at reduced rates to users (Ripani, 2020; Zucchetti, 2021). Among these, it is worth noting the agreement with National Administration of Telecommunications (*Administración Nacional de Telecomunicaciones* – ANTEL), the state Internet provider company, in addition to the partnership with the private telecommunications company Claro.

The plan also offered a solid provision of digital platforms and services, as well as support and orientation for teachers, students, and their families to guarantee distance learning in public Primary and Secondary schools, with coverage close to 88% of students and 90% of teachers in the public education system in Uruguay (Plan Ceibal, 2020b). Furthermore, specific audiovisual content was developed, in emerging formats, with multiplatform distribution both on social networks and on television channels, in order to reach those students with no Internet connection at home.

The integral design of the activity, aimed at teachers, students, and their families, was carried out in a context of major implementation challenges, which could be addressed thanks to the versatility of the management and working teams in Plan Ceibal and ANEP, and the collaboration of the whole education community in Uruguay.

6 Information obtained at INE (2018, 2019), and AGESIC (2020), compiled in Plan Ceibal (2021c).

MONITORING AND ORIENTATING TEACHERS, STUDENTS, AND THEIR FAMILIES

Plan Ceibal went from being a complement to in-person education to become the main means of learning for girls, boys, and young people in the country, as well as a communication mediator between teachers, students, and their families. This process involved technical and pedagogical aspects, from facilitating access to educational resources without data consumption costs to training teachers and orienting parents.

For the implementation of the Ceibal at Home, the support and efforts of the whole teacher collective were essential, working in every education community, using, transforming, and giving new meaning to the educational resources provided, as well as applying creativity to develop their own content and ideas. Teachers played a fundamental role as facilitators and creators of learning experiences, encouraging the mobilization of students and their families, which strengthened ties between all those involved and consolidated the school as a learning community.

To facilitate the learning experience, Ceibal at Home designed and made available support and orientation resources for the main figures participating in the continued education program: teachers, students, and families.

Teaching strategies, facilitated by specific communication actions, were shared via the Plan Ceibal website and social media, with a view to involving every one of the relevant groups in the virtual learning environments proposed. Diverse games and creative activities to suit the curriculum were offered to students. Teachers had access not only to teaching resources, but also to consultation services, exchange forums, tutorials, virtual training, and orientation for distance learning.

BOX 4 – RESOURCES FOR TEACHERS

Ceibal at Home for Teachers (*Ceibal en Casa para Docentes*): a program that aims to support teachers in Primary, Secondary, and Technical and Professional levels, by offering virtual workshops, reading clubs, and spaces with teaching resources and tutorials, as well as technology and inclusion (Plan Ceibal, 2020b).

Learning for All (*Aprender Tod@s*): a training management program of Plan Ceibal that works for the inclusion of digital resources in the teaching proposals of education centers of all levels. Since its creation in 2011, it has promoted a comprehensive assessment regarding the approach to the relationship between information and communication technologies (ICT) and education, emphasizing partnerships between education centers and families for learning. In this way, the program has been a promoter and articulator of other Plan Ceibal proposals in the institutions that participate in the initiative. Over the years, *Aprender Tod@s* has expanded its work proposals along a cross-cutting axis: the construction and development of digital citizenship with students, teachers, and their families (Plan Ceibal, 2020a).

Reference Teachers Have the Floor (*Los Docentes Referentes Tienen la Palabra*): a virtual space dedicated to the perspective and experience of the "reference teachers"[7] of the six centers that make up the *Aprender Tod@s* program (Plan Ceibal, 2021b).

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7 Within the scope of *Aprender Tod@s*, "reference teachers" are responsible for making the digital inclusion project more dynamic in schools and promoting the use of Ceibal's resources among teachers, students, and families.

Lastly, families were given daily tips on how to orient their children and on how to provide social and emotional support drawing from recommended content for different knowledge areas. Plan Ceibal participated in the development of guides to support families during the COVID-19 pandemic, namely:

- Screens at home (*Pantallas en casa*): guidelines for monitoring safe Internet browsing (Estefanell, 2021).
- Guide for families (*Guía para las familias*): psychological and emotional support for families during the quarantine imposed due to the pandemic (Rodríguez, 2020).

DIGITAL PLATFORMS: TECHNOLOGY-MEDIATED LEARNING

Given the impossibility of in-person classes, digital platforms became indispensable articulators of interaction between students, families, and teachers to ensure the continuity of the education process in Uruguay.

Social media and, especially, cyberspace, became practically the only places where a safe proximity could be constructed. This in turn demonstrated the importance of having educational resources and infrastructure to offer student-focused and online education. This was feasible in Uruguay because the country had implemented Plan Ceibal at national level, with universal coverage in the public education system at Primary level and the first years of Secondary school, including the provision of personal computers and access to education resources for all students.

Ceibal at Home offered two learning modalities, mostly based on digital platforms: (i) Systematized paths (*Trayectos sistematizados*): students were able to interact with teachers and colleagues through the LMS, CREA, following a structured organization of activities; and, in another instance, (ii) self-assisted experiences: students and teachers were able to access books, games, challenges, and other learning resources on demand through teaching platforms organized by groups, according to the students' age.

Plan Ceibal resources: Content and platforms

At the outset of the pandemic, Plan Ceibal consisted of an ecosystem of content and platforms offering over 173,000 educational resources. They included the CREA platform, gamification platforms, adaptive mathematics for Primary and Secondary Education, a digital library with more than 8,000 books (accessible to all the inhabitants of the country), free school texts for students, and a collection of 1,500 open educational resources, one of the most complete and robust in Latin America.

The CREA platform, which already had communication tools and digital learning platforms, was the main input to virtually develop a large part of the activities that were carried out in person. New features were also introduced to improve

digital interaction between students and teachers and to engage families as key facilitators in the teaching and learning process. Videoconference functions were added to CREA to take advantage of synchronous activities and to allow audiovisual group interaction between teachers and students.

Although Plan Ceibal had already incorporated the mass use of videoconferences in 2013 for English language distance learning in schools, this was the first time that this method was fully integrated into the CREA platform, becoming completely available for all teachers and students in public Primary and Secondary Education.

Transmedia strategy

The Ceibal at Home program also integrated educational content developed in multiplatform and transmedia formats, which integrated traditional media – including Uruguayan National Television (*Televisión Nacional de Uruguay* – TNU) – social media, Plan Ceibal platforms, as well as in-person interactions in education centers and alternative spaces, including student homes.

The COVID-19 pandemic created an opportunity to explore new educational ideas and find different media to continue student-teacher relations. Ceibal at Home (Plan Ceibal, 2020b) focuses on the creation of an education ecosystem with the capacity to adapt to diverse contexts, spaces, and actors, integrating informal ways of learning associated with communication practices related to students' cultural consumption and the emerging socio-technological ecosystem.

This initiative comprised three options for students from different education levels, that included an educational magazine program, Time to Learn (*Tiempo de Aprender* – TA), a series presented by young influencers (*C+*) which introduced educational content through the plot of its fictional story, and a participative space called Your Short (*Tu Corto*), in which young people were invited to create and share their own productions. A cycle was also created for teachers, called Live Link (*ENLACEvivo*), featuring interviews with specialists to rethink and orient teaching strategies in the new scenario.

BOX 5 – MULTIPLATFORM AND TRANSMEDIA INITIATIVES

Tiempo de Aprender[8]
This magazine program offered playful activities, technological spaces, and interviews with the aim of providing educational proposals to families, especially Primary-level children. The content addressed each week was previously announced on social media so as to improve coordination with teachers' planning. It was broadcast daily between June 8 and December 11, 2020, and the episodes are available on YouTube.

C+[9]
This transmedia series sought to bring High school students closer to learning experiences in a gamer environment. It rewarded curiosity to learn and boosted the exchange in a combined educational context. The proposal was carried out by Alaska (youtuber) and MadRaider (gamer). Every day in this 15-minute show they introduced stories and challenges which, after the broadcast of the program on television, continued on social media, especially Instagram.

Tu Corto[10]
This was a segment dedicated to broadcasting short films made by Secondary school and Technical Tertiary students. The program sought to encourage the participation of young people and teens, while opening up the television screen to the creation of new content made wholly by this audience. The students in Technical and Professional education, pertaining to the General Directorate of Technical and Professional Education (*Dirección General de Educación Técnico Profesional* – UTU), stood out with their high degree of participation.

ENLACEVivo[11]
A space for live interviews with specialists and the presentation of educational experiences related to the new scenario, devised to converse and debate about issues of interest and to offer teachers useful advice to address the new challenges. This form of exchange was broadcast over YouTube and Instagram Live Stories. Thirty-seven episodes plus a special were made, with a total of 64,298 views.

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8 All episodes are available at: https://www.youtube.com/playlist?list=PLA_SjgCHKBoGrYrobLUMX58lxtWcqpl6j
9 More information and episodes available at: https://www.youtube.com/channel/UCJbLLwUDdJGRDf4vC5Wd9jw/about&sa=D&source=editors&ust=1656009948619060&usg=AOvVaw1V-4UnD-pz3pHpZq7XuRMG
10 More information available at: https://www.anep.edu.uy/breves/tu-corto-en-televisi-n-abierta
11 All episodes are available at: https://www.youtube.com/playlist?list=PL-qsRyBzPs9tEkLV1qg_S881g5DDOvYTa

It was necessary to design modalities for feedback and to integrate traditional media, social media, and Plan Ceibal platforms to guarantee that all the educational community was reached, as well as in-person interactions in education

centers and alternative spaces, including in students' homes, in support of the gradual return to in-person classes.

MONITORING AND EVALUATION OF RESULTS

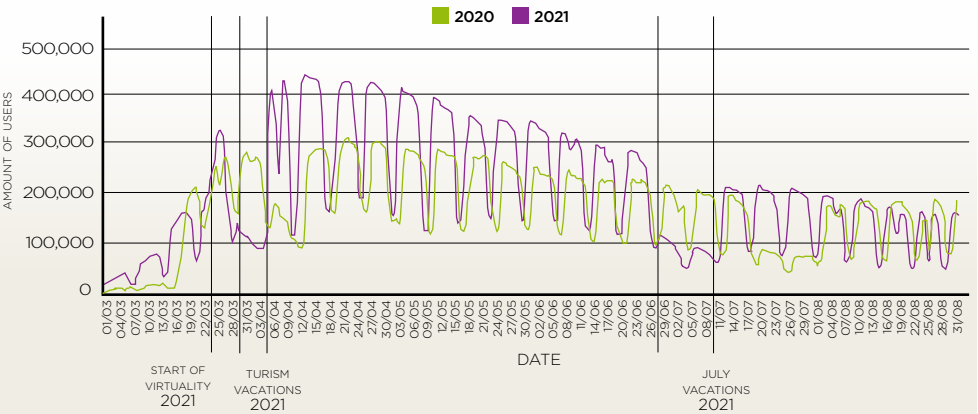
Permanent monitoring and evaluation actions provided feedback for improving the provision of the education service and understanding the changes that the new scenario brought about. Plan Ceibal educational resources were those most used by teachers in Uruguay, and its learning platform, CREA, was the fifth most visited website in the country, reaching 88% of students and 90% of teachers in the national public education system.

Teachers felt more confident using the platforms, lost their fear of technology, and perceived that families considered it positive that their children could play and learn at the same time in an online environment, as can be seen by qualitative studies carried out by teachers on the use of the Ceibal math learning platforms. While classes were suspended, these platforms registered a 53% increase in Primary school users, a 124% increase in Secondary school users, and a 165% increase in Tertiary technical Education students (Plan Ceibal, 2020b, 2021d).

As well as the exponential increase in the use of Plan Ceibal online learning spaces, according to the access data of hundreds of thousands of users, changes were observed in habits, with users logging on later in the day and on the weekend, a trend that remained, although to a lesser degree, even after the return to in-person classes.

During the closure of school buildings, access to CREA among the students and teachers of the public education system was 88% and 90%, respectively. In comparison with 2019, there was an increase of 109% among Primary school users, 247% among Secondary school users, and 345% among Tertiary technical Education users. On April 21, 2020, the peak of highest access of the year was registered: 307,022 users, representing an increase of 688% compared to the day with the most logins in 2019, on May 28.

CHART 1 – DAILY LOGINS TO CREA PLATFORM



SOURCE: PLAN CEIBAL (2021C).

Teacher perspective

Plan Ceibal carried out a national survey with a representative sample, consisting of 1,245 Primary and Secondary school teachers. Of these, 636 answered the survey by phone, whereas the remaining were contacted by e-mail and responded to the same questions on the SurveyMonkey platform. The results were processed by the Monitoring and Evaluation Department of Plan Ceibal: 93% indicated that the resources made available by Plan Ceibal were the most used to support educational activities in the public school system and 92% of the teachers were satisfied or very satisfied with the training activities offered by Plan Ceibal. In addition, the survey provided data on the online interaction between teachers and their students: 98% of public school teachers sent homework to their students, 90% received activities carried out by them, and 87% of teachers gave feedback.

FOCUS GROUPS

Through studies that applied a focus group methodology with teachers on the use of the math platforms of Ceibal at Home, it was shown that the teachers felt more confident about using those platforms and had a sense of urgency in doing so due to school closures. In addition, many understood

that the technology did not replace them, but rather supported them with specific, motivating resources that they couldn't generate any other way. They also positively evaluated the autonomy that students achieved with activities adapted to their level, and their own better time administration thanks to the management resources on the platforms.

Another change that was registered was the adoption of the videoconferences service to communicate among teachers and students. Ceibal at Home incorporated a videoconference service in CREA to enable audiovisual interaction, through which a total of 141,000 videoconferences were held between April 14 and October 26, 2020. The education level that most used this resource was Primary school (62%), followed by Secondary (28%), Technical Tertiary Education (8%), and others (2%) (Plan Ceibal, 2020b).

IMPLEMENTATION CHALLENGES

The main challenges that Ceibal at Home faced were related to the equitable supply and adaptation of infrastructure and teaching resources, and attending to the social and emotional impact caused by social isolation.

Most of the difficulties were resolved through contingency plans, which included cooperation between various areas of government and, in some cases, with the private sector. For example, Ceibal at Home reached an agreement with ANTEL, the state Internet provider company and market leader, and with the private telecommunications company Claro, so that the mobile data consumed in accessing educational resources and platforms was free of charge or offered at a reduced rate. This was fundamental in guaranteeing equal opportunities.

In addition, a special contingency procedure was designed and implemented to deliver computers to students, always maintaining physical distance. This was vital in reaching students in rural areas and disadvantaged communities. Processes and protocols were also quickly created to sustain and broaden services with the majority of staff (95%) working remotely, and just a small proportion (5%) working in-person to cover essential tasks, such as computer repair. This was possible thanks to the virtual systems adopted previously by Plan Ceibal and its working teams' capacity for management and adaptation.

It was essential to increase the capacity of the technological infrastructure fourfold and redesign the architecture to increase concurrent use functions. Maintenance work was carried out at night to avoid interrupting the service during the times when there was the most traffic. In addition, to deal with the growing customer service demand, Ceibal at Home implemented an automated tool for end users that included account configuration functions and password resets.

In terms of pedagogical aspects, the implementation of Ceibal at Home also required training teachers and broadening the content on offer, through various communication channels. Specific training was offered to improve interaction with students over digital platforms, and communication campaigns and strategies for distributing educational resources were presented in a way that was visible, accessible, and easy to use.

One of the challenges of the pedagogical aspects relates to the reformulation of programs and projects because of the health crisis, which required adjustments with the counterparts, considering the demands of the respective groups.

Work was also done on the socio-emotional impact caused by social isolation. Ceibal at Home focused on providing support and relevant information for wellbeing during the pandemic. The target audience of these activities was composed of teachers, students, and their families, who were reached mainly through digital communication channels—including Plan Ceibal websites and social media—with specific messages according to their needs. Work was also carried out with strategic partners, such as ANEP and United Nations Children's Fund (UNICEF), to draw up the guidelines for getting through the quarantine period with social wellbeing.

CONCLUSION

Being the first country in the region to resume in-person classes after the beginning of COVID-19 pandemic, Uruguayan education went through three stages with different learning modalities: in-person, distance, and blended. Plan Ceibal was at center stage in the pandemic scenario with a future perspective of an even more strategic role.

Given this reality, Plan Ceibal also broadened the functionality of its infrastructure and pedagogic services, making its LMS one of the most visited websites in Uruguay. Such platform integrated a new videoconference service, and generated proposals adapted for teachers, students, and their families, including teacher professional training and social and emotional support. Permanent monitoring and the use of data to adapt to the changing of scenario were fundamental in generating flexible and efficient management, and for taking informed decisions.

Ceibal at Home also developed emerging audiovisual formats, with multiplatform distribution strategies, via social media and television, through which it managed to extend the availability of content beyond digital systems.

Its aim of reaching all homes in the country equitably was also seen in the generation of agreements with public and private organizations for the free provision of mobile data services to access educational platforms. This stressed the importance of generating synergies and agreements with stakeholders that lead to innovative solutions, always with a focus on leveraging technologies to benefit the service that Plan Ceibal offers.

In line with the plan's strategy, education projects that had been adapted to changes in learning environments were identified, with participative proposals designed by students to address relevant issues for the education community, which benefited from a creative and significant appropriation of Plan Ceibal resources.

The pandemic led the Plan Ceibal's leadership and teams to reflect on the plan's structure and the need to rethink the concept of technology in education. They stressed the need to work to consolidate a more flexible and resilient education model, with strategic interdependencies. This would allow to enhance learning and regard teachers as designers of experiences and content, with capacity for interaction through different media platforms. The disruptive scenario of the pandemic generated enormous challenges but also opportunities to resignify a digital plan that achieved systematized growth over time and which today has been strengthened with a high level of appropriation among the education community, in a context marked by the expansion and prevalence of the socio-technological ecosystem.

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CHAPTER 4

Continuity of learning during the COVID-19 pandemic: The use of ICT in Brazilian public schools[1]

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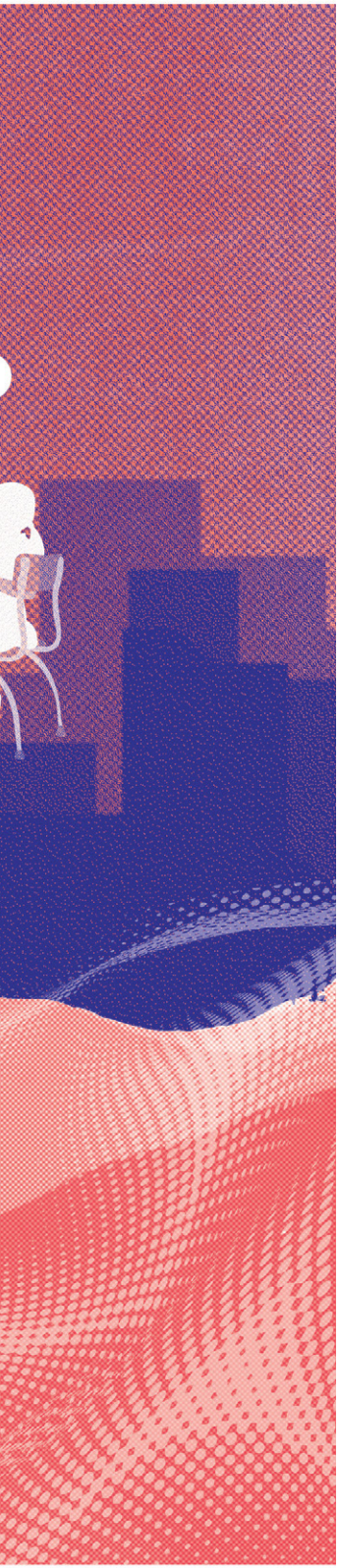


INTRODUCTION

The implementation of social distancing measures imposed by the COVID-19 pandemic caused the interruption of several face-to-face activities worldwide in different fields of work. The impacts of the health crisis were especially profound in the education sector as more than 190 countries closed their schools and suspended in-person classes, affecting more than 1.6 billion students (ECLAC & UNESCO, 2020; UN, 2020; OECD, 2020). In Latin America and the Caribbean (LAC), 160 million students were left without in-person classes (ECLAC & UNESCO, 2020) due to the class suspension measures adopted by nearly all countries in the region (96%) (ECLAC, n.d.).

There were notable differences among how the several countries in Latin America approached the crisis and even within national territories. Before the pandemic, the United Nations Economic Commission for Latin America and the Caribbean (ECLAC) already indicated an increase in poverty and extreme poverty rates in LAC, and also the deepening of social inequalities (ECLAC & UNESCO, 2020). In turn, the United Nations Educational, Scientific and Cultural Organization (UNESCO) also drew attention to the global disparities in terms of the proportion of children enrolled in schools and to discrepancies in educational achievement (UIS & GEM Report, 2019). In addition to these challenges, the pandemic adds to this scenario new difficulties arising from the closure of schools, especially among the most vulnerable populations, such as lack of food and consequent child malnutrition, as well as the interruption of mental health services and recreational activities (ECLAC & UNESCO, 2020).

In face of this new context, governments and school communities had to react quickly and seek emergency solutions that would allow the continuity of educational activities remotely. In this situation, in which in-person classes were suspended at all levels of education, the three main responses in LAC included development of distance learning practices (with or without the use of technology), support and mobilization of school communities, and health care and well-being of students (ECLAC & UNESCO, 2020). However, as these

solutions were implemented, many students were adversely affected by the digital divide, an issue that became especially evident during the COVID-19 pandemic (Williamson, Eynon, & Potter, 2020).

In Brazil, although historically there are public policies aimed at the use of information and communication technologies (ICT) in education (Valente & Almeida, 2020; Gonsales, Buzato, & King, 2021; IDEC, 2021) since the 1970s, in addition to the existence of a National Common Curricular Base (Base Nacional Curricular Comum – BNCC)[4] that addresses the use of digital technologies in the school environment (Brasil, 2018; UNESCO, 2019; Gonsales et al., 2021), the conduction of emergency distance learning in the pandemic period faced many challenges. It should be noted that the country kept its schools closed for longer than the average in LAC, and measures implemented for the continuity of teaching varied according to the different regional and socioeconomic contexts, which led to an increase in school dropout, learning gaps and inequalities in the country (Queiroz, 2021).

Thus, important questions on public education policies in the Brazilian context are: what is the current situation regarding connectivity in Brazilian public schools? What were the emergency measures adopted by Brazilian public schools for the continuity of education in the pandemic? What was the role of technologies in this process? And lastly, what were the main challenges faced by public schools and how were they addressed?

To address these and other questions, based on data collected by the survey on the use of information and communication technologies in Brazilian schools – ICT in Education 2020 (COVID-19 Edition – Adapted methodology) (NIC.br, 2021a), this article aims to analyze the challenges faced and the measures adopted by Brazilian public schools for the continuity of education during the health crisis, with an emphasis on the use of ICT. In this regard, a brief regional contextualization of the continuity of learning in LAC and in Brazilian public education during the pandemic will be presented, followed by a description of the data collected by the aforementioned survey.

4 Document that defines the set of essential learning that all students must develop in Basic Education.

POLICIES FOR THE CONTINUITY OF EDUCATION IN LAC DURING THE PANDEMIC

On account of the health crisis, the suspension of in-person classes by most LAC countries (ECLAC, n.d.) affected millions of children from different educational levels (UNICEF, 2020) (Table 1), with impacts that are still unknown. To allow the continuity of classes during this period, 78% of countries provided tools for conducting distance learning through some modality, whether via radio, TV, distance-learning materials, or online platforms. In turn, feeding programs were maintained by just over half (51%) of the countries (ECLAC, n.d.), which may have triggered a situation of food insecurity for millions of children, given that in many cases the school provides the main meal for numerous students (Bittencourt et al., 2021). Finally, 51% of countries implemented measures other than the three previously described (ECLAC, n.d.).

TABLE 1 – CHILDREN AFFECTED BY THE CLOSURE OF SCHOOLS IN LATIN AMERICA AND THE CARIBBEAN, BY EDUCATIONAL LEVEL

On April 15, 2021

EDUCATION LEVEL	TOTAL NUMBER OF CHILDREN
Pre-primary	6,787,780
Primary	20,321,438
Lower Secondary	11,266,672
Upper Secondary	7,131,820

SOURCE: UNICEF (2020).

Although countries have adopted a variety of different measures to allow the continuity of school days, most chose to make use of digital resources, which can potentially bring schools, educational processes, and students in their homes closer together (ECLAC & UNESCO, 2020).

It should be noted that, in general, LAC countries have been investing in digital infrastructure in schools since the late 1980s. The first policies were aimed at improving learning and teaching outcomes in schools; then, they became more specifically focused on providing access to ICT by students, especially for the most vulnerable strata of this population. Recently, in the context of expanded access to mobile devices and connections, the attention of these programs has

turned to the development of students' digital skills (Trucco & Palma, 2020; ECLAC & UNESCO, 2020).

It is noteworthy, however, that despite these efforts, the region presents marked digital inequalities within and between countries. Thus, it is important to consider that the different strategies implemented by governments for the continuity of education during the pandemic period were strongly impacted by the unequal distribution of resources in households and by the differences in school readiness for offering digital solutions (Marinelli et al., 2020). Although most countries in the region have digital resources and platforms for distance learning, including open television, radio, and online resources (ECLAC & UNESCO, 2020), few have consolidated national remote education strategies (Marinelli et al., 2020). In this context, it is important to consider that many solutions were the product of improvision, rather than structured planning, and lack documentation and further monitoring to be better understood (Reimers, 2021).

In face of this scenario, in addition to directing efforts at vulnerable populations with no access to ICT so that they can continue undertaking classes from their homes, recovery strategies and school reinforcement must be planned for after the reopening of schools, considering the increase in learning inequalities that resulted from the health crisis (ECLAC & UNESCO, 2020). From the teachers' perspective, the availability of resources and training for the adequacy of teaching in the most disadvantaged contexts have been important barriers that challenge the possibility of a more inclusive education in pandemic times (ECLAC & UNESCO, 2020).

PUBLIC BRAZILIAN EDUCATION AND THE COVID-19 PANDEMIC

In the Brazilian context, understanding the particularities of how public education is organized, including the attributions of each federative entity, allows a better comprehension of the different actions that were implemented for the continuity of education in the pandemic.

A right that is guaranteed by the Federal Constitution of 1988 (Brasil, 1988), education in Brazil is the responsibility of the Union, the 26 states, the Federal District, and the

5,568 municipalities, whose attributions were established by the Law of Guidelines and Bases (*Lei de Diretrizes e Bases* - LDB) on national education (Brasil, 1996). In addition to defining principles that govern Brazilian education, such as equal conditions to access and attend schools, and free public education, the LDB establishes how Brazilian education is organized, that is, divided into Basic Education (comprised of Preschool, Primary Education, and Secondary Education)[5] and Higher Education (covering undergraduate and postgraduate courses).

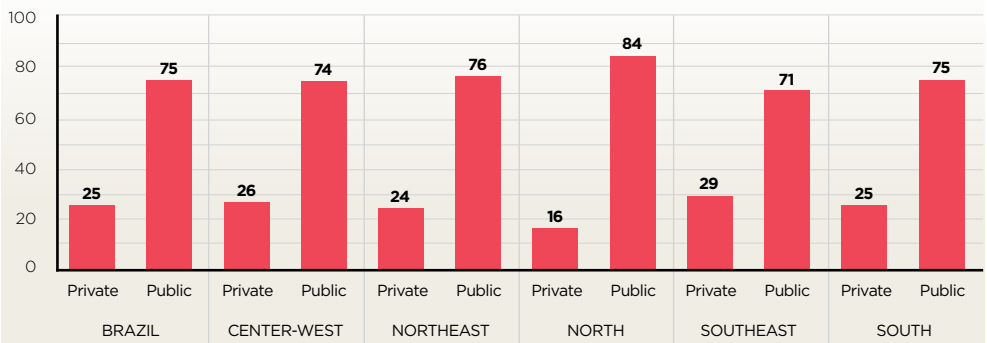
In the federative context of Basic Education, municipalities are responsible for Preschool Education; the responsibility for Primary Education is shared between municipalities and states; Secondary Education is the responsibility of states; and the Federal District has the same responsibilities as the states and municipalities (Brasil, 1996). In this form of organizing Brazilian education, the Law foresees that the Union is responsible for coordinating the national education policy, which includes the articulation of different levels and systems (Brasil, 1996).

According to data from the Brazilian Institute of Geography and Statistics (IBGE), collected in the National Households Sample Survey (PNAD) COVID19 (IBGE, 2020), Brazilian public education serves 75% of the population attending school in the country (Chart 1). Although this proportion is different in the five regions of the country, in all of these, public education is responsible for at least 70% of all Brazilian students. In the Southeast region, for example, public education is responsible for 71% of students; in turn, in the North region, public education serves 84% of students (IBGE, 2020).

5 Preschool Education, composed of daycares and preschools, comprises the period up to 6 years of age. Primary Education lasts nine years, being mandatory from 6 years of age onwards. Secondary Education consists of at least three years of education.

CHART 1 – DISTRIBUTION OF PERSONS ATTENDING SCHOOL, BY SCHOOL NETWORK AND BY REGION (2021)

Total number of persons aged between 6 and 29 years old who attend school (%)



SOURCE: IBGE (2020).

Especially regarding Basic Education, data from the 2020 Brazilian School Census (INEP, 2021) show that Brazil had a total of 43.09 million enrollments in Preschool, Primary Education, and Secondary Education. Of these, 89.04% correspond to urban schools, representing 42.12 million enrollments, with 18.67 million in the municipal school system and 14.39 million in the state school system[6] (INEP, 2021). On the other hand, enrollments in rural schools correspond to 10.95% of total enrollments in the country, 80% of which are in municipal schools, equivalent to 4.23 million students[7] (INEP, 2021). Added to this scenario is the expectation of growth in the number of enrollments in the public education system, given the current economic crisis, which is expected to increase the demand for the public system (Todos Pela Educação, 2020).

Public school students are distributed among more than 138 thousand existing facilities in operation, of which 84,734 are in urban areas and 53,753 in rural areas (Table 2), according to data from the National Institute for Educational Studies and Research Anísio Teixeira (INEP) (2021). In the case of facilities in the urban area, the majority (70%) are under municipal

6 The other enrollments correspond to federal (354 thousand) and private (8.7 million) networks (INEP, 2021).
7 The other enrollments are from the federal (51 thousand) and private (88 million) networks (INEP, 2021).

administrative dependence, whereas less than a third (29%) correspond to the state. This prevalence also occurs in establishments in rural areas, where this is more pronounced: 90% of public establishments in rural areas are municipal.

TABLE 2 – NUMBER OF PUBLIC FACILITIES OF BASIC EDUCATION IN OPERATION, BY LOCATION AND ADMINISTRATIVE DEPENDENCE (2020)

LOCATION	ADMINISTRATIVE DEPENDENCE	NUMBER OF FACILITIES
Urban	Municipal	59,492
	State	24,636
	Federal	606
Rural	Municipal	48,407
	State	5,252
	Federal	94
Total		**138,487**

SOURCE: INEP (2021).

In summary, these data portray the importance of public education in Brazil, responsible for serving more than 70% of students in the country, distributed across various locations. In terms of number of enrollments, public educational institutions prevail both in urban and rural areas, with states and municipalities responsible for Basic Education in the country. This portrait of the different contexts in which public education takes place in Brazil is important to understand the challenges faced when schools at distinct levels of education began to be closed as one of the measures to contain the COVID-19 pandemic (Amorim, Ribeiro Junior, & Bandoni, 2020; Barberia, Cantarelli, & Schmalz, 2021).

Although collaboration between federative entities is one of the characteristics of the Federal Constitution (Abrucio, Grin, Franzese, Segatto, & Couto, 2020) and especially in the field of education, the Union plays an important role in intergovernmental coordination and educational policy (Brasil, 1996; Abrucio et al., 2020), this attribute was not very notable in the actions of continuity of education during the COVID-19 pandemic. Thus, responses to the crisis were implemented mainly by the state and municipal levels, in an unordered manner (Prates et al., 2020). The justification for the lack of coordination on the part of the Brazilian Ministry

of Education (MEC) and/or the Federal Government was anchored both in the attributions provided for in the LDB (considering only the responsibility of states and municipalities with the provision of Basic Education, and ignoring their role to coordinate the national education policy) (Brasil, 1996) and in the decision of the Brazilian Supreme Court (*Supremo Tribunal Federal* - STF) so that subnational entities could take decisions on isolation measures during the pandemic (Barberia et al., 2021; Abrucio et al., 2020). The lack of coordination mostly affected students in public school, who rely on the school for the fulfilment of their right to education (Alves, Farenzena, Silveira, & Pinto, 2020).

Furthermore, following school closures, there was a delay in the implementation of remote education programs, which in turn presented flaws in their design (Barberia et al., 2021). Thus, the need to migrate school activities to a remote education configuration – with or without the use of technology – resulted in very unequal experiences: factors such as physical space and furniture at home, devices (type, availability, need for sharing), Internet connection (availability, quality), and food,[8] for example, were decisive in this period (Alves et al., 2020; IDEC, 2020). These aspects will be further detailed below.

8 With the universalization of school meals provided for in the Federal Constitution of 1988 (Brasil, 1988), the Brazilian National School Food Program (*Programa Nacional de Alimentação Escolar* – PNAE) is responsible for offering school meals to millions of students in public Basic Education (FNDE, n.d.). Due to the closure of schools during the pandemic, school meals were also negatively impacted (Amorim et al., 2020). Given the exceptional nature of the situation, "during the period of class suspension [...] the distribution of foodstuffs acquired with PNAE resources for parents or guardians of students in public Basic Education schools" (Brasil, 2020) was authorized. Despite some limitations (uncoordinated actions at the beginning of the pandemic, the universal nature of the program and the purchase of food from family farming), the PNAE continued during the pandemic.

BOX 1 – PUBLIC POLICIES ON CONNECTIVITY IN EDUCATION

In Brazil, the use of ICT in education began in universities in the 1970s, driven by examples outside the country. In the 1980s, the first computer programs in Basic Education emerged, proposed by Federal Government bodies (Valente & Almeida, 2020). In this context, the Brazilian National Educational Informatics Program (*Programa Nacional de Informática Educativa* - PRONINFE) and the National Program for IT in Education (*Programa Nacional de Tecnologia Nacional* - ProInfo) are important examples of the first policies, which focused on providing technological infrastructure to schools through the provision of informatics and connectivity laboratories (IDEC, 2021). In fact, historically, technology policies in the field of education have focused on improving the infrastructure available in schools. In general, there have been few efforts specifically aimed at the adoption of technologies by students and teachers (IDEC, 2021).

It is noteworthy that the programs varied in scope, logistical and financial support, and their management was conducted by different federal agencies (Valente & Almeida, 2020). In this sense, the lack of governance and dialogue between many of these initiatives were limiting factors for the greater success of these policies (IDEC, 2021). Furthermore, while such programs were concerned with expanding the technological infrastructure of schools, a small portion was dedicated to training teachers and integrating technologies into pedagogical planning (IDEC, 2021).

FIGURE 1 – CONNECTIVITY POLICIES IN EDUCATION IN BRAZIL (1997-2017)

PROGRAM						
ProInfo (National Program for IT in Education)	**Gesac** (Electronic Government - Citizen Support Service program)	**PBLE** (Broadband in Schools Program)	Portable Computer for Teachers	**PROUCA** (One Laptop per Student Program)	**PNBL** (National Broadband Plan)	**PIEC** (Connected Education Innovation Program)
FOCUS						
Equipment distribution for schools	Internet connection for schools	Internet connection for schools	Individual equipment distribution	Individual equipment distribution	Internet connection for households; Internet connection for schools	Internet connection for schools; equipment purchase for schools; teacher training
1997	2002	2008	2008	2010	2010	2017

SOURCE: IDEC (2021, P. 5).

ICT IN EDUCATION 2020 SURVEY: COVID-19 EDITION – ADAPTED METHODOLOGY

Conducted annually by the Regional Center for Studies on the Development of the Information Society (Cetic.br), department of the Brazilian Network Information Center (NIC.br), since 2010, the survey on the use of Information and Communication Technologies (ICT) in Brazilian schools, ICT in Education, aims to

> investigate access to, and use and appropriation of, information and communication technologies (ICT) in Brazilian public and private schools that offer Elementary and Secondary Education, in relation to the use of these resources by students and teachers in teaching and learning activities. (CGI.br, 2021, p. 182)

Its scope is national, and its target population is public (state, municipal, and federal) and private schools, located in both urban and rural areas, which offer regular teaching, with Primary or Secondary Education classes.

METHODOLOGY

Historically, data collection is carried out with different classes of respondents, using structured questionnaires that are applied in face-to-face interviews, with the aid of a computer (tablet) (Computer-assisted personal interviewing – CAPI), and also via computer-assisted telephone interviews (CATI). Furthermore, ICT in Education survey presents a sample of schools based on a single-stage probability stratified simple sampling (Cochran, 1977). Thus, sample selection is carried out by stratifying the research universe according to the following variables: federative unit (27 classes), administrative jurisdiction (federal, state, municipal, private), and location (capitals, urban non-capital cities, rural non-capital cities) (CGI.br, 2021). In the 2020 edition, the survey was reformulated and included new thematic modules in order to collect unprecedented information on the use of digital technologies in schools (CGI.br, 2021). In addition, its methodology had to be adapted due to the pandemic, which implied the adoption of an alternative method to face-to-face interviews. Thus, data were collected between September 2020 and June 2021, using a structured

questionnaire, through remote interviews with school managers, including urban school principals and persons responsible for rural schools (CGI.br, 2021). In this edition, two units of analysis were considered: (i) Schools; and (ii) School managers.

As this chapter seeks to analyze the challenges faced and the measures adopted by Brazilian public schools for the continuity of education during the health crisis, with an emphasis on the use of ICT, the data are presented for the Schools analysis unit and are drawn from the following modules:

- Module A: Internet access;
- Module B: Use of computers and digital devices; and
- Module CO: Conducting pedagogical activities during the COVID-19 pandemic.

The indicators collected by these modules were reprocessed[9] so that the results could be presented for the total number of public schools in the following domains of interest (CGI.br, 2021):

- region of Brazil: Center-West, Northeast, North, Southeast, and South macro-regions, according to IBGE criteria;
- administrative jurisdiction: type of administrative subordination of the school – municipal public, state public, federal public;
- area: classification of the school as rural or urban, according to INEP criteria;
- location: definition of schools located in capitals or in non-capital cities (other municipalities);
- highest level of education: classification of the highest level of education offered by the school, according to information from the Brazilian School Census on Basic Education (INEP, n.d.), in schools that offer up to Preschool or Primary Education; up to Lower Secondary Education; and up to Upper Secondary Education or Professional Training;
- size: classification of the school by enrollment ranges according to the Brazilian School Census on Basic Education (INEP, n.d.) in: up to 50 enrollments; from 51 to 150 enrollments; from 151 to 300 enrollments; from 301 to 500 enrollments; from 501 to 1 thousand enrollments; and more than 1 thousand enrollments.

9 The tables of results for ICT in Education 2020 survey (proportion, total, and error margins) reprocessed for public schools are available at: https://cetic.br/pt/publicacoes/indice/estudos-setoriais/

RESULTS

Just like in most part of the world and in LAC, schools in Brazil were closed as a containment measure due to COVID-19 as of March 2020. This section presents the different strategies implemented for the continuity of public education during this period, based on reprocessed data from the ICT in Education 2020 survey (COVID-19 Edition — Adapted methodology) (NIC.br, 2021a). The analysis of results considers the particularities of Brazilian public education previously presented, as well as the connectivity policies in education in Brazil, historically focused on providing technological infrastructure to schools.

Beyond the topic of connectivity in schools, data on digital inclusion in Brazil that have been reported since 2005 by Cetic.br|NIC.br surveys, reveal that, although there have been important advances in relation to access to and use of digital technologies in recent years, inequalities persist in different spheres of society. In this context, the health emergency shed light on the country's digital divide, with special emphasis on socioeconomic and regional aspects (IDEC, 2021); in addition, inequalities in education were possibly deepened, since teaching conditions were very unequal among the population, as shown below.

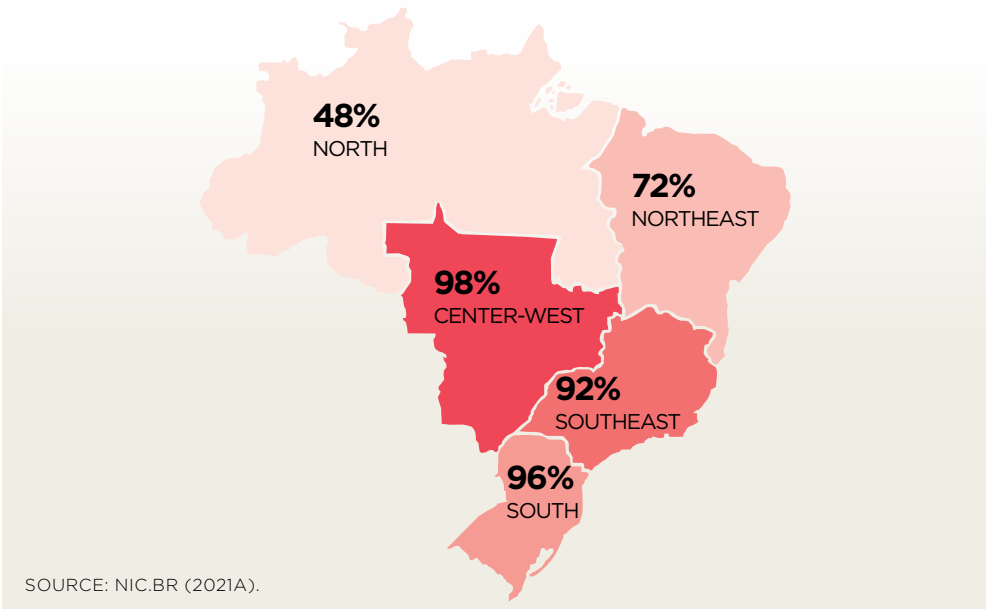
Overview of Internet and computer access in Brazilian public schools

In Brazil, the expansion of technological infrastructure remains an important challenge to be faced by many schools, and the different levels of access to ICT can be seen in the connectivity indicator. The ICT in Education 2020 survey (COVID-19 Edition — Adapted methodology) identified that 78% of public schools (municipal, state, and federal) in Brazil had Internet access, with significant variations by region of the country, area (urban and rural), and location (capital or non-capital cities) (NIC.br, 2021a).

In relation to the different regions of the country, while the Center-West, South, and Southeast show proportions above 90%, less than half of the schools have Internet access in the North (48%) (Figure 2). The main reasons reported for the absence of connection in the North are the lack of infrastructure for Internet access in school (79%) and in the region (78%), and

the high Internet connection cost (58%). In smaller proportions, the lack of need for Internet at school (37%) is mentioned, as well as basic issues related to the availability of electricity: 37% reported lack of electricity at school; 35% said the electricity in school is unstable. In this sense, basic infrastructure issues still represent a key factor for the lack of connection in schools.

FIGURE 2 – SCHOOLS WITH INTERNET ACCESS
Total public schools (municipal, state, and federal) (%)



SOURCE: NIC.BR (2021A).

In addition, there is a notable difference in connectivity between public schools in urban and rural areas (98% and 51%, respectively) and between those located in capitals and in non-capitals cities (98% and 75%, respectively). In schools located in rural areas or in non-capital cities, the main reasons for not having Internet access are also those related to the lack of infrastructure for Internet access in the region (77% and 75%, respectively) and in school (72% and 71%), as well as the high connection costs (49% and 48%). Finally, the difference in the administrative jurisdiction of schools also reflects distinct levels of connectivity in the municipal (71%) and state (94%) school systems.

Although the advances achieved by public policies on connectivity in schools have been relevant, Internet access programs proved to be insufficient for the digital inclusion of students, which had important repercussions in the context of social isolation resulting from the COVID-19 pandemic (IDEC, 2021).

BOX 2 – CONNECTIVITY IN EDUCATION

The Connectivity in Education[10] project, coordinated by NIC.br and the Innovation Center for Brazilian Education (CIEB), aims to gather data to portray an overview of connectivity in Brazilian education and support the formulation of public policies on this matter.

The Connected Education Internet Measurement System,[11] a portal developed by NIC.br and the Brazilian Ministry of Education (MEC), main source of data on Internet quality in schools, uses data collected by the Internet Traffic Measurement System (SIMET),[12] developed by the Centre of Study and Research in Network Technology and Operations (Ceptro.br|NIC.br).[13] By using this tool, schools can measure the quality of their connection and visualize the result and the history of previous measurements (NIC.br & CIEB, n.d.).

Although the Connected Education Internet Measurement System has not yet been installed by all public schools in the country, the diagnoses of the school systems in each federation unit are important for public policies. By providing details about the quality of the Internet in schools, this tool allows analyzing the specifics of each location, placing the information regarding each school system into perspective; for example, even though, in some cases, the download speed in schools on the school system is higher than that of the surroundings, the Internet quality can be classified as "poor."[14]

Chart 2 illustrates a portrait based on the data made available by this tool: the proportion of state schools whose average Internet speed is higher than that of their surroundings, considering those that have the Measurement System installed. In this case, Paraná state stands out for having the highest proportion of state schools with the Connected Education Internet Measurement System installed (91%). However, even though 42% of these schools have an average speed better than that of their surroundings, they correspond to an average speed classified as "reasonable" (31.0 Mbit/s). For example, in Tocantins state, Northern region, 72% of state schools have the Measurement System installed: although 65% have an average speed higher than that of their surroundings, it is considered "bad," equivalent to 19.0 Mbit/s.

10 More information available at: https://conectividadenaeducacao.nic.br/

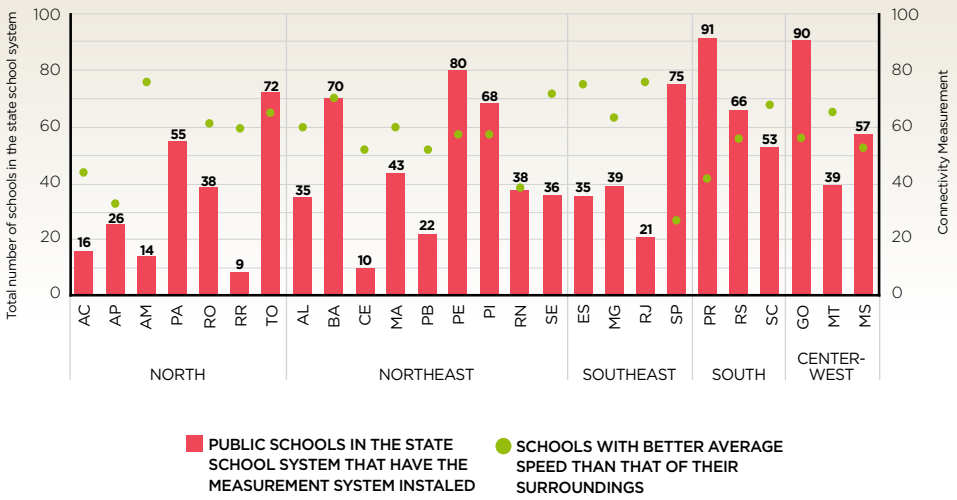
11 More information available at: https://medidor.educacaoconectada.mec.gov.br/

12 More information available at: https://beta.simet.nic.br/

13 More information available at: https://www.ceptro.br/

14 According to the Connectivity in Education project, a school with "good Internet" is one with a download speed above 50 Mbit/s; a school with "reasonable Internet" has a download speed between 20 Mbit/s and 50 Mbit/s; and a school with "bad Internet" has a download speed of less than 20 Mbit/s.

CHART 2 – PUBLIC SCHOOLS IN THE STATE SCHOOL SYSTEM THAT HAVE THE MEASUREMENT SYSTEM INSTALLED, WITH A BETTER AVERAGE SPEED THAN THAT OF THEIR SURROUNDINGS, BY FEDERAL UNIT (%)[15]



SOURCE: NIC.BR AND CIEB (N.D.).

It should be noted that, in addition to providing a connectivity reading, the Connectivity in Education project allows participants to interactively visualize information such as: schools within that school system that have adequate connectivity, Internet speed in schools, connectivity technologies available in the municipality (optical fiber, satellite, radio, etc.), and the sources of resources available for the contracting of Internet in schools (NIC.br & CIEB, n.d.). Another action within the project scope is the Connectivity in Education Guide (GICE, NIC.br, & CIEB, 2021), which is divided in four steps: (i) diagnose the connectivity status of schools; (ii) plan the contracting of connectivity services for schools; (iii) contract connectivity services for schools; and (iv) monitor school connectivity. The material presents, in a simplified form, guidelines on infrastructure parameters, equipment and signal distribution, financing alternatives and contracting models.

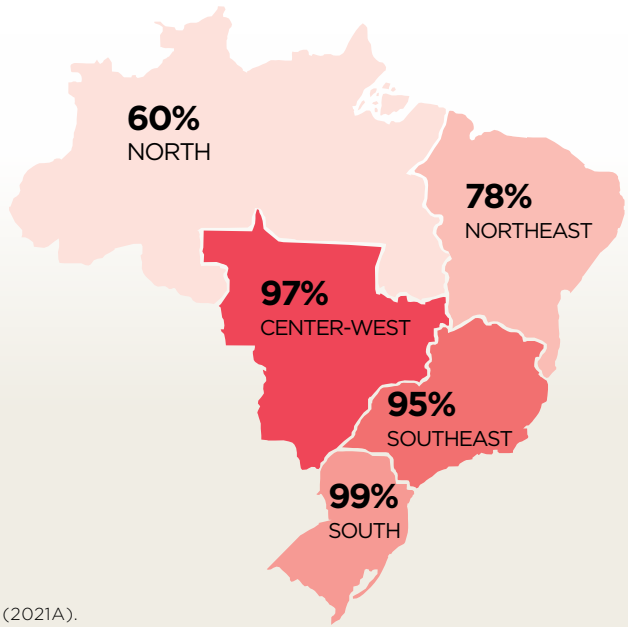
15 Does not include the Federal District.

With regard to access to technology, the ICT in Education 2020 survey (COVID-19 Edition — Adapted methodology) (NIC.br, 2021a) found that the proportion of public schools in Brazil that had a computer (84%) was higher than those who had access to the Internet (78%), which means that 6% of schools had the equipment, but no connection to the network.

It should be noted that the computer was present in almost all public schools, with the exception of the North (60%) and Northeast (78%) regions (Figure 3). The almost universal presence of computers is also characteristic of schools located in urban areas and those located in capitals (both 99%); on the other hand, in rural areas and in non-capital cities, these proportions are lower (63% and 82%, respectively). The administrative jurisdiction of schools also reveals significant differences: whereas computers were present in 95% of state schools, only 79% of municipal schools had the equipment (NIC.br, 2021a).

FIGURE 3 – SCHOOLS WITH COMPUTERS

Total public schools (municipal, state, and federal) (%)

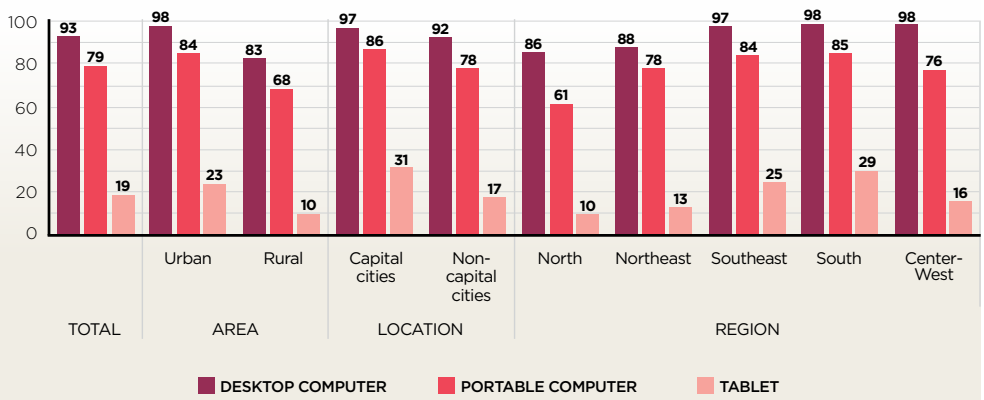


SOURCE: NIC.BR (2021A).

In general, the presence of desktop computers is predominant in public schools (93%), followed by portable computers (79%), and tablets (19%). With respect to desktop computers, they are present in more than 80% of schools, including those located in rural areas and in the North region (Chart 3).

CHART 3 – SCHOOLS WITH COMPUTERS, BY TYPE OF DEVICES

Total public schools (municipal, state, and federal) with computers (%)



SOURCE: NIC.BR (2021A).

Despite the wide presence of computers in Brazilian public schools, it is important to highlight that such equipment is not always available for pedagogical use. This question refers to old dilemmas related to the appropriation of ICT in schools: whereas administrative activities used management systems in their development, the use of technologies in teaching and learning processes, in turn, has not yet become a consensual point in school practices (Valente & Almeida, 2020). According to the ICT in Education 2020 survey (COVID-19 Edition — Adapted methodology) (NIC.br, 2021a), among public schools that had a desktop computer, 38% did not make their devices available for pedagogical use, whereas 19% of schools provided up to five, and 20% provided from six to 15 computers for this purpose. Among public schools with por-

table computers, almost half (46%) did not make this device available for pedagogical use, and about a quarter (23%) did so with up to five devices.

Mobile phones, on the other hand, were used to access the Internet by 83% of Brazilian public schools. In the 12 months preceding the ICT in Education 2020 survey, context of the COVID-19 pandemic, 90% of public schools used this device to carry out administrative or pedagogical activities, which portrays the importance of this type of device in the period of social isolation (NIC.br, 2021a). This proportion is close to 80% in all school profiles (area, location, and region), indicating that, unlike the scenario portrayed in other indicators, mobile phone use is quite widespread.

Regarding the origin of the mobile phone used in administrative activities, 65% of public-school managers stated that the devices used are personal and credits or plans are not paid by the school, and 63% said these are personal phones, accessed through from the school's Wi-Fi. Only 10% said that the mobile phone and credits or plans are paid for by the school, the same proportion of those who declared using personal devices whose credits or plans are financed by the school.

Additionally, among public schools that do not have Internet access, more than half (59%) used their mobile phone to access the network. Among public schools that do not have a computer, 71% claimed to have used a mobile phone to carry out administrative or pedagogical activities in the last 12 months (NIC.br, 2021a).

As the cases of COVID-19 decrease, several countries are starting to reopen their schools and implement hybrid teaching models that contemplate both in-person and distance learning (UN, 2020). In this sense, for schools that choose this path, having a good technological infrastructure in schools will be essential, including access to adequate equipment that allows this process to be continued and a good Internet connection, among other requirements.

BOX 3 – ACCESS TO ICT IN BRAZILIAN HOUSEHOLDS

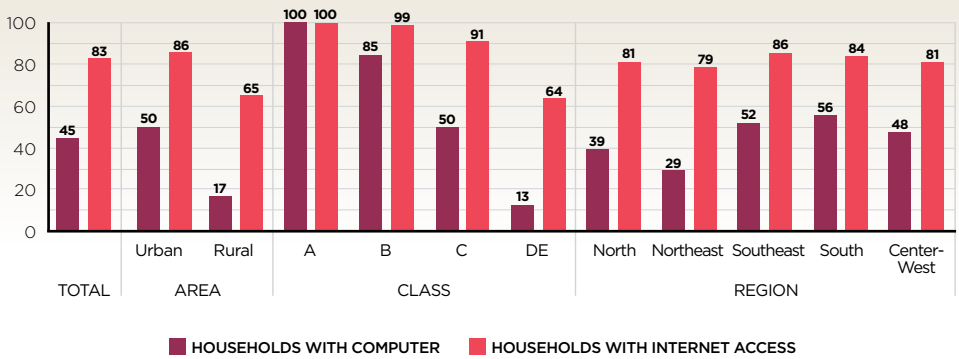
In Brazil, one of the great challenges for the continuity of education during the pandemic was the inequality of access to devices and to the Internet by the Brazilian population in their households. In this sense, data from the ICT Households 2020 survey (NIC.br, 2021b), collected during the pandemic,[16] indicate that, although 83% of households had Internet access, almost half of them (39%) had no computers at home; 16% did not have a computer nor Internet access. Such data are particularly important when looking at educational activities, considering the broad usability and functionality of computers for different tasks in comparison to the limited possibilities offered by mobile phones.

The survey data also reveal regional and sociodemographic differences in access to technologies: less than one-fifth (17%) of households in rural areas had a computer, and just over two-thirds (65%) of these had Internet access. Computer and Internet access in households in class A[17] was universal (100%), whereas these proportions corresponded to 13% and 64% for households in classes DE, respectively (Chart 4).

Furthermore, the type of connection is a crucial factor for the use of technologies in education, since synchronous activities, for example, require more bandwidth. In this regard, the ICT in Households 2020 survey (NIC.br, 2021b) found that, whereas 69% of households had a broadband connection, 22% of households were connected via modem or 3G or 4G chip. Among classes DE, for example, the proportion of households with a mobile connection reached 33%.

CHART 4 – HOUSEHOLDS WITH COMPUTER AND INTERNET ACCESS

Total households (%)



SOURCE: NIC.BR (2021B).

16 Data from the ICT in Households 2020 survey (COVID-19 Edition — Adapted methodology) (NIC.br, 2021b) were collected between October 2020 and May 2021.

17 Based on the Brazilian Criteria for Economic Classification (CCEB), defined by the Brazilian Association of Research Institutes (Abep), which considers ownership of durable goods for household consumption and level of education of the head of the household. This scoring system divides households into the following economic classes: A1, A2, B1, B2, C, D, and E (highest to lowest).

The collected data illustrate the context of inequality in access to technologies in Brazil and its potential impacts on teaching students in the public network who either do not have a good Internet connection, use the network exclusively on a mobile phone, or whose access is limited to basic applications (IDEC, 2021). Therefore, we must consider that without devices that are adequate – preferably those with large screens and sufficient computing capacity – and until Internet connection is unlimited, students' learning experiences are significantly compromised (IDEC, 2021).

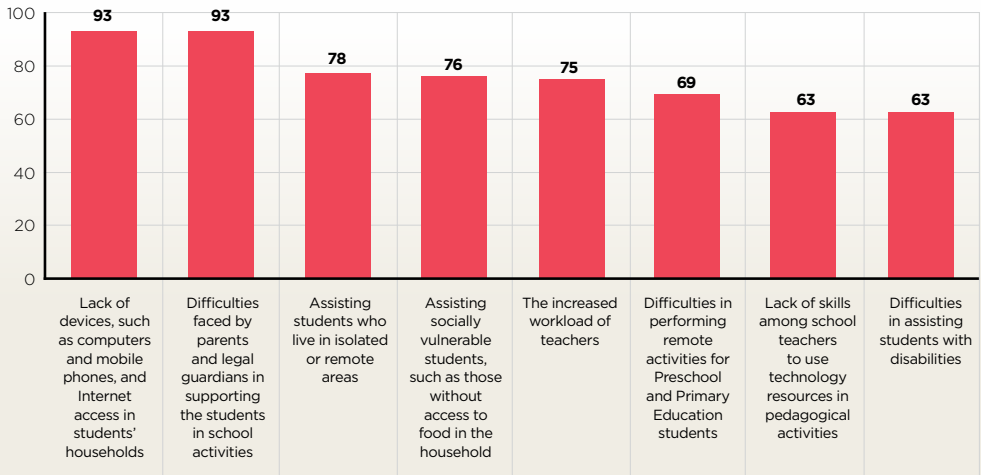
Challenges faced by Brazilian public schools for the continuity of education during the pandemic

The adversities resulting from the COVID-19 pandemic were diverse and had repercussions in the political, economic, and social spheres (Williamson et al., 2020), extrapolating the technological issues mentioned. Likewise, schools also faced multiple and different challenges during this period. The ICT in Education 2020 survey (NIC.br, 2021a) investigated eight different challenges (Chart 5), all mentioned by more than two thirds of public schools, which reinforces the complexity of this scenario with such diverse problems.

Among the different issues addressed by the survey, the two challenges most cited by public schools were: (i) the lack of devices and Internet access in the households of students, and (ii) the difficulties faced by parents and legal guardians in supporting the students in school activities. Both problems were experienced by more than 90% of schools and had similar incidences in all school profiles analyzed (NIC.br, 2021a).

CHART 5 – CHALLENGES FACED IN CONTINUING PEDAGOGICAL ACTIVITIES DURING THE COVID-19 PANDEMIC

Total public schools (municipal, state, and federal) (%)



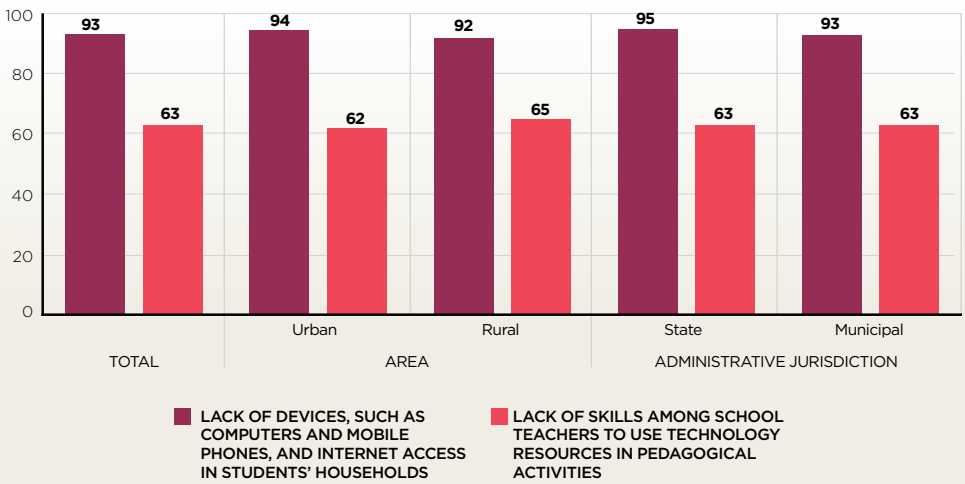
SOURCE: NIC.BR (2021A).

Thus, the main challenge, the lack of devices – such as computers and mobile phones – and Internet access in students' households was an issue for more than 94 thousand public schools in Brazil (93%). The proportion of educational institutions that cited this problem was equal to or greater than 90% for all domains of interest: urban and rural area, state and municipal administrative jurisdiction, school location (capital or non-capital cities), and region of the country (Chart 6). This high incidence expresses the enormous relevance of barriers for accessing technologies in all populational contexts in Brazil, especially in times of social isolation, which is corroborated by the data from the ICT Households 2020 survey (NIC.br, 2021b) presented in Box 2.

In addition to the barrier for accessing ICT, another important challenge for the use of technology in pedagogical activities was the lack of skills among teachers, cited by 63% of public schools. Thus, as in the previous item, this question also presented equivalent results between the different domains of interest.

CHART 6 – CHALLENGES FACED IN CONTINUING PEDAGOGICAL ACTIVITIES DURING THE COVID-19 PANDEMIC (1)

Total public schools (municipal, state, and federal) (%)



SOURCE: NIC.BR (2021A).

The technological barrier, however, is not the only concern when implementing remote learning programs, especially in emergency contexts. The exclusion of student populations living in remote areas, low-income families, people with disabilities, or people who communicate at home in a language other than that used in their schools are important risks and should be mentioned (Montoya & Barbosa, 2020). Thus, other challenges faced by schools in continuing pedagogical activities were related to reaching students who demanded specific forms of assistance that were distinct from the main solution offered. In this context, 78% of public schools reported difficulty in assisting students who live in isolated or remote areas (Chart 7). With the exception of the area (urban or rural), this challenge presented similar levels across the analyzed domains of interest; moreover, although it stood out in schools in rural areas (83%), its incidence was also high in schools in urban areas (74%) (NIC.br, 2021a).

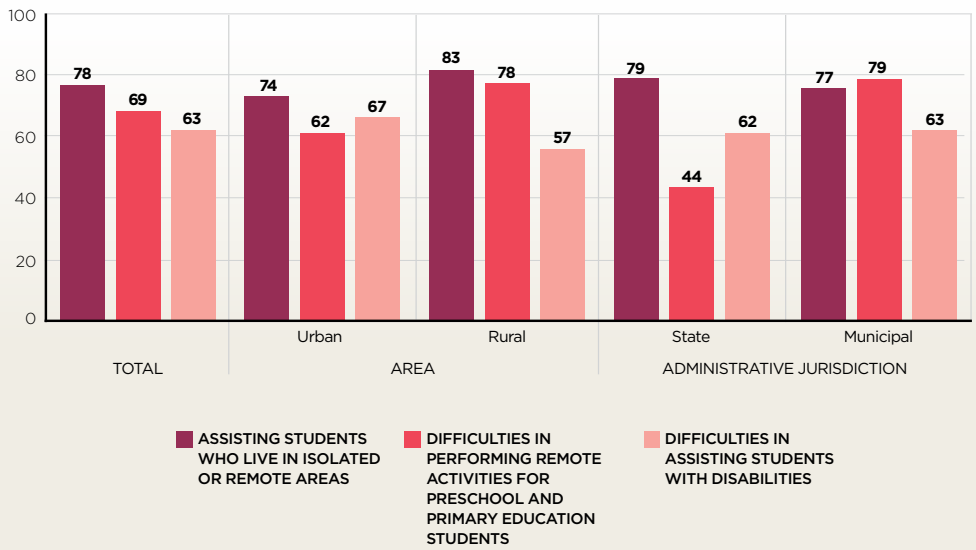
Another challenge reported by public schools refers to the difficulties in performing remote activities for younger students, specifically those in Preschool and those in the early years of Primary Education.

This issue was mentioned by 69% of public schools, especially those in rural areas (78%) and municipal administrative jurisdiction (79%). In this last item, the smaller proportion of state schools that identified this issue (44%) may be related to the difference in attributions of states and municipalities: the LDB (Brasil, 1996) defines that local governments are responsible for Early Childhood Education, whereas the responsibility for Primary Education is shared between these two federative entities.

Furthermore, assisting students with disabilities during the pandemic period was a challenge experienced by two-thirds of public schools in Brazil (63%). In urban areas, this issue was mentioned by 67% of schools (NIC.br, 2021a).

CHART 7 – CHALLENGES FACED IN CONTINUING PEDAGOGICAL ACTIVITIES DURING THE COVID-19 PANDEMIC (2)

Total public schools (municipal, state, and federal) (%)



SOURCE: NIC.BR (2021A).

Finally, some general challenges experienced by more than three quarters of public schools include: (i) difficulties faced by parents and legal guardians in supporting the students in school activities; (ii) assisting socially vulnerable students;

and (iii) the increased workload of teachers (Chart 8). It should be noted that the first two items did not show major distinctions between the different domains of interest.

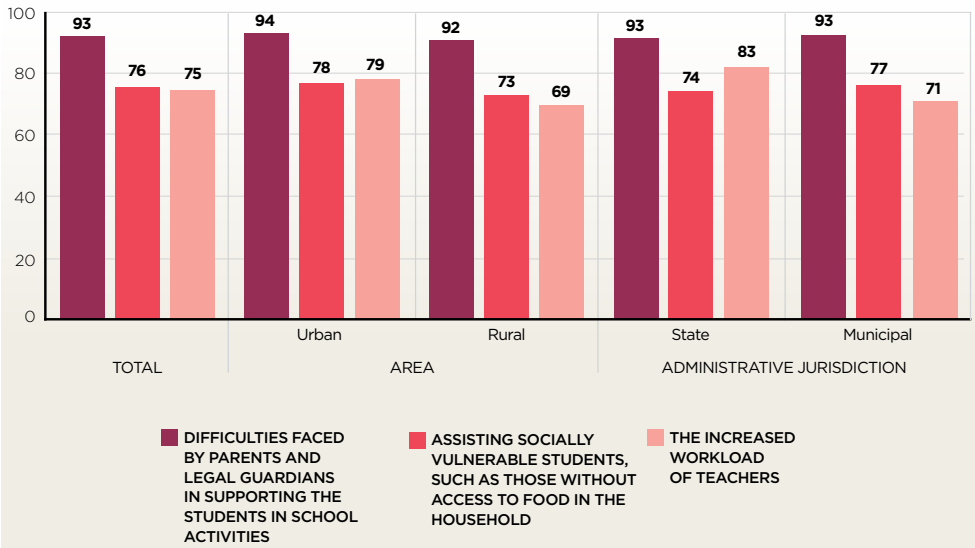
The difficulties faced by parents or legal guardians in supporting the students in school activities was cited by 93% of public schools, one of the crucial issues reported. In the pandemic, the role of the family became even more relevant for monitoring education, and there was a heavy burden on parents and legal guardians, who, in turn, also had very unequal resources to fulfill this task (Prates et al., 2020). Thus, in remote learning, schools need to take into account the specific demands of parents and legal guardians, who play an especially vital role in facilitating pedagogical activities, particularly among younger children (Montoya & Barbosa, 2020). In this sense, for learning modalities that require the use of technologies, the ICT skills of parents and legal guardians also become critical (Montoya & Barbosa, 2020).

Regarding the provision of assistance to socially vulnerable students, for example, those without access to food at home, this issue was identified by more than three quarters of public schools (76%). This challenge stood out in urban areas (78%), in capitals (80%), and in the Center-West region (79%) (NIC.br, 2021a).

Another issue reported by 75% of schools during the COVID-19 pandemic was the increased workload of teachers. This challenge was faced by those located in urban areas (78%), in the South (90%) and Center-West (88%) regions, and in schools of state administrative jurisdiction (83%) (NIC.br, 2021a).

CHART 8 – CHALLENGES FACED IN CONTINUING PEDAGOGICAL ACTIVITIES DURING THE COVID-19 PANDEMIC (3)

Total public schools (municipal, state, and federal) (%)



SOURCE: NIC.BR (2021A).

Measures taken by Brazilian public schools for the continuity of education during the pandemic

In view of the social distancing imposed by the COVID-19 pandemic and the consequent closing of institutions, schools had to seek strategies that would allow the continuity of education during this period. For this, they adopted different measures to make it possible to communicate with students and families and to continue teaching practices remotely either synchronously or asynchronously. For example, to continue holding classes at the beginning of the pandemic, 78% of LAC countries provided some instrument to conduct distance learning in some modality, whether via radio, TV, distance learning materials, or online platforms (ECLAC, n.d.).

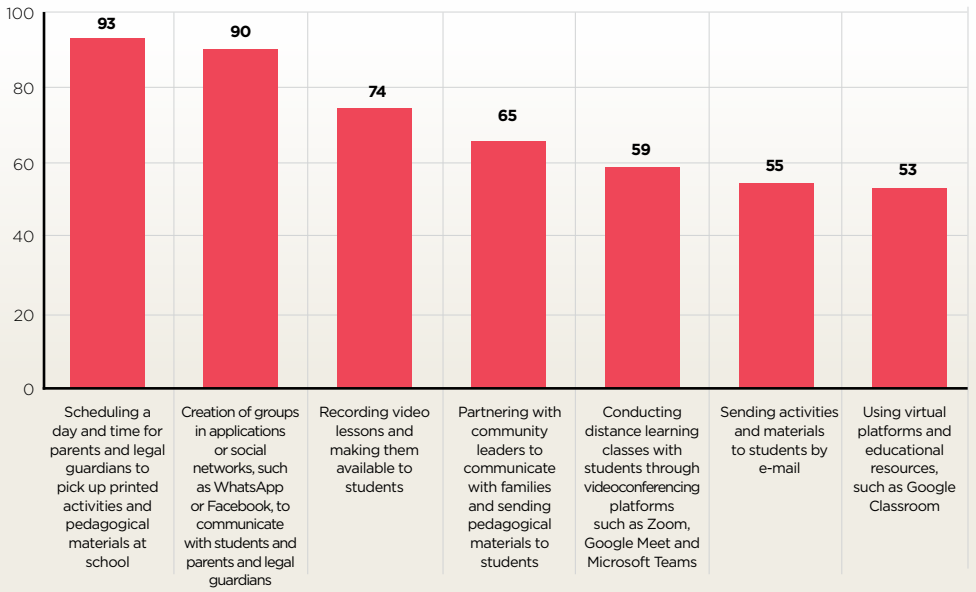
In this context, the ICT in Education 2020 survey (NIC.br, 2021a) investigated the adoption of seven measures imple-

mented by Brazilian public schools, which ranged from the availability of printed teaching materials to the realization of distance learning classes. The incidence of these strategies showed important variations in the different contexts in which they were adopted, considering their primary objectives and the availability of technology, among other factors. All measures investigated were implemented by more than half (50%) of the country's public schools (NIC.br, 2021a), which indicates that it was important to adopt multiple strategies to deal with different action fronts at the same time. In general, urban schools, state schools, those located in capital cities, and larger ones were found to be those that most reported the adoption of measures for the continuity of education during the pandemic, among all the items surveyed, but the incidence of specific measures varied according to local contexts.

The results show that, on the one hand, the principal measures adopted by public schools were scheduling a day and time so that parents and legal guardians could pick up printed activities and pedagogical materials at school (93%), and the creation of groups in applications or social networks, such as WhatsApp or Facebook, to communicate with students and parents and legal guardians (90%); on the other hand, the least implemented actions were sending activities and materials to students by e-mail (55%) and using virtual platforms and educational resources, such as Google Classroom, adopted by just over half of the schools (53%), which is equivalent to more than 53 thousand school facilities (Chart 9).

CHART 9 – MEASURES ADOPTED IN CONTINUING PEDAGOGICAL ACTIVITIES DURING THE COVID-19 PANDEMIC (1)

Total public schools (municipal, state, and federal) (%)



SOURCE: NIC.BR (2021A).

On the one hand, the use of the Internet for education offers a range of possibilities, considering the wide availability of pedagogical resources and communication tools capable of bringing schools and families closer together in the context of confinement (ECLAC & UNESCO, 2020). On the other hand, the adoption of multiple teaching modalities, with and without the use of technologies, was crucial to reach students during the period of social isolation (Montoya & Barbosa, 2020). Thus, policies must consider a variety of aspects, especially those related to digital exclusion, such as the availability of adequate ICT devices, Internet access, educational resources and teacher training, among others (Montoya & Barbosa, 2020).

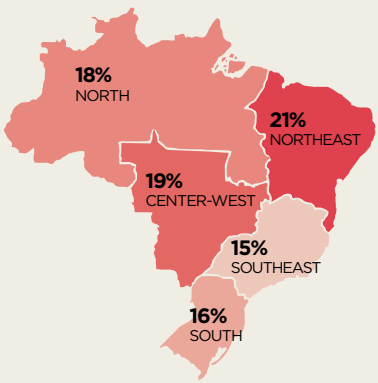
In Brazil, among the different resources used to make public education viable during the period of social isola-

tion, the ICT in Education 2020 survey (COVID-19 Edition — Adapted methodology) (NIC.br, 2021a) investigated two measures that make direct mention to classes: conducting asynchronous classes, whose content is recorded and made available to students for subsequent monitoring, and conducting synchronous classes, using videoconferencing platforms. Roughly three quarters of public schools reported recording video lessons and making them available to students (74%); on the other hand, conducting distance learning classes through videoconference platforms, such as Zoom, Google Meet, and Microsoft Teams was practiced by 59% of public schools. A third strategy researched, whose incidence was the lowest among all (53%), was using virtual platforms and educational resources, such as Google Classroom (NIC.br, 2021a).

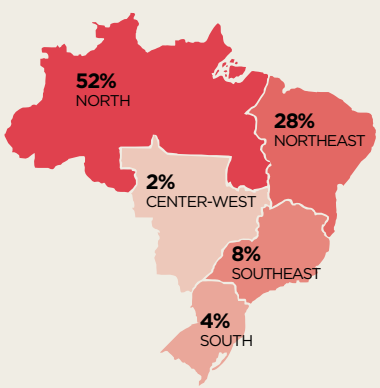
In general, the adoption of these measures showed large disparities between different school profiles, with lower proportions in regions of the country that present higher rates of households and schools with no Internet connection (Figure 4).

FIGURE 4 – INTERNET ACCESS IN HOUSEHOLDS AND SCHOOLS, AND MEASURES ADOPTED BY THE SCHOOL IN CONTINUING PEDAGOGICAL ACTIVITIES, WITH THE USE OF DIGITAL RESOURCES, DURING THE COVID-19 PANDEMIC

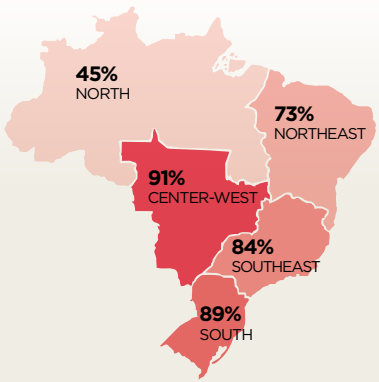
A- Households without Internet access
Total households (%)



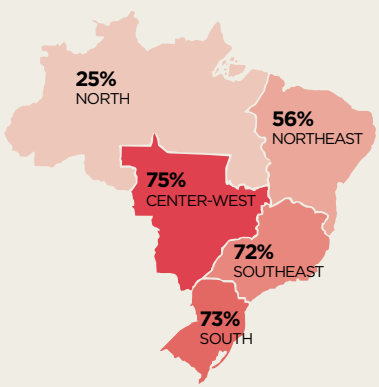
B- Schools without Internet access
Total public schools (municipal, state, and federal) (%)



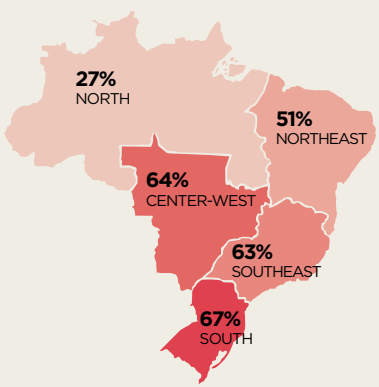
C- Recording video lessons and making them available to students
Total public schools (municipal, state, and federal) (%)



D- Conducting distance learning classes with students through videoconferencing platforms such as Zoom, Google Meet, and Microsoft Teams
Total public schools (municipal, state, and federal) (%)



E- Using virtual platforms and educational resources, such as Google Classroom
Total public schools (municipal, state, and federal) (%)



SOURCE: NIC.BR (2021A).

In the North region, a quarter (25%) of public schools conducted distance learning classes, whereas in the Center-West, South, and Southeast, they were adopted by about two thirds of schools (Figure 4 - item D). In addition to the marked differences by region, educational facilities located in rural areas and those belonging to the municipal administrative jurisdiction also emerged with proportions below the average for these three practices.

The strategy of adopting digital resources as a measure for continuing pedagogical activities during the pandemic raises a series of important reflections. First, given the digital exclusion still present in the country – which is more accentuated in specific contexts (in rural areas and in the North and Northeast regions, for example) – a considerable portion of students would not be able to follow the classes in this way. In this scenario, recording video lessons and making them available to students is seen as a complementary measure, aiming to reach those who would not be able to follow the classes in real time.

A second aspect is related to the decision and choice of which platforms to use, as well as the concern with the collection of data and metadata from the uses of these platforms, and the privacy of students and teachers (Gonsales & Amiel, 2020). Although not the focus of this chapter, this is a critical issue, arising from the widespread use of these private platforms (whether videoconferencing, virtual, or educational resources) (Gonsales et al., 2021). Furthermore, at a time when remote learning is the only possibility, discussions about the decision of which technologies are adopted may be overlooked given the pandemic context (Gonsales & Amiel, 2020).

In this sense, the choice of digital resources used in the classroom impacts the school in different ways. Therefore, this must be a conscious and qualified decision, involving management and teaching staff, based on information regarding the potential and limitations of technologies, and should also be aligned with the school's educational perspective and specific demands (Valente & Almeida, 2020).

In addition to these measures related to the use of distance education platforms, other widely adopted strategies were related to communication between schools, families, and/or

students, whether for the exchange of information or for sending teaching materials and school activities. Although schools have implemented different strategies, with and without the use of technology, scheduling a day and time for parents and legal guardians to pick up printed activities and pedagogical materials at school was the most adopted measure by Brazilian public schools, reaching 93% (Chart 10). Thus, it can be noted that the use of printed pedagogical activities and materials was of great relevance for the continuity of education in a country that is still very marked by digital inequalities.

This measure showed high levels of adoption in all domains of interest, including regions of the country, area, location, administrative jurisdiction, highest education level, and size of public school (NIC.br, 2021a). In contexts in which ICT adoption is lower, this was the main measure adopted by municipal schools (93%), in rural areas (90%), or in the North region of the country (84%) (NIC.br, 2021a). However, despite the relevance of printed materials for allowing the continuity of education in places with low ICT adoption, this measure was adopted to a lesser degree among schools in rural areas and those located in the North (Chart 10). It should be noted that activities related to the availability of printed pedagogical activities and materials, and the use of platforms were essential measures for not interrupting access to education (Montoya & Barbosa, 2020).

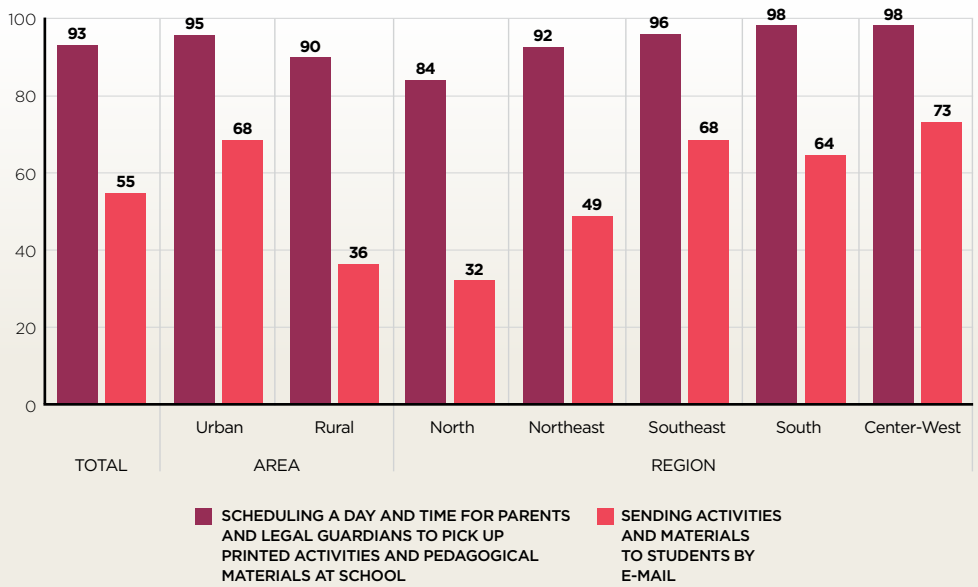
Another means of distributing activities and teaching materials among students was e-mail, a measure adopted by just over half of public schools in Brazil (55%). In contexts characterized by greater access to ICT infrastructure (such as urban area, state level, and capitals), the incidence of this strategy was higher (NIC.br, 2021a). Thus, in schools located in urban areas (68%) and in the Southeast (68%) and South (64%), the level of adoption of this strategy reached about two thirds of public schools (NIC.br, 2021a).

Furthermore, the adoption of this measure showed relevant differences in relation to the levels of education offered by the school. Whereas less than half of schools with up to Preschool or early grades of Primary Education sent activities and materials to students by e-mail (48%), this strategy was adopted by more than three-quarters of schools with up to the final grades

of Primary Education (76%) and schools with up to Secondary Education or Professional Training (78%). Similar differences were noted in relation to size: 41% of schools with up to 50 enrollments and 75% of those with more than 1,000 enrollments sent activities to students by e-mail.

CHART 10 – CHALLENGES FACED IN CONTINUING PEDAGOGICAL ACTIVITIES DURING THE COVID-19 PANDEMIC (2)

Total public schools (municipal, state, and federal) (%)



SOURCE: NIC.BR (2021A).

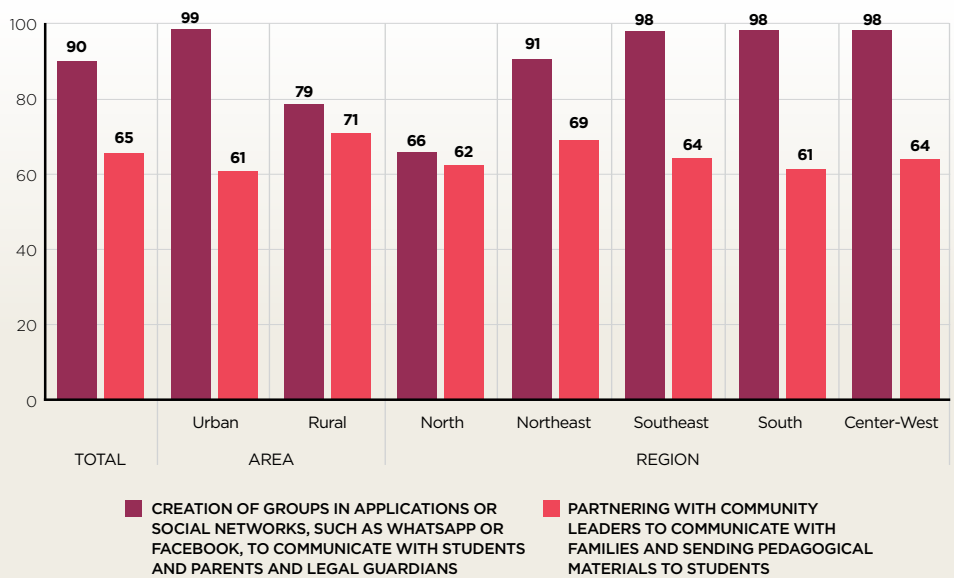
Another important strategy to facilitate contact between families and public schools during this period was creating local partnerships with community leaders (Chart 11). In addition to enabling communication between these parties, this measure was also relevant to distribute pedagogical materials to students in certain locations. Thus, partnering with community leaders to communicate with families and sending pedagogical materials to students was a strategy ad-

opted by 65% of Brazilian public schools, being the fourth most cited, maintaining homogeneous adoption levels among all analyzed domains of interest. Furthermore, its adoption was above average in schools in rural areas (71%) and in those located in the Northeast (69%).

In addition, during the pandemic, communication between schools and their students, parents and legal guardians took place mostly through instant messaging applications or social networks, a practice that requires access to a mobile phone and a basic connection. Thus, the second measure most cited by public schools was the creation of groups in applications or social networks, such as WhatsApp or Facebook (90%). Although this action has reached extremely high levels in the different domains of interest, it had lower proportions than the average for schools in the North (66%), in rural areas (79%), and among smaller ones (NIC.br, 2021a).

CHART 11 – CHALLENGES FACED IN CONTINUING PEDAGOGICAL ACTIVITIES DURING THE COVID-19 PANDEMIC (3)

Total public schools (municipal, state, and federal) (%)



SOURCE: NIC.BR (2021A).

In short, the measures adopted by public schools to continue teaching during the pandemic were diverse and varied, according to the contextual challenges. Due to regional and socioeconomic inequalities and differences in Brazil, it is extremely important that educational policies implemented in the context of health emergencies address the particularities of each situation. In addition, there must be some level of coordination between states and municipalities so that methodologies can be adopted in all locations, despite their particularities (Prates et al., 2020). Furthermore, the digital divide must be addressed from a multidimensional perspective that goes beyond the issue of access to technological devices, since the full realization of the opportunities provided by ICT also depends on other factors, such as appropriate skills – which, in turn, also present very unequal levels among the population, including teachers and students (ECLAC & UNESCO, 2020).

Finally, it should be recognized that, if the inequality in the access to education is not addressed – whether via digital media or another form of remote education –, the differences in access to information and knowledge will be further deepened in such a critical context as that of the COVID-19 pandemic (ECLAC & UNESCO, 2020).

FINAL REMARKS

Considering the scenario of school closures due to the COVID-19 pandemic and its various implications for the school community, this chapter presented the challenges faced by Brazilian public schools and measures adopted for the continuity of educational activities during the pandemic. To this end, data from the ICT in Education 2020 survey were used (NIC.br, 2021a) as a basis to analyze the role played by ICT in this situation.

Drawing from the contextualization of the public Basic Education network in Brazil, its functioning, dimension, and relevance, the text sought to elucidate the complexity of the implementation of emergency public education policies in a scenario of such marked regional and socioeconomic differences. Added to this setting are the digital inequalities that persist in the country, both in the spheres of schools and households, and which limit the opportunities of the adoption and enjoyment of digital technologies by the most vulnerable populations.

Thus, lack of devices and Internet access in students' households was one of the main challenges faced by public schools throughout Brazil. Nevertheless, policies implemented by state and municipal governments in the field of education did not consider the distinct levels of access to and use of digital technologies during the pandemic (Barberia et al., 2021). Thus, these not only failed to address discrepancies in access to education (ECLAC & UNESCO, 2020), but also exacerbated other inequalities (Barberia et al., 2021). The disparities in access to technologies historically faced by Brazilian schools also have implications for pedagogical practices today, since difficulties faced by many institutions reflect lack of familiarity with the use of technologies for educational activities (IDEC, 2021). Hence, the health crisis reinforced the importance not only of connecting schools, but also the school community, with adequate equipment and connection throughout the Brazilian territory and in all layers of society (IDEC, 2021). Furthermore, special attention is needed for the sections of the population that are most deprived of access to technologies and those who do not have the skills to take full advantage of the opportunities provided by technologies in educational contexts (UN, 2020).

Even among populations with good access to digital technologies, factors such as housing conditions, economic difficulties, and lack of parental support also influence remote education (UN, 2020). In this sense, the closure of schools was also critical for interrupting the provision of essential services to many children, such as those related to food and mental health, with relevant impacts on the most vulnerable communities (UN, 2020).

In several countries, the return of in-person classes is already a reality. Although this alleviates the urgency of addressing the effects of digital inequalities in education, educational policies must focus on teacher training, as well as on the integration of ICT in pedagogical planning (IDEC, 2021).

Furthermore, beyond the response to the health emergency, reflection on the role of ICT and of private platforms in education is necessary. Faced with the closure of schools, these platforms, often offered "free of charge," were hastily implemented, without necessarily considering the implications of these choices (Gonsales et al., 2021; Gonsales & Amiel, 2020). In this sense, the decision-making process within the scope

of educational policies should consider the effects of the use of such platforms, by teachers and students, regarding data privacy and processing, as well as the metadata generated from this use. Finally, it is worth considering whether and how the school community participates in these definitions (Gonsales & Amiel, 2020).

The analyses carried out in this chapter were made possible due to the production of data. Many efforts have been made to generate statistics that are able to portray education during the pandemic, despite the contextual difficulties. Although there are a lot of data on access to ICT and the use of digital technologies in education, advances are needed in the production of indicators on "the use, appropriation, skills, opportunities and barriers experienced by children and teachers – especially in developing countries" (Martínez & Jaimes, 2020, p. 9). Furthermore, there are still few studies dedicated to the monitoring and evaluation of the potential impacts of remote education on population learning (UN, 2020); therefore, the conduction of further in-depth studies are needed to assess this issue and its reverberations in other social indicators.

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CHAPTER 5

The platformization of education in times of pandemic

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INTRODUCTION

Since the 1980s, some research groups[5] have discussed the relationship between education, communication, and technologies through the monitoring of projects and public policies that incorporate technologies and media in pedagogical practices and schools in Brazil. In this period, these policies have moved from a perspective of instrumental use to a structuring one, from a private to a public approach – which prioritizes freedom and the opening of knowledge, and questions established ideas and externally produced solutions that are imposed on the different educational realities. Throughout this time, these research groups have evinced weaknesses and inadequacies of public policies focused on universalizing technologies in schools and on teacher professional development aimed at revisiting pedagogical practices (Amiel, 2018).

Within this context, the year 2020 came along, a period in which schools and universities – all over the world and in Brazil – closed their doors as a protective measure against the health crisis caused by the COVID-19 pandemic. Thus, society turned once again to the debates that had long been raised about the integration of technologies in education. Although present, this discussion had not yet been effectively incorporated by most scholars, politicians, education professionals, and families. We were then faced with various unaccomplished tasks, ranging from access to technologies in schools (including broadband presence and connectivity) to digital literacy of teachers and students (such as critical reading and creative, productive, and authorial appropriation with and through digital resources). The lack and inadequacy of public policies in Brazil for overcoming inequalities in an education project that prepares citizens while training them for the job market became evident.

5 Some research groups focused on this topic are: GEC (FACED/UFBA), available at: https://blog.ufba.br/gec/tag/gec/; Comunic (UFSC), available at: https://comunic.paginas.ufsc.br/; the UNESCO Chair in Open Education (Unicamp), available at: https://www.nied.unicamp.br/projeto/catedra-unesco-em-educacao-aberta/; and the UNESCO Chair in Distance Education (UnB), available at: https://catedra.fe.unb.br/

In this crisis setting, aggravated by the pandemic, we observed the acceleration of the implementation of proprietary platforms and services by large commercial software companies, through contracts or participation with limited transparency. Thus, there was an accelerated dissemination of services offered "free of charge" by companies associated with the so-called surveillance capitalism, defined by Zuboff (2019b) as "a new economic order that claims human experience as free raw material for hidden commercial practices of extraction, prediction, and sales" (p. 8). The author also incorporates, in her definition, concerns about an unprecedented concentration of power.

Dominant privately held companies, such as Google and Microsoft, are usually associated with this new form of capitalism. These companies have a strong presence in private and public initiatives at all levels of education through their platform services (Platform as a Service – PaaS), such as Google Workplace for Education and Microsoft 365. Services and platforms from smaller companies also align with this business model. However, no matter the size of these companies, there is a lack of clarity and transparency regarding user privacy.

The COVID-19 pandemic justified and legitimized the presence of these private commercial platforms in education – the private occupation of public space – and in the training of an entire generation. This strategy involves strengthening the discourse that the only alternative for the continuity of educational processes is the adoption of solutions offered by the market. This discourse became widespread, resulting in the "naturalization of the (un)avoidable." This strategy was broadly supported by several actors: public managers, school leaders, and the academic community, which could – if there had been systematic planning and clarity on these issues – have sought alternatives. However, the path for the "occupation" of teaching networks and educational institutions was paved. Thus, this article discusses the new form of colonization of education, which has been intensified by the pandemic, pointing to free/public alternatives to meet the needs of education systems.

CONTEXT

As previously stated, some research groups that are part of an investigation network that share the same agenda in the expanded field of education and technology have sought to qualify the issue around the penetration of large private technology companies in public education, a phenomenon we call Platformization of Education, contributing with a perspective that goes beyond the educational field. We understand that public policies aimed at overcoming the deep inequalities in Brazil involve tackling the digital divide (Bonilla, 2010; Lapa, 2013; Amiel, 2006) and go far beyond. It is necessary to think about teacher and student training to achieve active citizenship that is both critical and creative, grounded on democratic values and on the strengthening of human rights. What we propose involves the development of education policies that enable the incorporation of technologies in pedagogical practices at all educational levels in a non-instrumental perspective (Pretto, 2013), in order to prioritize freedom and the opening of knowledge and to question established ideas that are widely disseminated by the corporate media, the market, public policies, or even by social subjects. Our goal is to discuss the neglect of these subjects, who are considered mere consumers of products, ideas, and knowledge produced outside their context.

We are currently facing an unprecedented global crisis, which combines health, political, economic, and educational factors, among others. Therefore, we cannot lose sight of the fact that we are in the midst of a threat to life, in different dimensions and proportions. For Brazilian society, particularly, it would already be a major challenge to confront this situation due to its peculiar and at times fragile democratic and institutional structures. However, the challenge becomes greater due to the political conflict that is exposed by the media daily, which hinders the effectiveness of the State in guaranteeing assistance policies for the most vulnerable and increases the insecurity of the population due to the absence of clear, integrated, and articulated guidelines.

There is little transparency and limited information and data about the penetration of surveillance capitalism in education. There is no consolidation that allows us to know, for example, which services and platforms were adopted by the

Brazilian federal government, states, municipalities, and educational institutions during the COVID-19 pandemic. Thus, as a reaction mechanism to this scenario, it becomes more relevant and necessary to collect data associated with the open, collaborative, and public debate about the presence of large private platforms adopted in Brazilian education by a significant number of actors as the only alternative for today. Also, the context of a future that is still being built or, who knows, intentionally made impossible, seems more alarming to us.

Therefore, we propose a reflection based on experimentation of alternatives and research data, as a form of contributing to facing these great challenges posed by the pandemic, without excluding the numerous dimensions of the Brazilian social and educational context.

We argue that this debate should not be limited to academic spheres. Therefore, we believe that it is crucial to exercise the role of public intellectuals to promote the construction of knowledge that can flow through different media and groups, in order to reach an increasingly broader audience. Our article seeks to contribute to confronting the debate, both from a theoretical point of view and from the perspective of the construction of public policies for education in Brazil.

PRESENCE OF DIGITAL TECHNOLOGIES IN EDUCATION

Until recently, when thinking about introducing computers in educational processes, the model used was of information technology (IT) labs organized in schools, using proprietary software.[6] This model has always been limiting: whether from a pedagogical perspective, since only a limited number of students could use the lab in each period, excluding others from using it simultaneously; from an economic perspective, since it implies a huge investment, with the payment of licenses for all computers in Brazilian schools; or even from a political perspective, as it reduces students and teachers to mere users of technologies, which hinders training processes that involve the development and selection of technologies and, consequently,

6 Proprietary software is a software that keeps its source code closed, only releasing the binary code upon the payment of a use license.

reduces the technological potential of the country. However, this has always been the model that interested the market, not only due to direct sales of software licenses, but also because it meant the creation of a culture of use of these systems by teachers and students, which implied the expansion of such use to personal computers, and the consequent strengthening of the market.

As of the second half of the first decade of this century, with the development of mobile technologies, we witnessed other movements in schools, due to the arrival of smartphones to the hands of students and to the proposition of public policies for the inclusion of laptops and tablets in the 1:1 model (one computer per student). The advent of mobile devices brought uncertainties, insecurities, and tensions to the pedagogical practice and to the management of technologies in schools, due to the near impossibility of controlling the actions of students online, and also due to the insufficiency of public policies conducting these projects.[7]

The first decade of this century is also marked by the growing debate around the use of free software[8] on computers. Early in the 2000s,[9] the Free Software Association *(Associação do Software Livre* – ASL)[10] held the 1st International Free Software Forum (*Fórum Internacional de Software Livre* – FISL)[11] in the city of Porto Alegre (state of Rio Grande do Sul). This event was a milestone that brought together Brazilian activists related to this theme and drew the attention of activists from other countries. FISL effectively gained an international dimension as of 2005, with the presence of all Brazilian states and participants from more than 35 countries. During the Luiz Inácio Lula da Silva administration, which began

7 Research developed by GEC/UFBA (Nassri, 2013; Silva, 2013, 2017; Cordeiro, 2014; Coelho, 2014; Damasceno, 2014; Quartiero, Bonilla, & Fantin, 2015; Rosa, 2017) analyzed this new school reality and the problems present in the conduct of these projects and programs, such as the prohibition of the use of smartphones in the classroom, weaknesses and failures in devices and connections present in schools, as well as the potential of mobile technologies for authorial and innovative pedagogical practices.

8 Software is free when its source code is available to be studied, modified, and improved by society, and it is licensed in a way guarantees the four basic licenses: use, study, modify, and distribute (General Public License – GPL).

9 At the time, Rio Grande do Sul was governed by the Workers' Party (Partido dos Trabalhadores – PT), which brought professionals linked to free software movements to the area of information technology (IT).

10 More information available at: http://softwarelivre.org/asl

11 More information available at: https://pt.wikipedia.org/wiki/F%C3%B3rum_Internacional_Software_Livre

in 2003, the Brazilian federal government received some leaders of free software and free culture movements, which designed policies and projects for digital inclusion and for the development and incorporation of free software in the public sphere. Therefore, management and implementation of free software began with, for example, the creation of Telecenters (*Telecentros*) for the population to access the Internet; policies around free culture, carried out by the Ministry of Culture (*Ministério da Cultura* – MinC), such as the implementation of Culture Points (Turino, 2009); the Public Software Portal,[12] created by the Ministry of Planning (*Ministério do Planejamento* – MP),[13] among others. Also in this period, the Ministry of Education (*Ministério da Educação* – MEC) began to migrate from proprietary software to free software in schools. This did not take place without tension, since teachers were not trained to go beyond the instrumental dimension and understand the reasons that led to that migration and its implications for the Brazilian education (Bonilla, 2012, 2014). Difficulties in preparing and executing the call for proposals, associated with strong lobbying by technology companies and the discourse of device stores and the media, which disqualifies free and open solutions –, contributed to the weakening of the national free software policy and to the tensions triggered in schools.

Considering that a fundamental difference between proprietary software and free software lies in its development model – closed and hierarchical (proprietary software); open, collaborative, and decentralized (free software), according to Silveira (2018) –, the model adopted for the Brazilian Basic Education system was open licensing, with a concentrated development process, that is, free software with a proprietary hint. *Linux Educacional* (Educational Linux), for example, which was installed in the IT labs of schools, was developed by the Federal University of Paraná (*Universidade Federal do Paraná* – UFPR), the only institution that had the power to change its code. Therefore, the educational community contributed with suggestions and/or corrections, reporting

12 More information available at: https://www.gov.br/governodigital/pt-br/software-publico
13 The MinC and the MP were defuncted on January 1, 2019.

problems that were analyzed by the UFPR team in a centralized process.[14]

Later, when the One Laptop per Student (*Um Computador por Aluno* – UCA) project[15] was designed and carried out after an intense legal dispute, the winner of the public tender was the CCE/Digibrás/Metasys consortium, which supplied computers installed with the Metasys system. Although this system was based on the OpenSuse 10.1 distribution, the tests carried out showed that it did not have the attributes of free software (Bonilla, 2012; Rosa, 2017). It only allowed the use of the applications installed on it automatically, and it was not possible to install other programs or access the editing of repositories, which impaired other installations; also, the environment configuration options were very restricted.

The company that won the public call for proposals for the UCA project was Positivo, which offered the Positivo Mobo S7 computer with the Mandriva Mini software installed. Even though this software is licensed under the General Public License (GPL),[16] its development was left in the hands of Positivo, which made it impossible to incorporate the characteristics of an open development model.

Therefore, the logic used in these initiatives was "we produce, you use," which really limited the options of the educational community to study, participate, and develop technologies: teachers could aspire to be qualified users at most, executors of scripts authored by others, but they would never be the authors and producers of their own technologies, resources, and trajectories. Among the factors highlighted in choosing this model of incorporation of free software by MEC are: (i) the focus on cost reduction, with license fee exemptions, and not on building collaborative ecosystems for producing technology; and (ii) the conception of the need for a single model, a standard for the entire country, which maintains schools and

14 We noted that, on the Digital Government Public Software website (*Software Público do Governo Digital*), Linux Educacional is outdated and does not allow interaction: https://www.gov.br/governodigital/pt-br/software-publico; the same applies to the project's website on UFPR: it is outdated, which demonstrates its discontinuity: https://linuxeducacional.c3sl.ufpr.br

15 More information available at: https://www2.camara.leg.br/a-camara/estruturaadm/altosestudos/pdf/pdf-uca.pdf

16 More information available at: https://www.gnu.org/licenses

teachers as consumers of projects and technologies produced in a centralized manner and evenly distributed to all.

The central question is: how can the presence of technologies in education be promoted in a way that allows people to transcend the role of consumers towards critical citizenship?

Most Brazilian public Higher Education Institutions (HEI): Federal Institutes of Higher Education (*Institutos Federais de Ensino Superior* – IFES), Federal Institutes of Education, Science, and Technology (*Institutos Federais de Educação, Ciência e Tecnologia*s – IF) and other public HEI (both state and municipal) already used free software in their back end (Internet servers, e-mails, and information systems) because they are more stable and secure systems. However, the reality of desktops and office suites was quite different, due to the difficulties arising from the migration process; and although this process was being mapped and made available,[17] it was discontinued.

One of the free systems adopted by most public HEI was the Moodle virtual learning environment.[18] It was used to manage the teaching and learning processes of online courses, support on-site courses, and organize research groups and events. Among its features, there are synchronous and asynchronous communication resources and individual and collaborative production spaces; recently, web conferencing and gamification were added. Its advantage lies in the possibility of being installed for free on any server, as it works on all operating systems, and can be customized according to the profile of the institution and the objectives of each project. It has been developed collaboratively over time by a large, networked community that brings together programmers and developers of free software, system administrators, teachers, designers, and interactors from all over the world.

Since free systems, such as Moodle, are accessed on the Web (using a browser), they managed to break the barriers of negative discourse and prejudice against free software.

17 There is evidence of this occurrence since it is only possible to access the website of the mapping through its cache: http://web.archive.org/web/20180221165534/http://www.softwarelivre.gov.br/levantamento/levantamento/levantamento

18 More information available at: https://moodle.org/

Thus, educational communities began using them more naturally; many are even unaware of the fact that it is a free and open-source system. Therefore, a culture of Moodle usage was established in HEI. It became widely used in classrooms and distance courses over the last few years, especially now, with remote learning due to the pandemic, being adopted as an official Virtual Learning Environment (VLE) at most Brazilian public HEI, such as UFBA, UnB, and UFSC, among others. Due to the health emergency, many institutions offered training to use the system as the core environment for their courses.

This entire movement to deploy digital technologies in Basic and Tertiary Education, marked by advances, tensions, and setbacks, was important because it allowed the construction of knowledge and perceptions about the potential of these technologies for teaching practices and training processes. Today, the presence of current digital technologies in schools and universities, in their networked communication dimension, allows a change in broadcasting education systems and expands the possibilities of a more democratic education, based on collaborative and authorial practices.

However, the mere presence of these technologies in educational institutions, despite being a required condition, is not sufficient. Although access guarantees equal opportunities in communication, social practices, and cultural production that are mediated by technologies, it must be followed by conditions that enable critical and creative appropriation in order to have an active and activist participation in these contemporary contexts. As technology is not neutral – since it is value-laden –, nor autonomous – since it can be controlled by humans –, its integration into society needs to be understood in its various dimensions (Feenberg, 2002). In this sense, technologies are not tools, but structures for lifestyles, while, at the same time, available choices determine which values should be incorporated into the technical structure of our lives. Submitting these choices to democratic controls is a proposal that requires political willingness and action to regulate the institutions that hold the power to control the technologies in use by society, always aiming to meeting primarily the rights of the population, not the interests of the market.

By stating that this issue transcends access to infrastructure and includes forms of appropriation (whether instrumental or critical and creative), we highlight the need to promote policies for use and immersion in digital culture that are inspired by the democratic potential of technologies. The access that promotes an instrumental use of information and communication technologies (ICT) does not contribute much for promoting individuals as authors and protagonists, nor does it allow them to transcend the role of consumers who voluntarily conform to the current strategies of control and social dominance. Conversely, policies are made based on choices – in this case, the types of technologies, means, and their forms of integration in public educational spaces – that define scenarios and futures, either by what they allow and promote or by what they silence and naturalize. That is, uses and policies for use can either promote the updating and reproduction of forms of social control through technologies, or can present alternatives to subvert them, so as to allow the creation of new scenarios.

Therefore, it is important to protect these spaces against negative market influences that distance us from the objectives and goals of education as a human right, as provided for in the Brazilian Federal Constitution, which aims at "the full development of the person, their preparation to exercise their citizenship, and their qualification for work"[19] (Brasil, 1988, art. 205). This means that each person has the right to have the training and the tools to choose their own life projects, with education being a decisive factor for guaranteeing this right or not, and other human rights, which can promote education for citizenship (Lapa & Coelho, 2021).

Schools and universities are, therefore, the locus of socialization and citizenship, constituting privileged environments for insertion in the culture of communication in a digital context. The right to education and communication are universal and closely related. Thus, schools and universities are essential and the most suitable places to have digital technological infrastructure with high-quality connection, which provides young people with learning and interaction opportunities

19 "*ao pleno desenvolvimento da pessoa, seu preparo para o exercício da cidadania e sua qualificação para o trabalho*".

with communicational elements and processes of digital culture (Pretto, Lapa, & Coelho, 2021). They are privileged spaces to provide equal opportunities, experiences, skills, and knowledge that prepare people for full participation in the contemporary (also digital) world, so that they can perceive themselves as cultural producers and participants, and not mere consumers – whether critic or not. Thus, we highlight the important role of schools and universities for critical citizenship in digital culture.

DIGITAL DIVIDES IN THE COUNTRY

Despite the understanding that has been presented – education as a human right and the duty of the State to promote social justice through equal opportunities and training for citizenship –, Brazilian numbers are frightening. The data collected by surveys on the access to and use of information and communication technologies (ICT) carried out by the Regional Center for Studies on the Development of the Information Society (Cetic.br), a department of the Brazilian Network Information Center (NIC.br), which is linked to the Brazilian Internet Steering Committee (CGI.br), clearly demonstrate the profound digital divide in the country (CGI.br, 2020a, 2020b, 2021).

According to the ICT Households 2019 survey (CGI.br, 2020a), 47 million people in Brazil were unconnected just before the spread of the COVID-19 pandemic. The lack of connection was a reality in 48% of households in rural areas (against 25% in urban areas). Regarding children, data from the ICT Kids Online Brazil 2019 survey (CGI.br, 2020b) show that 89% of the Brazilian population 9 to 17 years old used the Internet, while 6% had not used it for more than three months, and other 5% had never accessed it. With the pandemic, this scenario was aggravated. The ICT Panel COVID-19 (CGI.br, 2021) showed that, among Internet users 16 years old or older in the lower socioeconomic classes who tried to request emergency aid (*Auxílio Emergencial*) from the Brazilian federal government, 22% claimed Internet limitation as a reason for not receiving it, 23% mentioned not having space on their mobile phone, and 28% stated not knowing how to use the application. Also, of those who attended school or university at that time, 82% had remote lessons or activities, with mobile phones being the main device used for this purpose, especially in the lower classes (54%).

So far, we have presented the scenario of growing inequality in Brazil, in order to understand the role of technologies and education in tackling it. Despite being a more democratic medium, which was born from collaborative initiatives and proposed a reorganization of powers in communication and society, on the Internet we see the same economic and ideological functions of the cultural industry (Duarte, 2016). In this context, we highlight once again the need for a critical perspective in defense of a technological non-determinism and the latent potential in the forms of appropriation that the subjects are able to engender when seeking to subvert the programmed logic in search of alternatives (Rose, 2003). Thus, we reaffirm the relevant role of education as a space for the empowerment of subjects for citizenship education. In this sense, it is necessary to first reflect upon the current reality of the advance of these private practices towards the public education and science system, and then present some perspectives of concrete possibilities for facing this reality.

THE PANDEMIC, PRIVATE PLATFORMS IN EDUCATION, AND THE NATURALIZATION OF THE (UN)AVOIDABLE

The current context brings more tension to the processes of insertion of technologies in education because the Internet – constituted from the occupation of cyberspace territories by a collaborative movement in favor of freedom of access, of the means, and also of socially produced knowledge – was gradually ceasing to be the space of open communication networks for everyone to become true walled gardens occupied by large market players, with their platforms and private technological solutions (Pretto, Lapa, & Coelho, 2021). These companies are supported by data collected from navigations of citizens, who think they are using a free service (Zuboff, 2019a, 2019b). These institutions have been part of the platform capitalism, which is understood as an economic system that organizes and is centered on "extracting and using a particular kind of raw material: data"[20] (Srnicek, 2018, p. 41). In this sense, platform capitalism and surveillance capitalism are combined and complement each other.

20 *"la extracción y uso de un tipo particular de materia prima: los datos"*

The isolation required to contain the dissemination of COVID-19 has further highlighted the limitation of instrumental approaches to technologies by recognizing that it is not a simple toolbox available to people with individual intentions. Technologies are pervasive and carry values that assume an increasingly active role. Thus, more autonomy at each level of innovation is delegated, for example, in the use of Artificial Intelligence techniques and strategies such as machine learning, which is evident in algorithms used in social networks. The allegedly free access to the Internet, which would expand democracy from the unfolding of the evolution of the Internet, was not materialized. Thus, at this moment, we see voluntary and, in some cases, coercive acceptance of the private control of public spaces, especially in the field of education, at all levels (Amiel, 2020).

During the COVID-19 pandemic, this phenomenon manifested itself in the dissemination of services offered "free of charge" to institutions and networks in the field of education by companies such as Google and Microsoft. There is a lot of uncertainty about what exactly these organizations bargain by offering high-cost and scaled up services free of charge. Based on the debate around surveillance capitalism and its business model, we have selected three aspects to reflect upon current problems and possibilities for overcoming them.

First, there is an interest, which is not recent, to present software and systems to students from an early age so that they get accustomed to their usage. In the words of Alexandre Campos, head of education at Google in Brazil: "One of the advantages of offering services to schools is to make the users loyal from an early age"[21] (Romani, 2019). This happens basically in two ways: when you create familiarity and fluency in using systems (as in operating systems), it becomes a habit; and mass storage of data in the "cloud" (such as e-mails, photos, media, and texts posted on social networks) and definitions that "tie" us to systems (such as creating an e-mail address that becomes a user identity on many other platforms). To illustrate the concept of loyalty, simply imagine how hard

21 "*Uma das vantagens de oferecer serviço para escolas é fidelizar o usuário desde cedo*".

it would be for most users of a @gmail.com address to migrate to another service, for example. Google's e-mail address is key not only for using messaging services, but also for accessing many of the company's services (Android mobile account, and platforms such as YouTube and Google Drive, for example), which generates the first step of loyalty. In addition to internal services, the mere change of e-mail address would impact dozens of services linked to the e-mail: as it is used as the access key to institutional accounts, it may become the access key for personal services (communication with banks, government services, etc.). Since the adoption of these systems was made, to a large extent, without consultation and discussion with the academic and school communities, loyalty becomes a form of coercion: how can a civil servant, a teacher or a student choose not to use an institutional system? If one of the goals of surveillance capitalism is to change and shape behavior (Zuboff, 2018), the accumulation of longitudinal data, over a childhood or a lifetime, is an instrument to achieve these goals.

Second, market consolidation leads the interaction with some systems of a company to cross data with information from other systems of the same company or even from third parties. In this case, we mention the example of Microsoft platforms, such as GitHub and LinkedIn, which also offer Microsoft 365 to educational institutions. For many users, the relationship between these systems is unclear, and there is no information as to whether data from these platforms (even if there is some attempt at anonymization) is somehow cross-referenced and used for commercial purposes or product improvement. Amitai Etzioni (2012) cautions against a "privacy violating triangulation," that is, the combination of apparently innocent data that may violate the privacy of users (for example, regarding the possible inferences made about a user who starts going to the pharmacy and stops checking her/his work e-mail). Due to the scale of these platforms and the umbrella of companies that make up these conglomerates (with activities in education, medicine, commerce, among others), it is very difficult for a user to "agree" with clarity with the terms of use, have knowledge regarding the future use of their data and the information that will be

generated from it. These issues become more pressing when we imagine that these data can be generated for years (even decades) if we look at students in basic education who use these "free" services.

Third, there is great concern with the technological infrastructure of institutions and networks, as we have limited their internal capacity, with a reduction in staff, knowledge, and autonomy, as essential services are migrated, such as storage, communication, and productivity to products and servers of large companies (Parra, Cruz, Amiel, & Machado, 2018). This third element constitutes the "cause and effect" of the adoption of these private commercial solutions, which seriously compromise their public dimension (Cruz & Venturini, 2020) because it occurs precisely due to the limited internal capacity of institutions that have suffered brutal budget cuts over the last few years. Thus, they enable these private solutions to enter institutions in a devastating way.

This phenomenon is also visible in the apparent lack of understanding of schools, networks, and institutions as co-responsible for student data and privacy, even when using company platforms (Lima, 2020). This same situation seems to occur in the offer by smaller companies that "donate" services in the form of applications used in education networks with very little clarity on the terms of use and user privacy (Audi & Zambarda, 2020).

This concern is not merely theoretical: the Education Under Surveillance Observatory (*Observatório Educação Vigiada*)[22] has been dedicated to mapping the partnerships between public HEI and state and municipal networks in cities with more than 500,000 inhabitants in Brazil, with two large companies associated with surveillance capitalism: Google and Microsoft, which effectively dominate the market. Data from August 2021 reveal that, from the servers mapped, approximately 66% host their e-mail services in those companies. The scenario is accentuated for state secretariats: 75% of servers are associated with the same companies; of the 43 state university servers, 37 (86%) are associated with Google or Microsoft.

22 More information available at: https://educacaovigiada.org.br/

Evgeny Morozov (2021) exposes that we have fragile structures that depend on private actors, and their interests are not always aligned with public interests. The debate that should have existed on digital infrastructures in the last 30 years never happened, that is, "technology and the digital space have never been properly submitted to political analysis [...] [and] this extremely apolitical way to talk about digitalization remains"[23] (Vega, 2021). For the author, the debate generally considers platforms as mere means of communication, ignoring that there is an economic policy linked to them and large investment funds that are not linked to the interests of society. Moreover, they standardize and control information organization systems for all societies, removing from the agenda this discussion that should precede the debate on doing a good job or paying for it. For Morozov (Vega, 2021), we are in a kind of Stockholm Syndrome, sympathizing with the terrorist who kidnapped us. Instead of discussing technology that will allow us to promote democracy, we limit ourselves to seeking the usefulness of tools such as Google, Facebook, and Twitter, despite their shortcomings.

THERE ARE ALTERNATIVES TO THIS DISPUTE

In this last section, we will present some ways and strategies for dealing with this issue. These are possibilities for action on several fronts: (i) dissemination of knowledge between the scientific and school communities; (ii) training for public managers and teachers; and (iii) investment in the development of science, technology, and innovation (STI). It is necessary to understand that these fronts need to be articulated so that the movement gains strength and confrontation becomes possible.

The dissemination of knowledge between the scientific and school communities will only be possible through broad discussion processes, in which the real and potential risks we run when we uncritically adopt packages produced outside the country and imposed on our social and cultural reality become clear. This debate needs to permeate not only aca-

23 *"a tecnologia e o espaço digital nunca se submeteram adequadamente à análise política [...] [e] se mantém esse modo extremamente apolítico de falar da digitalização"*.

demic and school spaces, but also the media, so that there is a wide dissemination of knowledge on the theme and pressure on the established powers to adopt public policies that meet the right of everyone to an open, plural, and safe education. The experience with the adoption of free software in schools in the past, without due discussion with the educational community, needs to be taken as a reference so that we can qualify our actions in the present; thus, it will be possible to confront in a qualified and critical way the advances in the market related to the Brazilian public education. Therefore, this qualified discussion is part of a broad training process of society in general and of educational agents in particular.

The training of managers and teachers, as proposed, is key, since they select and enable the technological options adopted in each educational institution or sphere of government responsible for national education. Since the first programs and projects involving technology and education, which in Brazil began in the 1970s, the importance of teacher professional development is clear (Almeida & Valente, 2016), whether initial or in-service. Strong, autonomous, critical, and creative teachers are able to make decisions and confront the model that seeks to subject them to bureaucratic decisions and/or decisions made in function of market lobbies.

Considering both aspects, these proposals aim at some results that confront surveillance capitalism in education. The training of actors allows at first that each of them can initiate a process to change their own practices. This is especially important for teachers and managers, who can influence what happens in their schools and, particularly, in their classrooms, either by using different platforms or through opportunities for debate and discussion on this topic with the school community. Furthermore, knowledge on this topic, on a large scale, allows us to envision collective actions and effective public pressure around it, which still lacks due prominence in the field of education.

Understanding the objectives and purposes of education, as well as the interests of groups that use it to make their projects feasible in a democratic society, is the duty of all those who work in this sector. This understanding is enabled with broad, strong, and permanent training processes, which

involve the analysis of the economic, philosophical, political, and cultural dimensions, and the knowledge and power relations underlying each model or technological project that may be adopted.

Over the years, some research (Pretto, 2011; Pretto, Bonilla, & Sena, 2020) showed that fragmented and instrumental public policies for training teachers and managers are not sufficient for proposing structuring pedagogical practices and for the autonomy and authorship of teachers. Therefore, we need to advance in the understanding that decisions around projects and the adoption of technologies are also political and lead to several consequences. Projects such as Choose Free (*Escolha Livre*),[24] developed by the Open Education Initiative (*Iniciativa Educação Aberta*) (UnB), with the support of the Brazilian office of the United Nations Educational, Scientific and Cultural Organization (UNESCO), follow this direction.

With regard to investment in the development of science, technology, and innovation, national universities and research institutes have a significant accumulation of knowledge in the technological field, with creative and significant experiences, and collaborative development projects, in networks such as the innovative Brazilian Digital TV System (*Sistema Brasileiro de TV Digital* – SBTVD).[25] It is also important to highlight the initiatives of the National Education and Research Network (*Rede Nacional de Ensino e Pesquisa* – RNP), in partnership with Federal Universities, for the development of solutions for web conferencing (*Conferência Web RNP*), streaming, video hosting (Eduplay), and customization, hosting, and support for Moodle. In particular, we highlight the case of the RNP Web Conference (*Conferência*

24 The website offers training materials, references, and concrete recommendations for changes and spaces for experimentation, as well as software tutorials and testimonies from educators and managers of Basic and Tertiary Education on how they adopt, use, and promote the use of free platforms and open educational resources in education, contrasting the discourse of large commercial and private platforms as the only viable alternative. More information available at: https://escolhalivre.org.br/

25 Established through the Decree 4901 (Brasil, 2003) in the first year of the Luiz Inácio Lula da Silva administration, the project involved 79 research institutions, organized in 22 consortia, for the development of national technology, operating with free software. The Ginga solution for the system's interactivity was developed as the result of research carried out by two groups: the Pontifical Catholic University of Rio de Janeiro (*Pontifícia Universidade Católica do Rio de Janeiro* – PUC-Rio) and the Federal University of Paraíba (Universidade Federal da Paraíba – UFPB).

Web RNP) system, whose development trajectory can be an inspiration for other projects that were effectively created through public policies (Box 1).

In the particular case of the RNP Web Conference system, it is important to briefly review the development process of this solution, up to the present day, as its history serves as an inspiration for other projects that were effectively created through public policies.

BOX 1 – THE RNP WEB CONFERENCE SYSTEM

Since 2002, RNP has opened annual calls for proposals for creating working groups aimed at developing network projects, including applications, services, and products.[26] In 2010, a group of researchers linked to the Audio and Video Projects Laboratory (*Laboratório de Projetos em Áudio e Vídeo* – PRAV) of the Computing Institute of the Federal University of Rio Grande do Sul (*Universidade Federal do Rio Grande do Sul* – UFRGS), led by Professor Valter Roesler, began to study the open and free alternatives available aiming to meet the demand for videoconference posed by RNP. The result was BigBlueButton (BBB), which was developed in 2007 at Carleton University (Ottawa, Canada).[27] Although this solution has been implemented and is widely used by the academic community, it lacks public investment to scale up and serve the entire education sector, constituting an alternative with equal or superior quality to the solutions provided by the market.

Between April and May 2020, due to the pandemic, the use of the RNP Web Conference platform grew 982%;[28] for its capacity to be increased (based on the expansion of service to all 69 Federal Universities, 38 Federal Institutes, 2 Federal Technological Education Centers (*Centro Federal de Educação Tecnológica* – CEFET), and the Federal Technological University of Paraná (*Universidade Tecnológica Federal do Paraná* – UTFPR), the 22 technical schools linked to the Federal Universities and to the Pedro II School (*Colégio Pedro II*), the system needs to expand and be enhanced. Thus, immediate investment by the Brazilian federal government is required to meet the increase in demand.

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26 More information available at: https://www.rnp.br/inovacao/editais

27 The group, which was renamed Mconf, improved the system based on a relationship with BBB, acting in a cooperative and collaborative way. The project evolved and generated two strands: a commercial one, with the original MConf turned into today's Elos.vc that offers the solution (in free software), upon contracting a service; and a public strand, with the system supported by RNP to be the web conferencing solution for educational and research institutions.

28 More information available at: https://www.rnp.br/noticias/conferencia-web-do-edital-de-pd-servico-de-sucesso

Evidently, the invasion of the market in education is not due to the national inability to develop science, technology, and innovation, including the development of the market around free software. In fact, it is a political decision made by governments in line with market interests, which cuts funds for the public sector, suspends projects under development, and opens the doors to some actors in the private sector, mainly foreign multinational companies, in order to present their technological solutions as the only alternative for the continuation of educational activities, especially in the context of the pandemic.

Therefore, given the omission of the Federal Government, the institutions had nothing to do but to accept and incorporate what was offered "free of charge" by the market. Teachers, managers, students, parents, and legal guardians were left with only the role of "users" and "adopters" – as pointed out, it is still a form of coercion. Therefore, the lack of investment in the IT of the educational and scientific sectors, associated with an "almost" lack of politicization of this debate, as emphasized by Evgney Morozov (Vega, 2021), opened space for IT companies, which characterize platform capitalism (Srnicek, 2018), to tap the education (and science) systems – a phenomenon that can be identified as a new form of colonization of the Brazilian public education, which is intensified in this pandemic context.

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CONCLUSIONS

Moving forward: Education for the most marginalized post-COVID-19

Guidance for governments on the use of digital technologies in education[1]

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1 This text is an edited version of the executive summary of the report "Education for the most marginalized post-COVID-19: Guidance for governments on the use of digital technologies in education" available at: https://edtechhub.org/education-for-the-most-marginalised-post-covid-19/

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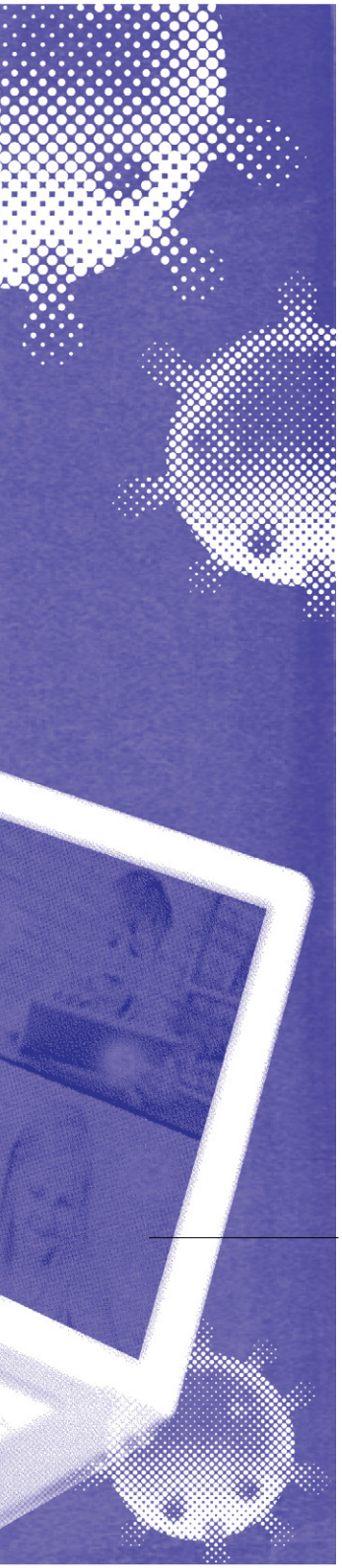


The COVID-19 pandemic has shown the huge potential of digital technologies, both hardware (including desktop and laptop computers, tablets, mobile phones, radios, and TV) and software (including applications, learning management systems, administrative systems, networks, platforms, content, and data analytics) to be used to support the delivery of better and more extensive education and learning. However, that context has also served as a stark reminder that all technologies can be used to create both positive and negative impacts, and that one of the main effects of the pandemic has been to increase educational inequalities at all scales.

This chapter provides recommendations to governments in light of the COVID-19 pandemic about how to use digital technologies to deliver better quality and more resilient education systems that enable everyone to have access to equitable learning opportunities. It highlights that governments need to put in place a holistic vision and commitment to the resilient transformation of education and learning that focuses especially on the most marginalized (Unwin et al., 2020). Unless this is in place, education systems will be made more unequal with the use of digital technologies, and the poorest and most marginalized will become ever more marginalized.

The recommendations provided in this chapter are drawn from a report[9] developed by the UNESCO Chair in ICT for Development[10] with support from the EdTech Hub.[11] The report was prepared by people from different countries in a consultative and collaborative way between June and September 2020 and involved a core team of seven people, supported by a board of eight advisors, including senior government and donor officials. This work entailed an innovative consulta-

9 The full report contains three separate documents (Acts), each of which can be read and used independently. Act One is intended primarily for the most senior government officials and contains a summary of the report's approach and main recommendations. Act Two provides the detailed exposition, arguments, and evidence upon which these recommendations are based, and is intended primarily for those in government who are charged with implementing them. Act Three contains 14 Guidance Notes which provide succinct advice on delivering important distinct aspects of the overall report (Unwin et al., 2020).

10 More information available at: https://ict4d.org.uk/

11 More information available at: https://edtechhub.org/about-edtech-hub/

tive process that included 87 people (43 women and 44 men) from 34 countries and comprised of online consensus decision-making exercises. The objective was to identify the five most important areas governments need to act on when using digital technologies in education systems designed to include the poorest and most marginalized. All the draft materials were shared publicly online (UNESCO Chair in ICT4D, 2020) so that people could provide further recommendations and advice which were used to improve the report.

BOX 1 – MARGINALIZATION AS A PROCESS

Marginalization is considered as the process through which people are excluded from access to resources and opportunities. One of the most profound and important ways through which this is maintained takes place through uneven access to and participation in education systems. Using digital technologies to support the poorest and most marginalized is therefore of critical importance in shaping fairer societies and more productive economies. The most excluded are those who remain completely unseen and unheard. However, there are seven groups of people who have been increasingly recognized by the United Nations (UN) and other organizations as being particularly susceptible to processes of marginalization, and for whom specific and focused educational actions making use of digital technologies should be taken: (i) out-of-school youth; (ii) persons with disabilities; (iii) girls and women; (iv) refugees and displaced persons; (v) ethnic minorities and indigenous peoples; (vi) persons living in isolated areas; and (vii) persons in informal or irregular employment.

The recommendations presented in this chapter have been written primarily for senior government officials who have already taken the first steps towards creating fairer and better education systems in their countries and who want to use digital technologies effectively and appropriately to deliver that vision under the new conditions prevailing as a result of the COVID-19 pandemic. The present text is driven fundamentally by a commitment to equity and inclusion within education systems, and consciously builds on the foundations of existing UN policies and advice such as those included in the Incheon Declaration (UNESCO, 2015).

A HOLISTIC VISION AND COMMITMENT TO THE RESILIENT TRANSFORMATION OF EDUCATION AND LEARNING FOR THE MOST MARGINALIZED

Creating a digitally informed, resilient education system requires a whole-of-government approach that involves many other ministries, and not the Ministry of Education alone. It must also begin with a profound commitment to the inclusion of the poorest and most marginalized; then, digital technologies must be used in ways that serve the needs and interests of that part of the population, and not just those of the rich and privileged. Three key practical actions are necessary for this to be achieved:

- **Crafting leadership and continuity**

Heads of State should put in place an experienced senior leadership team to deliver the required educational transformation. In democracies, this should be based on cross-party five- to ten-year commitments to use digital technologies appropriately to deliver inclusive education. These require not only absolute adherence to the principle of equity but must also be sufficiently flexible to adapt to new circumstances (such as the pandemic) and new technological developments.

- **Putting in place a holistic, cross-government approach**

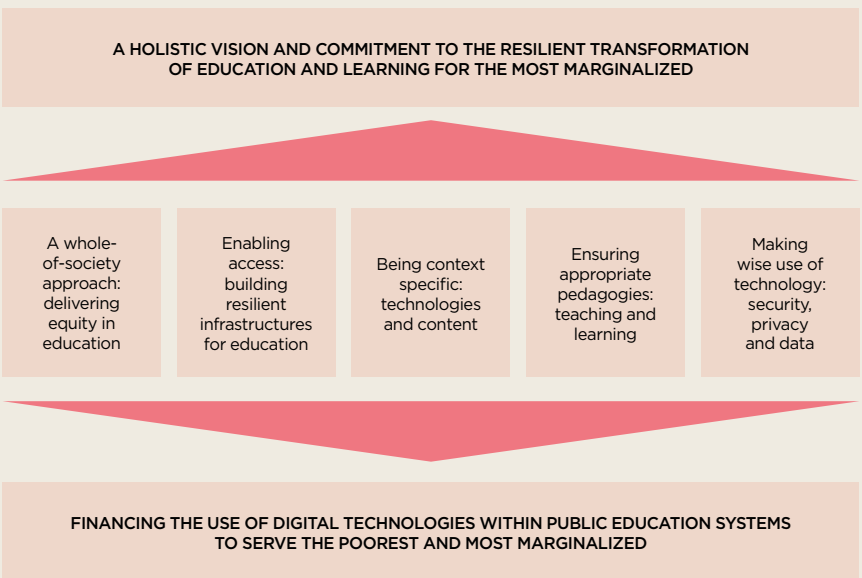
It is essential for government leaders, ministries, and departments from different areas to work collaboratively to develop and implement a cohesive strategy that aims to deliver effective learning for the most marginalized through the use of digital technologies. At the very least, Ministries of Education, Finance, Information and Communication Technologies (ICT)/Telecommunications, Infrastructure, Labor, Planning, Internal Affairs/Security and Health/Welfare should be involved, alongside ICT/Telecommunications and media regulators. This is an essential action, especially so that coherent, joint policies can be developed to provide an integrated approach for infrastructure to be funded centrally, which is particularly crucial in low-resource contexts.

- **Engaging all of society through effective partnerships**

Governments need to lead the process of systemic educational transformation, but also should put in place clear mechanisms through which all sectors of society own and support it. Although such mechanisms will vary depending on national contexts and political systems, they need to involve, at least, both private sector companies and civil society organizations. The private sector should be valued primarily for its understanding of the technologies, its management expertise, and its focus on sustainability, rather than merely as a vehicle for providing additional funding or technological resources for education systems.

Once the leadership and commitment are in place, governments need to focus on five inter-related areas to deliver their strategies and implementation processes (Figure 1).

FIGURE 1 – FRAMEWORK FOR DELIVERING RESILIENT EDUCATION SYSTEMS THAT USE DIGITAL TECHNOLOGIES TO ENHANCE THE LEARNING EXPERIENCES OF THE MOST MARGINALIZED



SOURCE: ADAPTED FROM UNESCO CHAIR IN ICT4D (2020).

A WHOLE-OF-SOCIETY APPROACH: DELIVERING EQUITY IN EDUCATION

Ensuring that education systems are equitable implies that resources are allocated disproportionately to those who have most need of them. Put simply, it usually costs more to educate the poorest and most marginalized, and additional resources therefore often need to be allocated to such purpose. Crafting a whole-of-society approach to making this type of education happen is not only a means of sharing resources more efficiently, but it also enhances a stronger sense of community and greater realization of the need for continuous learning throughout the lifecycle. As a starting point, to deliver equity in the use of digital technologies in education means beginning where it is most difficult.

In this sense, pilot projects should not be done where they are easiest to do and are most likely to succeed, but instead with and amongst the poorest and most marginalized, where the circumstances are most challenging, and where most innovation and creativity is required to make them succeed.

- **Involving families, learners, and communities in the education system**

One of the key impacts of COVID-19 has been the realization that families and communities have a crucial role to play in education, especially in circumstances where access to schools is not possible, be it because of a pandemic or natural disasters like earthquakes or tsunamis. Thus, governments therefore need to put in place mechanisms to involve and support parents, grandparents, and other community leaders in helping to deliver effective education to young learners, since those actions are especially significant in supporting out-of-school children and youth. It is also important for governments to put in place formal and informal mechanisms through which learners' voices can be heard and listened to when crafting the content and practices involved in education.

- **Ensuring effective learning for employment**

Rapidly changing societies and economies require flexible approaches to delivering learning that is lifelong (throughout the life cycle) and lifewide (involving real contexts and set-

tings). Much of the traditional vocational training has been insufficiently effective in supporting the needs of employers and in enabling employees to get a fulfilling job. Governments therefore need to establish and support new and relevant systems of training using appropriate digital technologies so as to ensure that everyone has the skills and expertise to find gainful employment.

- **Creating learning environments that promote wellness and well-being**

The consultations upon which this chapter is based highlighted the increased mental stress caused by lockdown and domestic pressures in countries across the world and in circumstances where parents – especially when living in confined and enclosed spaces – had to work while supporting their children's learning. It is therefore important for governments to build on the positive lessons learnt from COVID-19 about how digital technologies can indeed be used to support wellness (referring to physical health) and well-being (the holistic experience of feeling well and content) in the context of education rather than simply allowing education systems to revert to an "old normal."

ENABLING ACCESS: BUILDING RESILIENT INFRASTRUCTURES FOR EDUCATION

Funding national infrastructure initiatives including school connectivity and power supply should never be a cost placed purely on Ministries of Education that are already overstretched in paying teacher salaries. Rather, they must be a shared responsibility across the entire government, according to the holistic approach advocated above.

Nevertheless, it is impossible for learners to benefit fully from many of the latest digital technologies unless connectivity and electricity are available. Moreover, much can be done by appropriate use of old technologies (such as radio and TV). Thus, it is essential for governments to consider what technologies they should best use to ensure that everyone can have access to basic learning opportunities. For those for whom digital technologies are not feasible, governments need to continue to make alternative resources available (often paper-based).

These recommendations should be read alongside those pertaining to financing below.

- **Ensuring appropriate and resilient connectivity**

Resilience is the ability of education systems to continue or resume operations when schools close due to unforeseen circumstances such as the COVID-19 pandemic. Governments with a high level of resilience act and rebuild quicker than those with fragile systems. Governments need to address four specific issues to ensure resilience: (i) uninterrupted flow of electricity and Internet connectivity; (ii) alternative ways to deliver distance education (for example, radio, TV, online learning, mobile phones); (iii) continued instructional and technical teacher support; and (iv) creating safe and convenient learning environments.

- **Resolving the challenges in providing access for the most marginalized**

Lack of access to digital technologies further marginalizes those most marginalized. Hence, governments need to resolve the following main challenges: access to electricity, access to affordable Internet, access to devices, low levels of digital literacy, lack of local content, concerns around safety and security, and social norms.[12] Where digital technologies are unavailable, alternative (often paper-based) resources and content must continue to be provided.

- **Providing infrastructure for lifelong and life wide learning**

Governments need to ensure that they put in place flexible systems that can be adapted and enhanced so that learning provision may readily be continually improved. This can often be achieved by adhering to open standards and using Free and Open-Source Software (FOSS). It is also important that regulatory systems are designed to serve the interests of learners as much as of those who supply digital technologies and content.

12 Acts Two and Three of the full report provide detailed examples and advice on how this can be achieved (Unwin et al., 2020).

BEING CONTEXT SPECIFIC: TECHNOLOGIES AND CONTENT

There is no one-size-fits-all, universal digital solution that will deliver appropriate global education for everyone. Governments must understand that context matters and should resist initiatives by companies determined to offer a single "best" solution. Instead, they should draw on the many good examples highlighted in Act Two and Act Three of the full report (Unwin et al., 2020), to craft the most appropriate uses of relevant digital technologies for their own social, cultural, political, and economic context.

- **Being technology agnostic: balancing older and future technologies**

Governments need to ensure that the appropriate technologies are used to deliver the optimal services in any specific context. To this end, it is important for governments to be technology agnostic, meaning that they should not place all their investments into one specific kind or model of technology, but instead set educational objectives and then explore ways of providing the optimal technological solutions in different contexts. This applies as much to the networks used to provide content and instruction as it does to the devices used to access that content.

- **Supporting the design of a relevant curriculum**

The curriculum must be appropriate for the learning needs of children, youths, and adults in a world that is becoming increasingly dominated by digital technologies, and governments must at the same time also recognize the potential that these new technologies have for enhancing the effective delivery of a national curriculum. Specifically, it is essential that any legislated education policy and curriculum is designed to be relevant for the needs of each country and should especially serve the interests of the poorest and most marginalized.

- **Ensuring content is relevant and appropriate**

Governments must have national strategies established for the delivery of high quality, localized and, above all, relevant digital content that can enable teacher-facilitators and learn-

ers to access materials in support of the curriculum. In contexts where digital technologies are unlikely to be used in the short- to medium-term, it is also incumbent on governments to have in place alternative mechanisms, often paper-based, for learners to access content. Governments should always consider the benefits of making all publicly funded content available freely, especially as open content through Creative Commons licenses.[13]

ENSURING APPROPRIATE PEDAGOGIES: THE PRACTICES OF TEACHING AND LEARNING

One of the overwhelming outcomes of the COVID-19 pandemic has been the realization that teachers really do matter. This awareness has presented a good opportunity for education systems to be redesigned so that they place excellence in teaching at their heart. To achieve this objective, the highest priority must be placed on relevant in-service and pre-service teacher training. This should focus on enabling all teachers and learning facilitators to use digital technologies to enhance their own learning and thereby improve the quality of their teaching so that all students have better learning outcomes.

- **Empowering teachers, trainers, and learning facilitators**

The single most important thing that governments can do is ensure that teachers, trainers, and learning facilitators are appropriately and rigorously trained in the effective use of digital technologies. This is not just about teaching them "office" or "digital" skills, but rather ensuring that they all have the ability to use a diversity of technologies to support learners in their varying needs.

- **Ensuring that appropriate pedagogies are in place**

The surge of information available online over the last decade has rendered it impossible for teachers to be considered as the source of all knowledge. Changing theories and teaching practices are closely related to such externalities; therefore,

13 More information available at: https://creativecommons.org/

it is essential for governments to ensure that the pedagogies in use in their countries are fit for the intended purpose. This will often mean the replacement of traditional didactic modes with more constructivist or constructionist pedagogies.

- **Using relevant assessments**

Teaching and assessment go hand in hand. It is important to have appropriate mechanisms in place so that learners and employers can have a shared understanding of the skills and competencies that students have acquired. Digital technologies offer many strengths and opportunities for enhanced formative and summative assessments, which should feature highly in government educational agendas. Nevertheless, governments must also ensure that these assessments are indeed relevant to their country's needs.

USING TECHNOLOGY WISELY: SECURITY, PRIVACY, AND DATA

COVID-19 has illustrated very clearly how increased levels of digital connectivity and use during the pandemic have translated into increases in harms. This context has also highlighted difficult issues surrounding privacy and the use, or abuse, of personal data. Therefore, governments must ensure that the potential harms of using digital technologies in education and learning are mitigated, so that their benefits can be safely and fully achieved, especially by the most vulnerable populations.

- **Ensuring the safety of everyone involved in education and learning**

Governments must prioritize the safe use (in the broadest sense, including harmful content, health-related issues, and data loss) of digital technologies as an integral part of all learning and training programs for children, youth, and adults alike. This requires comprehensive legislation, enforcement of that legislation, and widespread training and support for learners and teachers alike.

- **Making systems secure**

It is essential to protect individual data and prevent education digital system disruption. Governments should therefore

ensure that clear guidance is given to heads and administrators throughout the system, from ministries to schools and community learning centers, and that breaches are treated with the utmost seriousness.

- **Caring about privacy and data**

Governments should create mechanisms for citizens to have open and sustained discussions with them about digital privacy in general, and specifically within the educational context. The marginalized are already by definition less fortunate than are most others within any society, and the dangers of any further loss of privacy for them are likely to marginalize and harm them even further. In general, governments should tend towards the precautionary principle in managing educational data.

FINANCING THE USE OF DIGITAL TECHNOLOGIES WITHIN PUBLIC EDUCATION SYSTEMS TO SERVE THE POOREST AND MOST MARGINALIZED

The delivery and funding of digital technologies within national public education systems should be planned for and implemented through integrated holistic cross-government policies. Thus, it should not be merely the responsibility of Ministries of Education, which should not, for example, be required to cover the costs of providing connectivity and electricity to all learning establishments. Instead, these actions should be undertaken by a holistic cross-government program for delivering wide-ranging services to communities. Eight basic recommendations that governments should adopt in funding are:

(i) Funding should be based on the principle of equity, so that additional funding is made available to those most in need.
(ii) Holistic cross-government approaches are essential.
(iii) The State has the main responsibility of funding public education; however, when used effectively and appropriately, donors, the private sector, households, and civil society can also contribute to funding.
(iv) All funding models must be based on the lifetime total cost of ownership of an initiative and include both capital expenditures (CAPEX) and operating expenses (OPEX), which is especially important when funding the use of digital technologies.

(v) Multi-sector partnerships can offer significant benefits, but only if undertaken appropriately and effectively.
(vi) Initiatives should be designed at scale, even if they are only started with pilot projects; nothing will "go to scale" unless it is "designed at scale".
(vii) All government policies relating to the use of digital technologies in education should be based on the principle of technology neutrality.
(viii) In general, public-sector education should be free to end users, especially so for the poorest and most marginalized.

FINAL REMARKS

There is no one-size-fits-all way in which governments should promote and implement initiatives that use digital technologies to improve the learning outcomes of the most marginalized. Notwithstanding, they always need to take into consideration their local contexts and priorities. In very general terms, the following order of initial priorities and actions is often appropriate:

(i) Creating a long-term cross-party vision for ensuring that digital technologies are used to enhance learning by the poorest and most marginalized.
(ii) Establishing an integrated and holistic cross-government team to deliver that vision.
(iii) Beginning by ensuring that all teacher training colleges have the most affordable high-quality digital infrastructures as possible; additionally, pre-service and in-service training programs need to be implemented to ensure that teachers are trained in appropriate and relevant pedagogies.
(iv) Prioritizing the specific educational challenges for which digital technologies can have the most significant impact for the most marginalized in your country. This could, for example, be high numbers of refugees, very dispersed island communities, or numerous minority ethnic groups for whom learning content in their main language is inappropriate.
(v) Identifying and implementing technology-relevant approaches (in terms of what is both feasible and af-

fordable) to resolve these challenges, keeping in mind that low-tech options (such as radio or TV) and Open Educational Resources can often deliver very cost-effective and resilient options, and that multi-sector partnerships with the private sector and civil society can be valuable in ensuring appropriateness and sustainability.

(vi) At all times ensuring that security, safety, and privacy are the highest priority when using digital technology for delivering education and training, especially for children and vulnerable adults.

The precise order in which the more detailed recommendations are implemented will depend heavily on the character of the existing educational systems, the political will, the levels of funding available, the extent of infrastructural provision (such as school buildings, libraries, electricity, and Internet connectivity), and the geographical size and complexity of the country.

Finally, two basic principles about what not to do also often seem to be forgotten, and should always be remembered:

(i) Do not put digital technologies into schools without sufficient teachers first being trained in how to use them effectively to enhance learning outcomes.

(ii) Pilot projects using digital technologies for education should not be done where they are easiest to do and are most likely to succeed, but instead with and amongst the poorest and most marginalized, where the circumstances are most challenging and where most innovation and creativity is required to make them succeed.

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